FINAL REPORT
REMEDIAL INVESTIGATION
SOUTH CAVALCADE SITE
HOUSTON, TEXAS

VOLUME 3 - APPENDICES

007186

PREPARED
FOR

KOPPERS

KOPPERS COMPANY, INC.
PITTSBURGH, PENNSYLVANIA

SUBMITTED TO:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
DALLAS, TEXAS

BY

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

MONROEVILLE, PENNSYLVANIA
JULY 1988

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APPENDIX A

GEOTECHNICAL SOIL TEST RESULTS

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APPENDIX A
GEOTECHNICAL SOIL TEST RESULTS

1.0 Permeability Testing

Currently there is not an accepted ASTM test procedure for cohesive soil permeability testing. A total of 12 constant head permeability test were performed using a triaxial cell apparatus with a flexible wall membrane to reduce side flow potential. The samples were isotropically consolidated at confining pressures of 10 psi and tested at a constant head of 4 psi (about 9.2 ft of water). The head pressure is generally equivalent to a gradient of about 30.

A solution of 0.01N $CaSO_4$ was used as the permeant to roughly correspond to the natural salt content of the soils and reduce potential clay chemistry changes associated with using distilled water. The samples were back-pressure saturated prior to conducting permeability measurements. The permeability tests were conducted over a period of about 1 to 2 weeks. The sample permeability value was calculated by averaging the daily readings. Results of the permeability tests are shown on Table A-1.

TABLE A-1
SUMMARY OF LABORATORY PERMEABILITY TEST RESULTS

Sample No.	USCS Classification	Depth (ft)	Geologic Unit	Plasticity Index	Average Coefficient Vertical Hydraulic Conductivity @ 20°C (cm/sec)
A16-SB02-24	CH	56-58	3	43	7.3×10^{-9}
A16-SB01-28	CH	65-67	3	37	2.9×10^{-9}
A16-SB01-18	CH	45-47	2	36	4.3×10^{-9}
A14-SB03-19	CL	41.5-42.5	2	14	1.5×10^{-7}
A14-SB03-27	CH	57-58	3	56	3.2×10^{-9}
A14-SB03-31	CL	57.5-58.5	3	27	3.3×10^{-9}
A04-SB07-09	CH	28-29	2	47	2.1×10^{-9}
A04-SB07-26	CH	63-63.5	3	47	2.0×10^{-9}
A04-SB02-11	CH	28-30	2	45	1.7×10^{-9}
A04-SB02-26	CH	56-58	3	48	2.3×10^{-9}
A04-SB01-23	CH	53-55	3		3.2×10^{-9}
A04-SB01-09	CL	23-27	2		4.8×10^{-9}

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2.0 Plasticity Index

A total of 10 plasticity index tests were performed following ASTM test procedure D 4318-84 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils. Tests were performed in duplicate to confirm test results. Plasticity index test results are presented on Table A-1.

3.0 Grain-Size Distribution

A total of 9 grain-size distribution tests were performed following ASTM test procedure D 422-63(1972) - Method for Particle-Size Analysis of Soils. Samples analyzed were obtained from piezometers and monitoring wells installed during the Remedial Investigation. Grain-size distribution curves are shown on Figures A-1 through A-6.

4.0 Summary

Geotechnical soil test were performed on select samples during the soil boring program. Testing performed included permeability test, plasticity index test, and grain-size distribution test. Measured laboratory hydraulic conductivity results were generally less than $1x10^{-7}$ cm/sec. One sample (A14-SB03-19) was reported with a hydraulic conductivity slightly above $1x10^{-7}$ cm/sec with a corresponding plasticity index of 14 indicating the presence of granular soils, such as sand seams and silt partings.

5.0 References

American Society for Testing and Materials (ASTM), Soil and Rock; Building Stones, Vol. 04.08, 1986.

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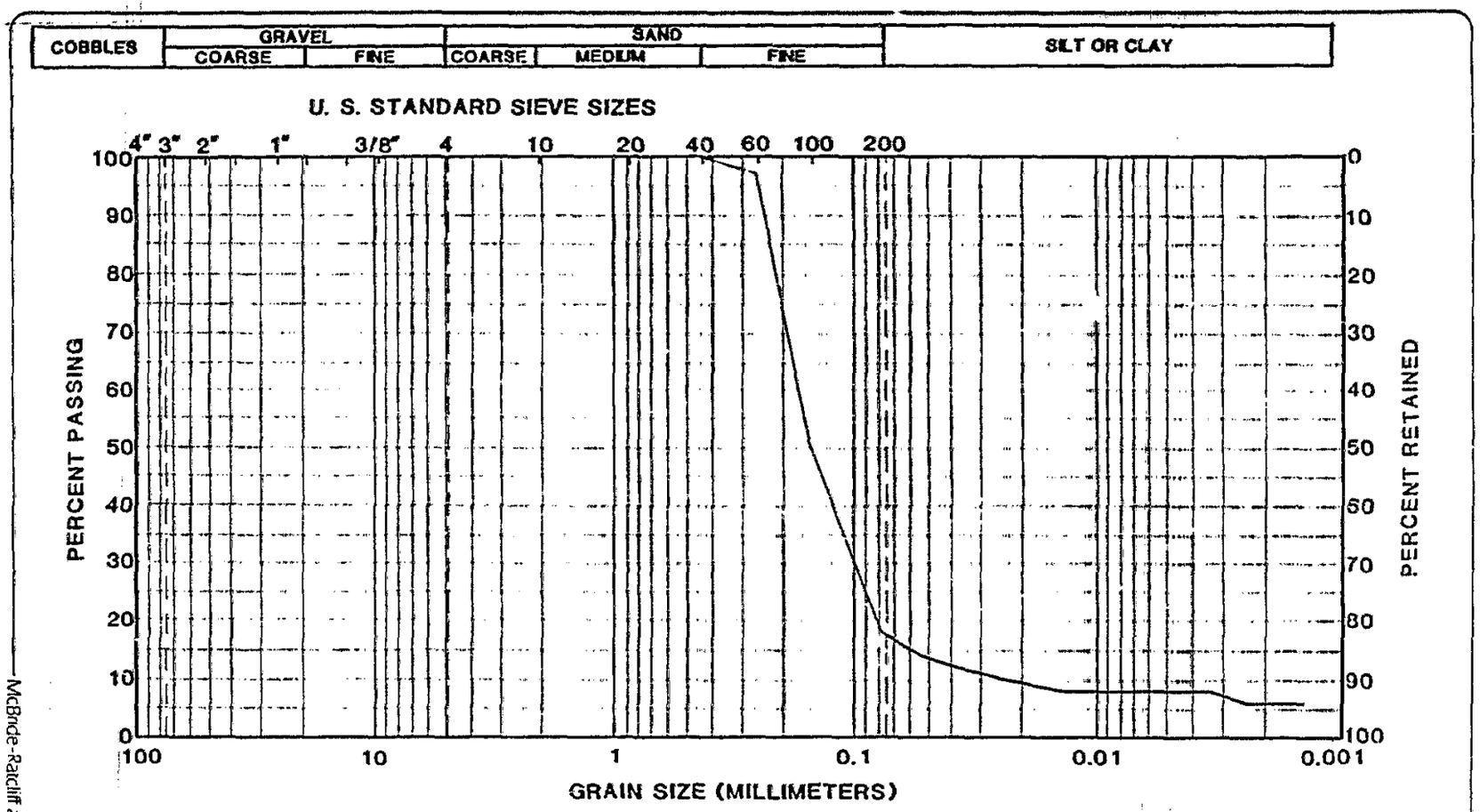


BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
MW01	12	SA	——

GRAIN SIZE DISTRIBUTION

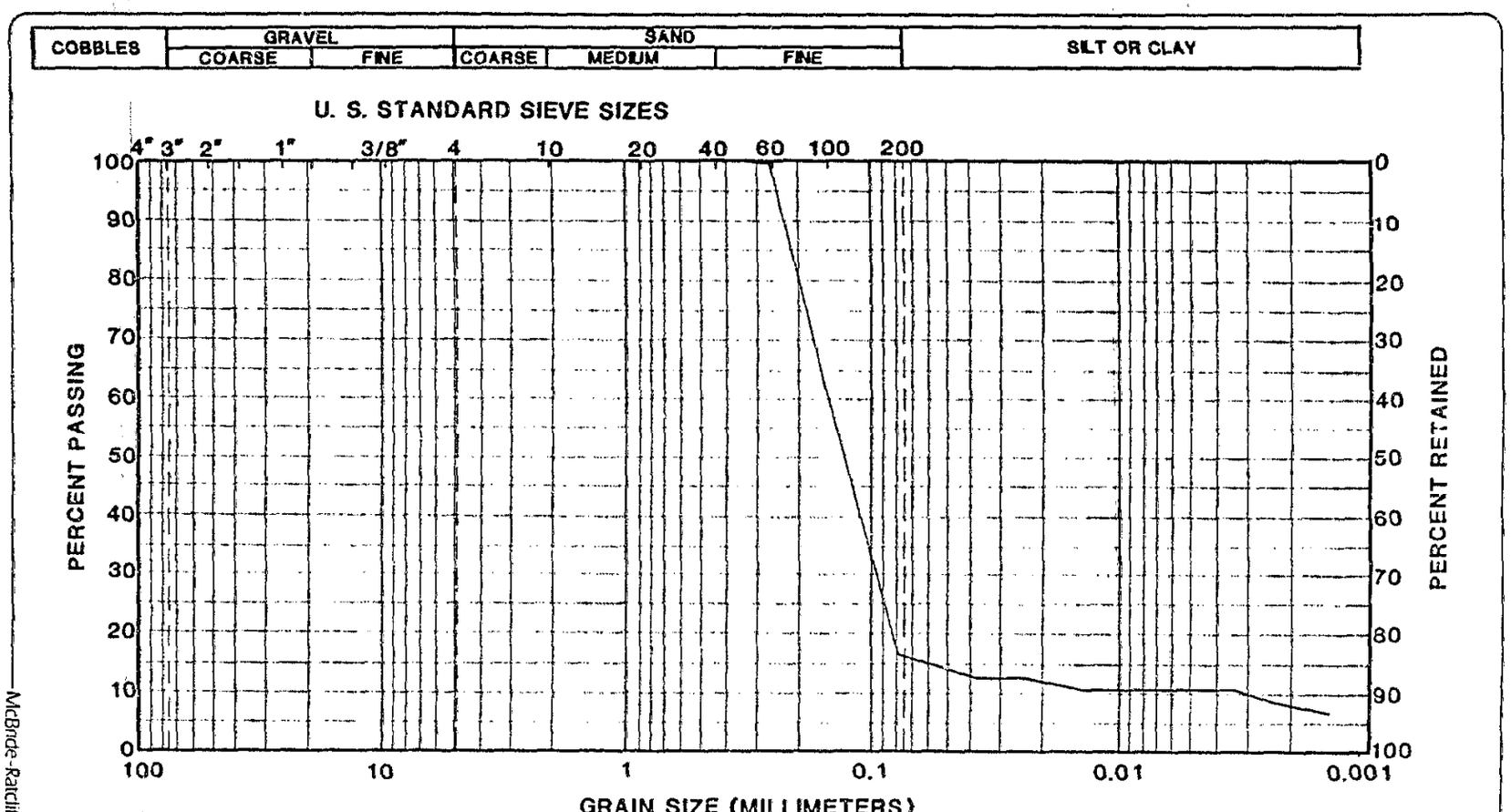
(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: A-1
DATE: 7-31-87

McBride-Ratcliff and Associates, Inc.

A-3

007193



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
MW02	12	Sa	———

GRAIN SIZE DISTRIBUTION

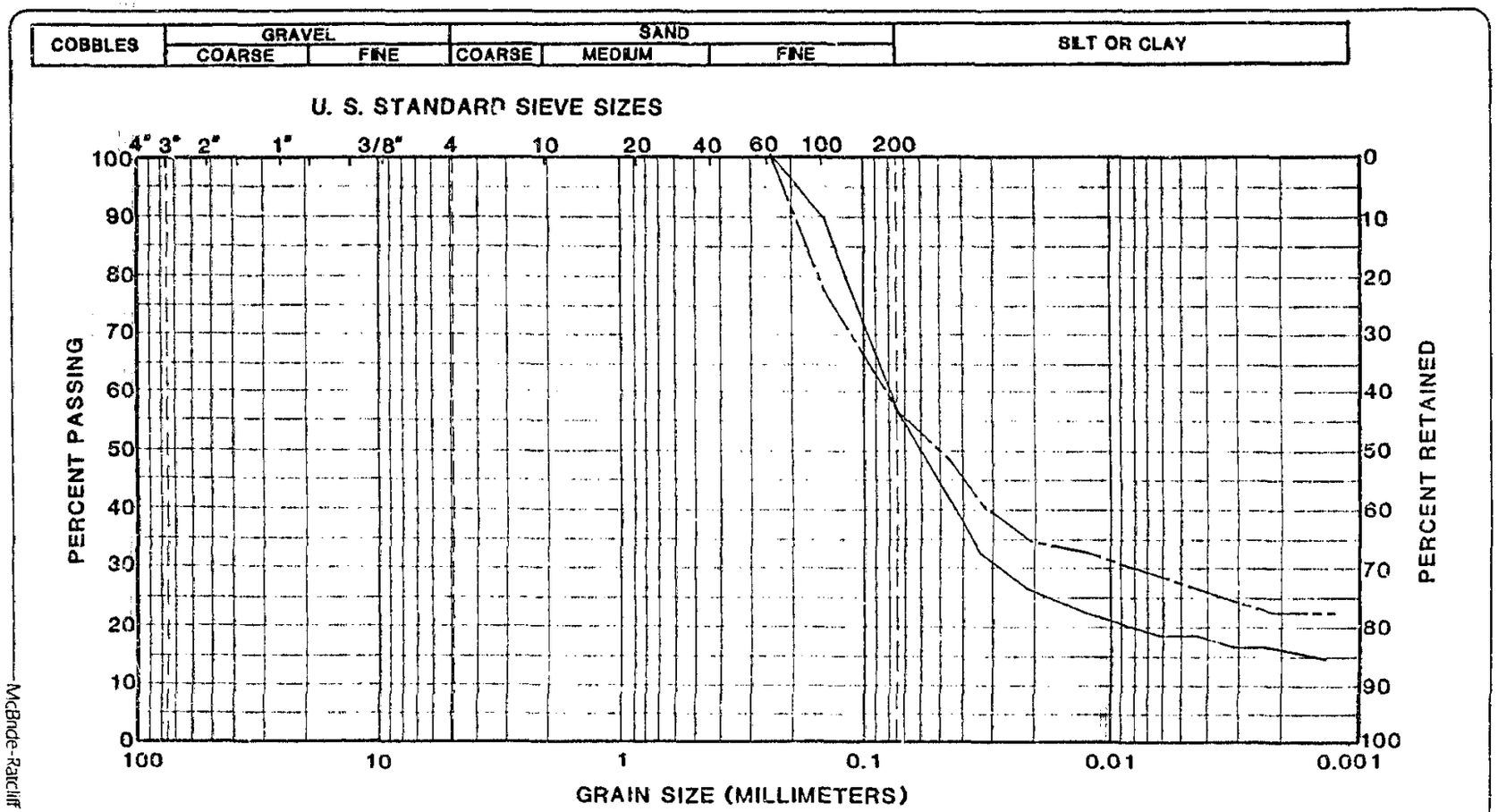
(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: A-2
DATE: 8-4-87

McBride-Ratcliff and Associates, Inc.

A-4

007194



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
P01	41	Si Sa	———
P02	43.5	Si Sa	- - - -

GRAIN SIZE DISTRIBUTION

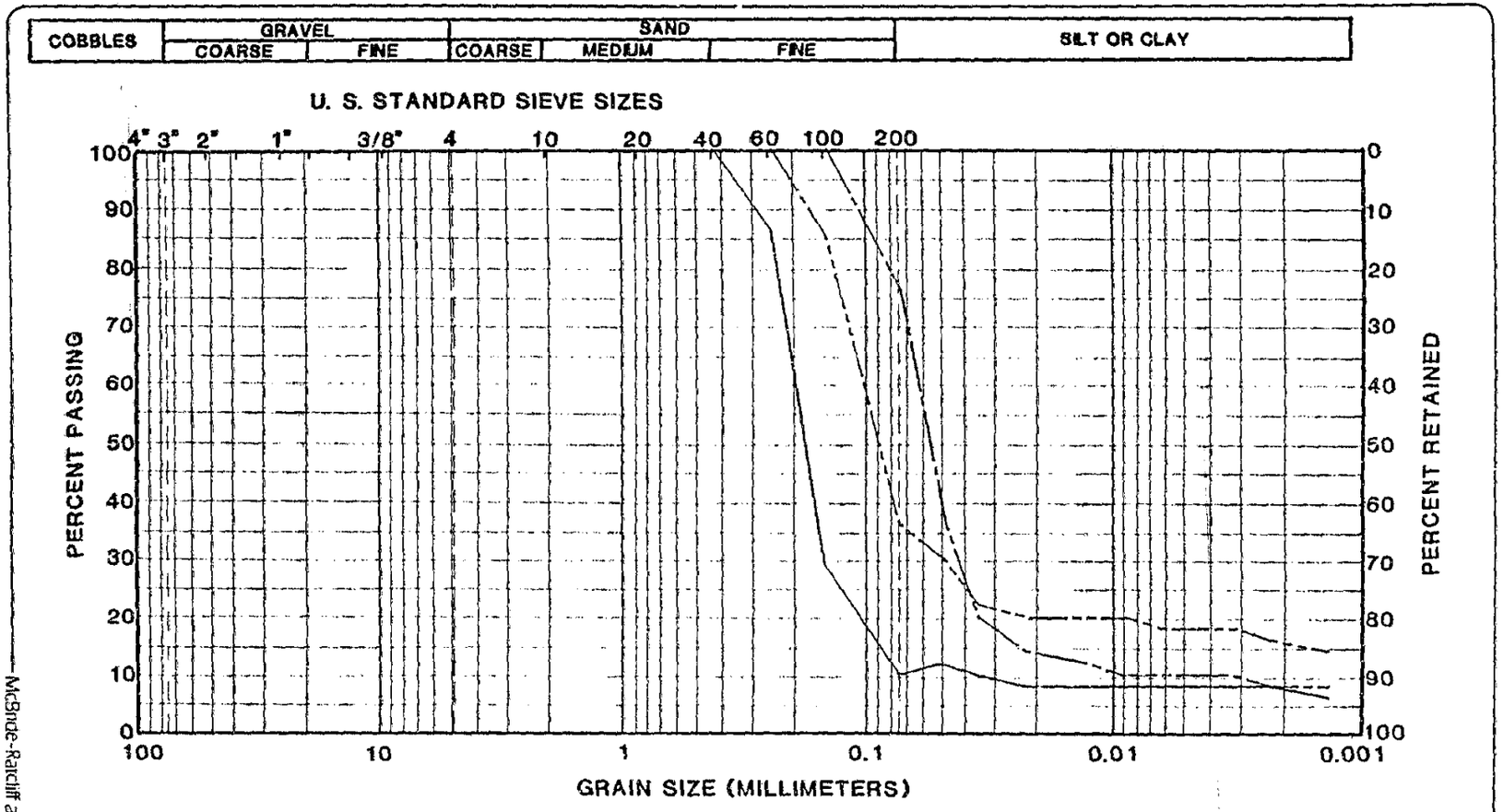
(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: A-3
DATE: 5-29-86

McBride-Ratcliff and Associates, Inc.

A-3

007195



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
P03	33.5	Sa	———
P04	48	Sa Si	——— -
P05	51	Cl Sa	——— - -

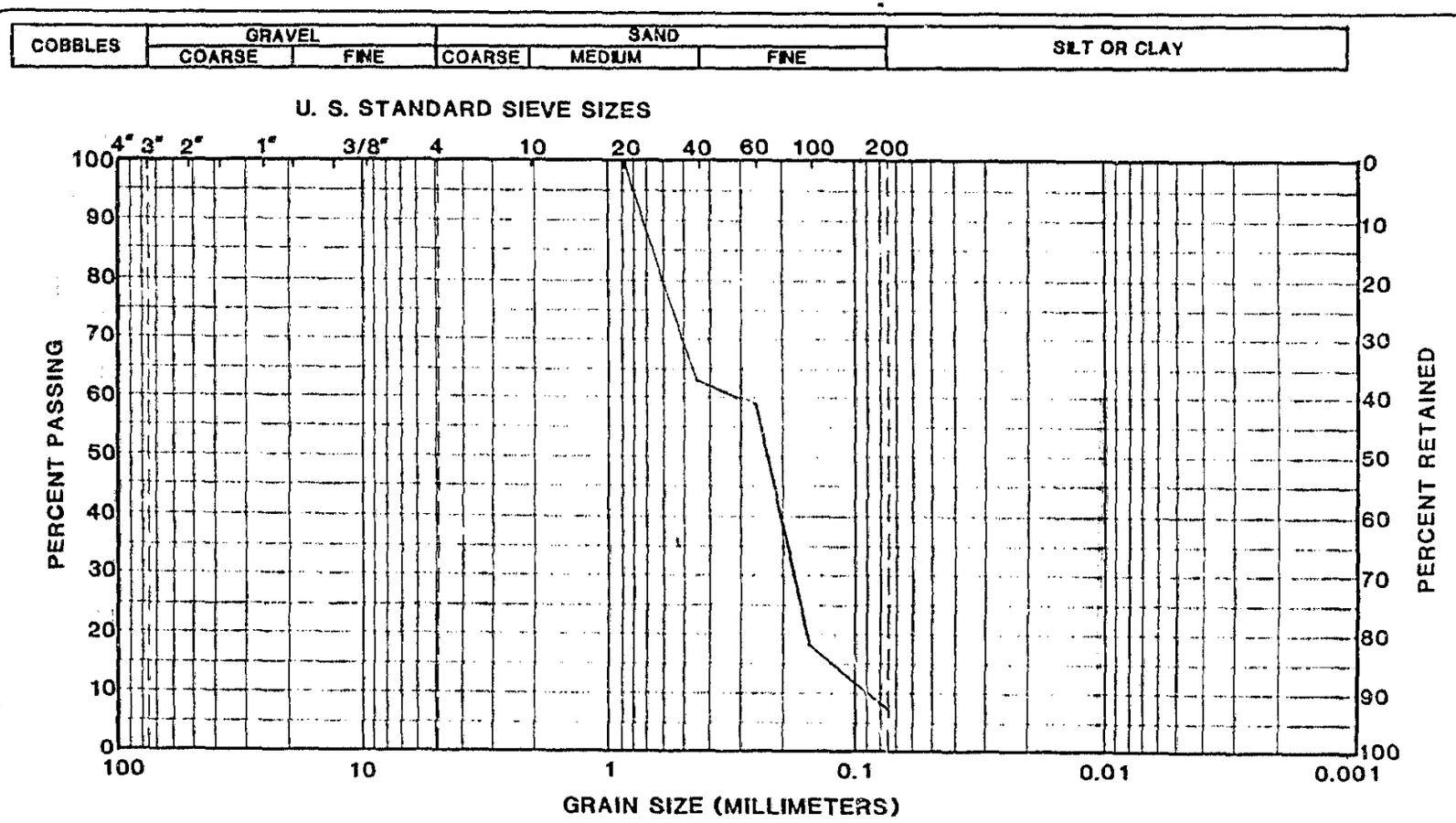
GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: A-4
DATE: 6-2-86

McBride-Ratcliff and Associates, Inc.

007196



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
PD6	194	Sand	------

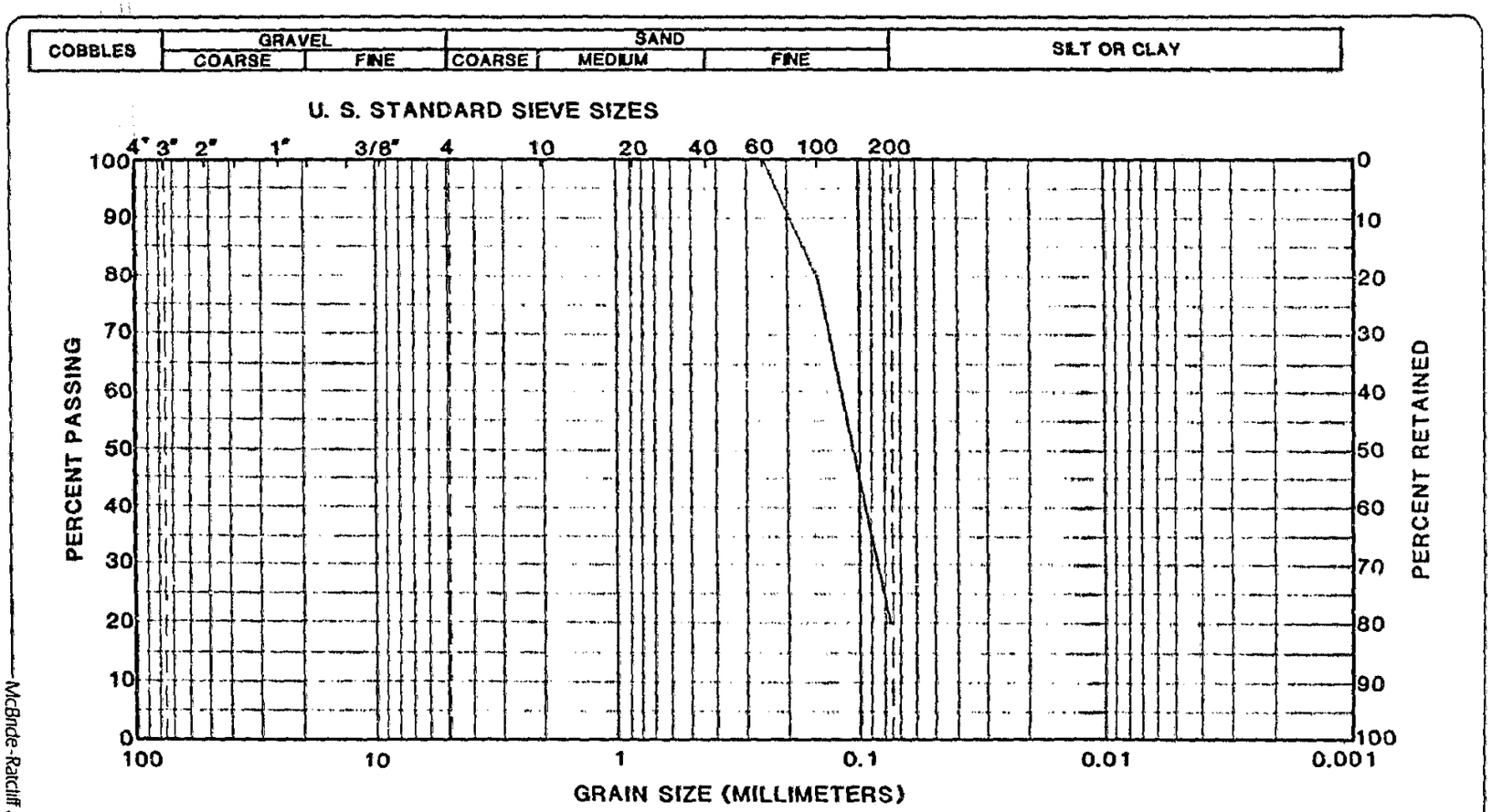
GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: A-5
DATE: 3-30-87

McBride-Ratcliff and Associates, Inc.

007197



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
P07	184	S1 Sa	———

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: A-6
DATE: 3-30-87

McBride-Ratcliff and Associates, Inc.

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APPENDIX B

SOIL BORING SURROGATE TEST RESULTS

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TOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic std. dev.	Chromium (DL=88) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=30) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	Total Aromatic Hydrocarbons DL
A01-SB01-09	16	2-18-86	2-24-86	57.0	173	56	BDL	204	BDL	42	124	162	45	56	7	2
A01-SB01-12	23	2-18-86	2-24-86	14.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	316	11
A01-SB01-13	25	2-18-86	2-24-86	26.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	336	11
A01-SB01-14	27.5	2-18-86	2-24-86	17.1	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	1020	32
A01-SB02-05	7	2-19-86	2-24-86	19.4	BDL	42	BDL	204	BDL	42	182	162	BDL	56	1530	108
A01-SB02-08	15	2-19-86	2-24-86	21.7	298	51	BDL	204	BDL	42	BDL	162	BDL	56	10300	360
A01-SB02-12	22	2-19-86	2-24-86	33.2	BDL	32	BDL	204	25	42	BDL	162	BDL	56	349	18
A01-SB02-14	27	2-19-86	2-24-86	27.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	24	2
A01-SB03-06	11	2-20-86	2-27-86	23.0	179	52	BDL	204	BDL	42	156	162	BDL	56	6520	760
A01-SB03-13	23	2-20-86	2-27-86	22.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	242	11
A01-SB03-21	46	2-21-86	2-27-86	17.8	124	53	BDL	204	BDL	42	123	162	BDL	56	104	5
A01-SB03-25	54	2-21-86	2-27-86	27.1	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	41	[illegible]
A01-SB03-60	20	2-20-86	3-5-86	26.1	BDL	32	164	204	31	42	129	162	BDL	56	54	[illegible]
A01-SB04-06	11	2-24-86	2-27-86	22.5	143	53	BDL	204	BDL	42	121	162	BDL	56	1110	54
A01-SB04-10	22	2-24-86	2-27-86	27.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	1070	54
A01-SB04-22	47	2-24-86	2-27-86	19.4	106	54	BDL	204	BDL	42	150	162	BDL	56	BDL	2
A01-SB04-25	53	2-24-86	2-27-86	26.9	BDL	32	BDL	204	55	42	BDL	162	BDL	56	BDL	2
A01-SB05-07	13.5	3-10-86	3-18-86	20.5	BDL	46	BDL	204	BDL	42	187	162	BDL	56	BDL	2
A01-SB05-08	24	3-10-86	3-18-86	23.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB05-19	45.5	3-10-86	3-18-86	18.3	127	55	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB05-21	49.5	3-10-86	3-18-86	16.6	BDL	44	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB05-22	50.5	3-10-86	3-18-86	17.7	BDL	79	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB06-07	13.5	3-10-86	3-18-86	14.0	99	57	BDL	204	BDL	42	118	162	BDL	56	BDL	2
A01-SB06-09	27	3-11-86	3-18-86	23.5	104	32	BDL	204	BDL	42	BDL	162	30	56	134	9
A01-SB06-18	47.5	3-11-86	3-18-86	16.9	349	62	BDL	204	BDL	42	138	162	39	56	5010	270
A01-SB06-21	53.5	3-11-86	3-18-86	18.5	127	56	BDL	204	BDL	42	114	162	BDL	56	24	2
A01-SB06-24	59.5	3-11-86	3-18-86	23.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	32	2
A01-SB06-63	22	3-11-86	3-18-86	21.9	114	32	BDL	204	BDL	42	124	162	32	56	48	2
A01-SB07-06	12	3-14-86	3-19-86	20.9	121	52	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB07-09	26	3-14-86	3-19-86	27.8	94	32	BDL	204	27	42	124	162	BDL	56	BDL	2
A01-SB07-21	52.5	3-14-86	3-19-86	17.2	106	47	BDL	204	BDL	42	BDL	162	BDL	56	652	27
A01-SB07-22	54.5	3-14-86	3-19-86	22.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	28	2
A01-SB07-25	59.5	3-14-86	3-20-86	22.5	BDL	32	BDL	204	BDL	42	196	162	32	56	BDL	2
A01-SB07-64	22	3-14-86	3-26-86	29.6	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	[illegible]	2
A01-SB08-06	11.5	3-20-86	3-26-86	20.7	125	62	BDL	204	27	42	205	162	BDL	56	BDL	2
A01-SB08-10	27.5	3-20-86	3-26-86	24.9	BDL	32	132	204	BDL	42	BDL	162	BDL	56	11	2
A01-SB08-22	51.5	3-20-86	3-26-86	19.7	BDL	51	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB08-25	57.5	3-20-86	3-26-86	21.4	BDL	34	BDL	204	BDL	42	BDL	162	BDL	56	25	2
A01-SB08-26	59	3-20-86	3-26-86	20.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB08-27	61.5	3-20-86	3-26-86	28.0	116	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB08-28	63.5	3-20-86	3-26-86	29.1	BDL	32	387	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB09-06	11.5	3-24-86	3-31-86	22.4	179	55	BDL	204	BDL	42	168	162	31	56	11	2

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

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KOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic std. dev.	Chromium (DL=88) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=50) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	Total Aromatic Hydrocarbons DL
A01-SB09-07	24	3-24-86	3-31-86	22.8	BDL	32	140	204	29	42	BDL	162	BDL	56	35	2
A01-SB09-20	51.5	3-24-86	3-31-86	14.1	BDL	48	BDL	204	BDL	42	111	162	BDL	56	7760	270
A01-SB09-24	59.5	3-24-86	3-31-86	23.3	BDL	32	157	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB09-26	63.5	3-24-86	3-31-86	28.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB09-27	66	3-24-86	3-31-86	32.8	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB10-06	11	3-25-86	3-27-86	21.9	BDL	51	BDL	204	BDL	42	129	162	BDL	56	BDL	2
A01-SB10-07	23	3-25-86	3-27-86	28.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB10-17	44	3-25-86	3-27-86	17.7	BDL	50	BDL	204	BDL	42	230	162	47	56	BDL	2
A01-SB10-22	54.5	3-25-86	3-27-86	31.7	BDL	32	101	204	40	42	BDL	162	BDL	56	BDL	2
A01-SB10-66	21	3-26-86	3-27-86	25.3	BDL	32	230	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB11-06	11.5	3-26-86	3-31-86	23.2	BDL	38	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB11-07	23	3-26-86	3-31-86	24.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB11-16	40.5	3-26-86	3-31-86	14.1	91	50	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB11-21	50.5	3-26-86	3-31-86	25.9	92	41	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A01-SB12-06	11	7-28-86	NA	24.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A01-SB12-19	47.5	7-28-86	NA	21.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A01-SB12-21	52	7-28-86	NA	23.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A01-SB12-26	61.5	7-28-86	NA	28.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A02-SB01-05	10.5	3-3-86	3-6-86	19.0	BDL	43	127	204	BDL	42	176	162	BDL	56	BDL	2
A02-SB01-07	21.5	3-3-86	3-6-86	19.6	161	51	107	204	BDL	42	169	162	65	56	BDL	2
A02-SB01-08	24	3-3-86	3-6-86	21.4	BDL	32	BDL	204	BDL	42	134	162	BDL	56	589	18
A02-SB01-10	28	3-3-86	3-6-86	22.9	BDL	32	134	204	BDL	42	BDL	162	BDL	56	339	18
A02-SB02-05	9.5	3-3-86	3-6-86	15.1	BDL	40	434	204	BDL	42	BDL	162	BDL	56	BDL	2
A02-SB02-0.	13.5	3-3-86	3-6-86	21.4	BDL	42	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A02-SB02-08	22.5	3-3-86	3-6-86	21.5	BDL	48	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A02-SB02-09	24	3-3-86	3-6-86	25.9	BDL	32	184	204	BDL	42	BDL	162	BDL	56	19	2
A02-SB02-11	28	3-3-86	3-6-86	24.7	BDL	32	BDL	204	39	42	BDL	162	BDL	56	5	2
A02-SB02-61	21	3-3-86	3-6-86	24.7	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	22	2
A02-SB03-07	13.5	3-4-86	3-6-86	23.7	109	51	BDL	204	BDL	42	146	162	BDL	56	BDL	2
A02-SB03-08	23.5	3-4-86	3-6-86	19.3	106	32	BDL	204	32	42	161	162	BDL	56	6110	162
A02-SB03-21	52.5	3-4-86	3-6-86	3.1	93	53	BDL	204	31	42	180	162	BDL	56	2520	54
A02-SB03-24	59	3-4-86	3-6-86	43.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A03-SB01-05	9	2-25-86	2-28-86	21.0	BDL	53	BDL	204	BDL	42	159	162	BDL	56	4480	108
A03-SB01-08	15	2-25-86	2-28-86	20.8	225	51	BDL	204	BDL	42	BDL	162	BDL	56	1260	54
A03-SB01-09	23	2-25-86	2-28-86	26.9	117	32	BDL	204	BDL	42	BDL	162	BDL	56	157	11
A03-SB01-11	27.5	2-25-86	2-28-86	28.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	36	2
A03-SB02-03	7	2-25-86	2-28-86	16.6	BDL	42	BDL	204	BDL	42	BDL	162	BDL	56	107	2
A03-SB02-05	10.5	2-25-86	2-28-86	21.9	120	49	BDL	204	BDL	42	166	162	BDL	56	142	2
A03-SB02-07	23	2-25-86	2-28-86	30.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	42	2
A03-SB02-09	26	2-25-86	2-28-86	22.4	BDL	32	140	204	BDL	42	162	162	BDL	56	371	11
A03-SB02-61	20	2-25-86	3-5-86	28.8	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	[illegible]	11
A03-SB07-05	9	2-26-86	3-5-86	19.7	BDL	54	BDL	204	BDL	42	115	162	BDL	56	12600	540

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

007201

HUPPERTS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic std. dev.	Chromium (DL=88) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=[illegible]) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	Total Aromatic Hydrocarbons DL
A03-SB03-09	23.5	2-26-86	3-5-86	25.8	BDL	40	93	204	BDL	42	203	162	BDL	56	4180	270
A03-SB03-18	41	2-26-86	3-5-86	14.0	BDL	50	BDL	204	BDL	42	206	162	BDL	56	BDL	[illegible]
A03-SB03-25	56	2-26-86	3-5-86	29.2	BDL	22	229	204	26	42	BDL	162	BDL	56	BDL	[illegible]
A03-SB04-04	8	3-17-86	3-19-86	19.0	BDL	45	BDL	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A03-SB04-07	13.5	3-17-86	3-19-86	20.0	BDL	54	BDL	204	BDL	42	211	162	BDL	56	BDL	[illegible]
A03-SB04-09	27.5	3-17-86	3-19-86	22.7	BDL	32	BDL	204	BDL	42	158	162	BDL	56	BDL	[illegible]
A03-SB04-21	54.5	3-17-86	3-19-86	16.5	173	31	BDL	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A03-SB05-06	13	7-17-86	NA	19.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB05-22	56.5	7-17-86	NA	18.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB05-24	60	7-17-86	NA	17.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB05-27	66.5	7-17-86	NA	28.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB06-05	11.5	7-29-86	NA	20.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB06-07	25.5	7-29-86	NA	21.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB06-15	41.5	7-29-86	NA	16.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB06-20	52	7-29-86	NA	18.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB06-23	57.5	7-29-86	NA	26.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB06-25	61.5	7-29-86	NA	20.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB06-65	21	7-29-86	NA	28.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB07-03	5.5	7-30-86	NA	20.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB07-06	11.5	7-30-86	NA	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB07-09	30.5	7-30-86	NA	20.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB07-18	48	7-30-86	NA	24.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A03-SB07-23	58	7-30-86	NA	22.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A04-SB01-06	10.5	3-5-86	3-7-86	16.6	BDL	51	BDL	204	BDL	42	276	162	BDL	56	64600	1620
A04-SB01-08	24.5	3-5-86	3-7-86	23.3	93	32	BDL	204	BDL	42	139	162	78	56	1370	54
A04-SB01-11	31	3-5-86	3-7-86	22.2	BDL	32	BDL	204	58	42	BDL	162	BDL	56	[illegible]	[illegible]
A04-SB01-15	39	3-5-86	3-7-86	17.2	BDL	46	BDL	204	BDL	42	127	162	BDL	56	BDL	[illegible]
A04-SB01-19	46.5	3-5-86	3-7-86	27.8	BDL	32	BDL	204	34	42	BDL	162	BDL	56	[illegible]	[illegible]
A04-SB01-23	54	3-5-86	3-7-86	28.1	BDL	32	204	204	37	42	BDL	162	BDL	56	BDL	[illegible]
A04-SB01-62	22	3-5-86	3-7-86	24.2	149	32	BDL	204	26	42	BDL	162	BDL	56	1550	54
A04-SB02-03	6	3-6-86	3-26-86	19.3	BDL	49	BDL	204	BDL	42	BDL	162	BDL	56	2020	32
A04-SB02-06	11	3-6-86	3-14-86	18.9	BDL	32	217	204	37	42	BDL	162	BDL	56	12400	540
A04-SB02-07	13.5	3-6-86	3-26-86	21.5	201	50	BDL	204	BDL	42	BDL	162	BDL	56	4820	54
A04-SB02-09	24	3-6-86	3-14-86	21.1	120	32	BDL	204	BDL	42	BDL	162	BDL	56	435	18
A04-SB02-10	25.5	3-6-86	3-26-86	26.8	BDL	32	BDL	204	BDL	42	129	162	BDL	56	[illegible]	[illegible]
A04-SB02-18	41.5	3-6-86	3-26-86	17.2	BDL	32	BDL	204	BDL	42	148	162	BDL	56	BDL	[illegible]
A04-SB02-20	44.5	3-6-86	3-14-86	19.2	107	56	BDL	204	BDL	42	152	162	BDL	56	19	[illegible]
A04-SB02-24	54	3-6-86	3-14-86	30.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A04-SB02-25	55	3-6-86	3-26-86	27.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A04-SB02-27	59.5	3-6-86	3-14-86	21.4	BDL	32	246	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A04-SB03-06	11	3-7-86	3-14-86	20.0	BDL	57	BDL	204	BDL	42	305	162	BDL	56	174	16
A04-SB03-08	23.5	3-7-86	3-14-86	22.3	158	32	BDL	204	28	42	BDL	162	BDL	56	BDL	[illegible]

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

FORMERG SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=08) Conc.	std. dev.	Chromium (DL=08) Conc.	std. dev.	Copper (DL=05) Conc.	std. dev.	Lead (DL=101) Conc.	std. dev.	Zinc (DL=30) Conc.	std. dev.	Total Aromatic Hydrocarbons Conc.	DL
A04-SB03-11	29.5	3-6-86	3-14-86	22.9	BDL	32	136	204	28	42	BDL	162	BDL	56	BDL	2
A04-SB03-20	47	3-6-86	3-14-86	15.3	BDL	50	BDL	204	BDL	42	147	162	BDL	56	52	2
A04-SB03-27	61	3-6-86	3-14-86	22.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	5	2
A04-SB03-62	24	3-6-86	3-14-86	28.9	BDL	32	205	204	BDL	42	BDL	162	BDL	56	20	2
A04-SB04-06	10.5	3-11-86	3-18-86	21.1	BDL	37	BDL	204	BDL	42	109	162	BDL	56	BDL	2
A04-SB04-08	21	3-12-86	3-18-86	22.7	139	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB04-12	29	3-12-86	3-18-86	31.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB04-18	41.5	3-12-86	3-18-86	16.0	100	57	BDL	204	BDL	42	127	162	BDL	56	BDL	2
A04-SB05-09	29.5	3-13-86	3-18-86	32.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB05-19	49.5	3-13-86	3-18-86	16.6	BDL	50	BDL	204	BDL	42	116	162	BDL	56	BDL	2
A04-SB05-20	51.5	3-13-86	3-18-86	17.1	BDL	43	BDL	204	BDL	42	155	162	BDL	56	BDL	2
A04-SB05-21	54	3-13-86	3-18-86	24.9	BDL	32	249	204	BDL	42	BDL	162	BDL	56	30	2
A04-SB05-26	63.5	3-13-86	3-18-86	31.0	BDL	41	460	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB05-64	22	3-13-86	3-18-86	28.3	BDL	41	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB06-04	10	3-19-86	3-26-86	18.3	BDL	45	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB06-05	13.5	3-19-86	3-26-86	22.9	149	57	BDL	204	BDL	42	237	162	65	56	BDL	2
A04-SB06-06	24.5	3-19-86	3-12-86	21.7	182	50	BDL	204	BDL	42	BDL	162	43	56	BDL	2
A04-SB06-18	44	3-19-86	3-26-86	28.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB06-23	60	3-19-86	3-26-86	26.0	87	34	BDL	204	BDL	42	113	162	BDL	56	BDL	2
A04-SB06-64	21	3-19-86	3-26-86	24.9	100	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB07-07	24.5	3-21-86	3-26-86	22.3	119	32	BDL	204	BDL	42	154	162	62	56	BDL	2
A04-SB07-14	39.5	3-21-86	3-26-86	17.1	BDL	49	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB07-22	56	3-21-86	3-26-86	34.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB07-24	59.5	3-21-86	3-27-86	20.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB07-65	21	3-21-86	3-27-86	18.8	BDL	32	BDL	204	BDL	42	104	162	BDL	56	BDL	2
A04-SB08-07	13.5	3-27-86	4-1-86	22.7	121	55	BDL	204	BDL	42	189	162	BDL	56	BDL	2
A04-SB08-08	14.5	3-27-86	4-1-86	22.2	BDL	32	BDL	204	48	42	BDL	162	BDL	56	BDL	2
A04-SB08-21	54.5	3-27-86	4-1-86	13.6	BDL	45	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB08-24	60.5	3-27-86	4-1-86	30.3	113	37	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB08-67	21	3-27-86	4-1-86	22.3	BDL	32	BDL	204	29	42	BDL	162	BDL	56	BDL	2
A04-SB09-03	6	3-31-86	4-3-86	16.7	BDL	47	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB09-10	19.5	3-31-86	4-3-86	25.4	BDL	41	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB09-20	39.5	3-31-86	4-3-86	16.9	BDL	53	BDL	204	BDL	42	140	162	BDL	56	BDL	2
A04-SB09-28	55.5	3-31-86	4-3-86	17.3	BDL	46	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB10-02	4	4-2-86	4-11-86	17.6	BDL	55	BDL	204	BDL	42	400	162	BDL	56	BDL	2
A04-SB10-11	21.5	4-2-86	4-11-86	24.5	BDL	32	BDL	204	BDL	42	226	162	BDL	56	BDL	2
A04-SB10-12	23.5	4-2-86	5-12-86	26.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB10-19	37.5	4-2-86	4-11-86	14.9	BDL	45	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB10-25	50	4-2-86	4-11-86	22.7	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A04-SB10-68	21	4-2-86	4-11-86	26.3	BDL	32	222	204	48	42	BDL	162	BDL	56	BDL	2
A05-SB01-07	17.5	4-30-86	5-12-86	21.2	BDL	58	1063	204	BDL	42	152	162	BDL	56	293	4
A05-SB01-10	28.5	4-30-86	5-12-86	29.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

007203

HOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=80) Conc.	Arsenic std. dev.	Chromium (DL=08) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=30) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	DL
A05-SB01-19	50.5	4-30-86	5-12-86	20.7	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	55	2
A05-SB01-20	52.5	4-30-86	5-12-86	27.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A05-SB01-24	60	4-30-86	5-12-86	23.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A05-SB02-08	16	5-1-86	5-12-86	22.4	292	57	BDL	204	BDL	42	BDL	162	BDL	56	6	2
A05-SB02-10	24	5-1-86	5-12-86	23.9	BDL	32	BDL	204	BDL	42	94	162	BDL	56	BDL	2
A05-SB02-18	42	5-1-86	5-12-86	20.1	95	56	BDL	204	BDL	42	141	162	BDL	56	BDL	2
A05-SB02-21	47.5	5-2-86	5-12-86	19.1	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A06-SB01-02	3.5	4-22-86	5-1-86	20.0	BDL	53	BDL	204	BDL	42	173	162	BDL	56	164	2
A06-SB01-16	39.5	4-22-86	5-1-86	18.2	110	50	BDL	204	BDL	42	120	162	BDL	56	BDL	2
A06-SB01-19	45.5	4-22-86	5-1-86	19.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	45	2
A06-SB01-28	63	4-22-86	5-1-86	24.0	102	36	BDL	204	BDL	42	173	162	48	56	BDL	2
A06-SB02-06	12	4-24-86	5-1-86	18.9	BDL	54	BDL	204	BDL	42	150	162	BDL	56	211	4
A06-SB02-09	24.5	4-24-86	5-1-86	23.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A06-SB02-15	41	4-24-86	5-1-86	15.9	BDL	46	BDL	204	BDL	42	BDL	162	BDL	56	12	2
A06-SB02-20	50.5	4-24-86	5-1-86	13.4	BDL	74	BDL	204	BDL	42	BDL	162	BDL	56	140	[illegible]
A06-SB02-26	62.5	4-24-86	5-1-86	22.3	144	35	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A06-SB02-28	66.5	4-24-86	5-1-86	27.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A06-SB03-02	5.5	4-28-86	5-2-86	58.8	BDL	50	BDL	204	BDL	42	141	162	BDL	56	130	2
A06-SB03-08	27.5	4-28-86	5-2-86	24.5	BDL	32	BDL	204	43	42	BDL	162	BDL	56	BDL	2
A06-SB03-19	51.5	4-28-86	5-2-86	21.7	BDL	32	BDL	204	29	42	BDL	162	BDL	56	145	2
A06-SB03-24	63.5	4-28-86	5-2-86	27.6	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A06-SB03-25	64.5	4-28-86	5-2-86	29.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A07-SB01-02	4	4-25-86	5-1-86	16.8	BDL	54	BDL	204	BDL	42	121	162	BDL	56	2150	54
A07-SB01-07	13.5	4-25-86	5-1-86	19.2	BDL	51	BDL	204	BDL	42	BDL	162	BDL	56	942	54
A07-SB01-14	35	4-25-86	5-12-86	26.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	10	2
A07-SB01-20	48.5	4-25-86	5-1-86	23.6	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	29	2
A07-SB01-28	66	4-25-86	5-1-86	21.9	90	40	BDL	204	BDL	42	169	162	32	56	17	2
A07-SB01-29	69	4-25-86	5-1-86	29.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A07-SB01-65	21	4-25-86	5-1-86	22.6	BDL	32	190	204	BDL	42	125	162	BDL	56	75	2
A08-SB01-01	3	4-23-86	5-1-86	18.3	BDL	50	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A08-SB01-07	29.5	4-23-86	5-1-86	21.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A08-SB01-18	52	4-23-86	5-1-86	19.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	32	2
A08-SB01-24	62.5	4-23-86	5-1-86	22.5	138	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A08-SB01-25	63.5	4-23-86	5-1-86	20.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A08-SB01-64	21	4-23-86	5-1-86	24.6	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	47	2
A08-SB02-06	13	6-10-86	NA	24.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A08-SB02-09	26.5	6-10-86	NA	27.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A08-SB02-17	42.5	6-10-86	NA	19.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	2
A08-SB02-27	62	6-10-86	NA	21.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB02-30	66	6-11-86	NA	24.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A08-SB02-65	21	6-10-86	NA	31.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A08-SB03-05	10.5	7-21-86	NA	16.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

007204

HOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic std. dev.	Chromium (DL=88) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=161) Conc.	Lead std. dev.	Zinc (DL=50) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	Total Aromatic Hydrocarbons DL
A08-SB03-08	17.5	7-21-86	NA	20.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A08-SB03-27	55	7-21-86	NA	20.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11	[illegible]
A08-SB03-28	57.5	7-21-86	NA	25.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]
A09-SB01-06	13	4-29-86	5-12-86	18.7	BDL	45	BDL	204	BDL	42	176	162	BDL	56	BDL	2
A09-SB01-17	42	4-29-86	5-12-86	18.7	BDL	42	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A09-SB01-20	49	4-29-86	5-12-86	18.7	BDL	47	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A09-SB01-24	55	4-29-86	5-12-86	19.6	BDL	45	BDL	204	BDL	42	126	162	BDL	56	BDL	2
A09-SB01-29	65	4-29-86	5-12-86	26.0	97	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A09-SB01-65	21	4-29-86	5-12-86	20.3	BDL	50	BDL	204	BDL	42	151	162	BDL	56	BDL	[illegible]
A09-SB02-02	2.5	5-7-86	NA	12.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	38	2
A09-SB02-09	21	5-7-86	NA	26.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB02-17	37	5-7-86	NA	18.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB02-22	44	5-7-86	NA	18.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB03-06	13.5	7-8-86	NA	20.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	207	9
A09-SB03-08	30.5	7-8-86	NA	29.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25	2
A09-SB03-13	40.5	7-8-86	NA	18.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB03-23	62	7-9-86	NA	25.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB03-24	64	7-9-86	NA	22.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB03-25	66.5	7-9-86	NA	27.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A09-SB03-62	21	7-8-86	NA	30.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	402	19
A10-SB01-02	3.5	4-17-86	4-28-86	15.3	BDL	53	BDL	204	BDL	42	BDL	162	347	56	14600	405
A10-SB01-08	15.5	4-17-86	4-28-86	22.2	144	51	BDL	204	BDL	42	105	162	BDL	56	502	9
A10-SB01-09	27.5	4-17-86	4-28-86	29.4	BDL	32	BDL	204	31	42	BDL	162	BDL	56	92	2
A10-SB01-21	50.5	4-17-86	4-28-86	14.7	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	767	18
A10-SB01-22	53.5	4-17-86	4-28-86	27.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A10-SB01-27	65.5	4-17-86	4-28-86	25.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A10-SB01-29	71.5	4-17-86	4-28-86	34.4	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A10-SB02-04	7.5	4-18-86	4-28-86	14.8	BDL	43	BDL	204	BDL	42	BDL	162	BDL	56	188	18
A10-SB02-08	15	4-18-86	4-28-86	25.5	BDL	52	BDL	204	BDL	42	149	162	BDL	56	101	5
A10-SB02-09	26.5	4-18-86	4-28-86	24.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	22	[illegible]
A10-SB02-13	34.5	4-18-86	5-12-86	30.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	3	[illegible]
A10-SB02-16	42.5	4-18-86	4-28-86	16.2	BDL	54	BDL	204	BDL	42	119	162	BDL	56	41	[illegible]
A10-SB02-26	62.5	4-18-86	4-26-86	25.9	109	34	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A10-SB02-30	70.5	4-18-86	4-28-86	31.6	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	4	2
A10-SB02-32	75	4-18-86	4-28-86	24.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	[illegible]
A10-SB02-63	21	4-18-86	4-28-86	26.8	BDL	32	147	204	BDL	42	BDL	162	BDL	56	BDL	2
A10-SB03-08	15	5-21-86	NA	25.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A10-SB03-09	22.5	5-21-86	NA	22.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	45	[illegible]
A10-SB03-23	59.5	5-21-86	NA	23.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	93	[illegible]
A10-SB03-25	65	5-21-86	NA	38.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11	2
A10-SB03-27	67.5	5-21-86	NA	29.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A10-SB04-08	16	8-4-86	NA	27.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	[illegible]

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

007205

KOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=89) Conc.	Arsenic std. dev.	Chromium (DL=88) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=70) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	Total Aromatic Hydrocarbons DL
A10-SB04-13	25.5	8-4-86	NA	25.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A10-SB04-23	45.5	8-4-86	NA	18.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A10-SB04-31	61.5	8-4-86	NA	27.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A11-SB01-03	6	4-9-86	4-21-86	14.1	BDL	53	BDL	204	BDL	42	BDL	162	2897	56	12500	405
A11-SB01-08	15.5	4-9-86	4-21-86	18.6	BDL	52	BDL	204	BDL	42	BDL	162	3154	56	21300	405
A11-SB01-09	21	4-9-86	4-21-86	18.7	125	32	BDL	204	BDL	42	125	162	83	56	706	27
A11-SB01-19	41	4-9-86	4-21-86	17.8	BDL	44	BDL	204	BDL	42	BDL	162	BDL	56	69	2
A11-SB01-22	46.5	4-9-86	4-21-86	19.1	BDL	32	808	204	BDL	42	BDL	162	BDL	56	144	2
A11-SB01-30	62.5	4-9-86	4-21-86	24.1	BDL	32	BDL	204	BDL	42	139	162	BDL	56	BDL	2
A11-SB01-31	66.5	4-9-86	4-21-86	22.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	175	4
A11-SB01-32	69	4-9-86	4-21-86	29.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A12-SB01-08	15.5	4-16-86	4-28-86	18.9	BDL	52	BDL	204	BDL	42	BDL	162	BDL	56	26600	1620
A12-SB01-09	24	4-16-86	4-28-86	20.9	BDL	32	BDL	204	BDL	42	109	162	BDL	56	94	18
A12-SB01-10	26	4-16-86	5-12-86	28.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	7	2
A12-SB01-18	43	4-16-86	4-28-86	15.5	BDL	51	BDL	204	BDL	42	121	162	BDL	56	1720	162
A12-SB01-21	50.5	4-16-86	4-28-86	19.7	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	3170	54
A12-SB01-25	58.5	4-16-86	4-28-86	22.9	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	26	2
A12-SB01-30	67.5	4-16-86	4-28-86	30.1	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A12-SB01-33	74.5	4-16-86	4-28-86	19.8	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A12-SB01-62	21	4-16-86	4-28-86	22.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	130	18
A12-SB02-02	5.5	5-14-86	NA	15.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A12-SB02-07	15.5	5-14-86	NA	21.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A12-SB02-22	45.5	5-14-86	NA	27.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A12-SB02-23	61.5	5-14-86	NA	25.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A12-SB02-66	21	5-14-86	NA	25.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A13-SB01-02	3.5	4-7-86	4-14-86	20.7	BDL	55	BDL	204	BDL	42	BDL	162	4749	56	13000	1620
A13-SB01-08	15.5	4-7-86	4-14-86	21.5	BDL	60	BDL	204	BDL	42	BDL	162	2692	56	8500	1350
A13-SB01-10	23	4-7-86	4-14-86	19.5	128	32	187	204	30	42	229	162	78	56	658	18
A13-SB01-19	46	4-7-86	4-14-86	19.0	BDL	41	BDL	204	BDL	42	BDL	162	BDL	56	65	2
A13-SB01-22	51.5	4-7-86	4-14-86	20.6	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	105	4
A13-SB01-24	59.5	4-7-86	4-14-86	24.1	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A13-SB02-03	5.5	4-8-86	4-16-86	16.1	BDL	39	BDL	204	BDL	42	173	162	227	56	341	45
A13-SB02-07	15.5	4-8-86	4-16-86	24.5	BDL	49	BDL	204	BDL	42	BDL	162	1285	56	17400	1620
A13-SB02-08	23	4-8-86	4-16-86	18.[illegible]	143	32	BDL	204	BDL	42	123	162	52	56	1890	108
A13-SB02-11	30	4-8-86	4-16-86	24.0	BDL	32	122	204	BDL	42	BDL	162	BDL	56	BDL	2
A13-SB02-16	39	4-8-86	4-16-86	20.8	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	117	5
A13-SB02-20	50	4-8-86	4-16-86	18.6	105	48	BDL	204	29	42	BDL	162	BDL	56	59	4
A13-SB02-21	52	4-8-86	4-16-86	23.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A13-SB02-23	55.5	4-8-86	4-16-86	24.7	BDL	32	BDL	204	32	42	BDL	162	BDL	56	BDL	2
A13-SB02-61	21	4-8-86	4-16-86	26.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	12	2
A14-SB01-07	27	4-11-86	4-21-86	20.3	BDL	32	132	204	29	42	142	162	BDL	56	278	4
A14-SB01-17	44.5	4-11-86	4-21-86	20.0	185	62	BDL	204	BDL	42	252	162	52	56	BDL	2

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

007206

LOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic std. dev.	Chromium (DL=88) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=30) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	DL
A14-SB01-21	52	4-11-86	4-21-86	27.2	BDL	32	318	204	61	42	BDL	162	BDL	56	BDL	2
A14-SB01-23	57	4-11-86	4-21-86	23.2	BDL	32	113	204	67	42	BDL	162	BDL	56	BDL	2
A14-SB01-26	61	4-11-86	4-21-86	23.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB01-27	64	4-11-86	4-21-86	24.9	BDL	32	BDL	204	BDL	42	113	162	BDL	56	BDL	2
A14-SB01-28	67	4-11-86	4-21-86	27.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB01-30	71	4-11-86	4-21-86	29.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB01-61	30	4-11-86	4-21-86	26.8	BDL	32	BDL	204	37	42	BDL	162	BDL	56	81	2
A14-SB02-06	14	4-14-86	4-24-86	20.1	BDL	40	BDL	204	BDL	42	BDL	162	BDL	56	114	18
A14-SB02-08	22.5	4-14-86	4-24-86	19.6	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	802	54
A14-SB02-12	30	4-14-86	4-24-86	28.6	BDL	41	BDL	204	BDL	42	135	162	BDL	56	BDL	2
A14-SB02-17	40.5	4-14-86	4-24-86	18.3	BDL	32	BDL	204	BDL	42	113	162	BDL	56	54	2
A14-SB02-22	53	4-14-86	4-24-86	19.4	100	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB02-27	62.5	4-14-86	4-24-86	22.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB02-29	66.5	4-14-86	4-24-86	26.0	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB02-69	21	4-14-86	4-24-86	19.9	91	32	BDL	204	BDL	42	100	162	BDL	56	372	54
A14-SB03-07	14	4-15-86	4-22-86	21.2	BDL	42	BDL	204	BDL	42	BDL	162	BDL	56	341	9
A14-SB03-10	24.5	4-15-86	4-22-86	19.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	171	4
A14-SB03-14	32.5	4-15-86	4-22-86	28.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	778	9
A14-SB03-21	46.5	4-15-86	4-22-86	15.7	BDL	38	BDL	204	BDL	42	BDL	162	BDL	56	160	2
A14-SB03-24	52.5	4-15-86	4-22-86	24.7	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB03-28	63	4-15-86	4-22-86	23.6	89	32	BDL	204	BDL	42	BDL	162	BDL	56	8	2
A14-SB03-32	69.5	4-15-86	4-22-86	31.1	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A14-SB04-03	5.5	5-12-86	NA	22.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	64	2
A14-SB04-19	39.5	5-12-86	NA	22.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB04-26	52.5	5-12-86	NA	21.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB04-30	61.5	5-12-86	NA	6.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	57	2
A14-SB04-31	65.5	5-12-86	NA	26.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB04-33	69.5	5-12-86	NA	33.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB04-65	21	5-12-86	NA	23.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	52	2
A14-SB05-04	8	5-13-86	NA	18.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB05-10	19.5	5-13-86	NA	22.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB05-22	45.5	5-13-86	NA	18.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB05-26	55.5	5-13-86	NA	23.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB06-06	11.5	5-16-86	NA	20.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB06-09	21.5	5-16-86	NA	23.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB06-19	42	5-16-86	NA	15.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB06-27	60.5	5-16-86	NA	21.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB06-66	21	5-16-86	NA	16.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB07-07	13.5	5-19-86	NA	18.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB07-13	29.5	5-19-86	NA	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB07-25	54	5-19-86	NA	24.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB07-30	63.5	5-19-86	NA	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

007207

KOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic (DL=88) std. dev.	Chromium (DL=88) Conc.	Chromium (DL=88) std. dev.	Copper (DL=29) Conc.	Copper (DL=29) std. dev.	Lead (DL=101) Conc.	Lead (DL=101) std. dev.	Zinc (DL=39) Conc.	Zinc (DL=39) std. dev.	Total Aromatic Hydrocarbons Conc.	Total Aromatic Hydrocarbons DL
A14-SB07-67	21	5-19-86	NA	26.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB08-05	11.5	7-10-86	NA	17.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB08-10	21.5	7-10-86	NA	27.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB08-21	45.5	7-11-86	NA	20.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A14-SB08-29	64	7-11-86	NA	27.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A16-SB01-06	13.5	6-6-86	NA	22.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A16-SB01-09	28.5	6-6-86	NA	22.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A16-SB01-16	42	6-6-86	NA	22.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A16-SB01-25	59.5	6-6-86	NA	25.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A16-SB01-62	21	6-6-86	NA	21.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	71	2
A16-SB02-06	13	6-9-86	NA	100.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	2
A16-SB02-09	27.5	6-9-86	NA	26.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A16-SB02-21	51.5	6-9-86	NA	5.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	233	2
A16-SB02-26	61.5	6-9-86	NA	25.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A17-SB01-01	3	5-5-86	5-13-86	11.6	BDL	45	BDL	204	BDL	42	BDL	162	1147	56	604	2
A17-SB01-07	24	5-5-86	5-13-86	28.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A17-SB01-11	36	5-5-86	5-13-86	18.3	BDL	43	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A17-SB01-18	50	5-5-86	5-13-86	20.1	BDL	41	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A17-SB01-61	20	5-5-86	5-13-86	26.2	BDL	32	97	204	BDL	42	BDL	162	337	56	BDL	2
A17-SB02-01	3	5-6-86	5-13-86	14.0	BDL	57	BDL	204	BDL	42	BDL	162	BDL	56	38	2
A17-SB02-05	11	5-6-86	5-13-86	17.4	BDL	43	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A17-SB02-10	28	5-6-86	5-13-86	24.2	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	66	2
A17-SB02-21	50	5-6-86	5-13-86	19.6	BDL	46	BDL	204	BDL	42	BDL	162	BDL	56	23	2
A17-SB02-27	62	5-6-86	5-13-86	22.4	127	32	BDL	204	BDL	42	BDL	162	BDL	56	70	2
A17-SB02-29	66	5-6-86	5-13-86	26.3	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	10	2
A17-SB02-31	70	5-6-86	5-13-86	31.7	BDL	32	229	204	BDL	42	BDL	162	BDL	56	BDL	2
A18-SB01-05	15.5	6-3-86	NA	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A18-SB01-09	23.5	6-3-86	NA	24.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A18-SB01-17	39.5	6-3-86	NA	16.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A18-SB01-21	49.5	6-3-86	NA	18.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A18-SB01-27	60.5	6-3-86	NA	22.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A18-SB01-69	21	6-3-86	NA	27.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A19-SB01-04	10	6-2-86	NA	18.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A19-SB01-07	22.5	6-2-86	NA	23.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A19-SB01-20	48.5	6-2-86	NA	18.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A19-SB01-26	62.5	6-2-86	NA	30.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB01-02	5.5	4-3-86	4-11-86	15.8	BDL	42	BDL	204	BDL	42	115	162	BDL	56	BDL	2
A26-SB01-08	17.5	4-3-86	4-11-86	23.6	179	35	BDL	204	BDL	42	141	162	BDL	56	BDL	2
A26-SB01-13	27.5	4-3-86	4-11-86	20.5	BDL	32	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A26-SB01-22	45.5	4-3-86	4-11-86	19.0	BDL	32	1974	204	BDL	42	BDL	162	BDL	56	BDL	2
A26-SB02-05	11.5	5-20-86	NA	26.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB02-10	21.5	5-20-86	NA	23.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

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HOPPERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic std. dev.	Chromium (DL=86) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=30) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	DL
A26-SB02-19	41	5-20-86	NA	15.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB02-25	54	5-20-86	NA	24.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB03-07	13.5	6-4-86	NA	21.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB03-08	26.5	6-4-86	NA	25.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	2
A26-SB03-20	50.5	6-4-86	NA	19.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB03-26	62.5	6-4-86	NA	120.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB04-07	14	7-14-86	NA	22.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB04-10	28.5	7-14-86	NA	18.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB04-18	44.5	7-14-86	NA	19.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	42	2
A26-SB04-22	54.5	7-14-86	NA	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15	2
A26-SB04-26	62.5	7-16-86	NA	23.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB05-07	13	7-18-86	NA	22.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB05-11	33.5	7-18-86	NA	27.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	143	2
A26-SB05-15	42	7-18-86	NA	19.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	77	2
A26-SB05-19	50	7-18-86	NA	21.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB05-25	61	7-18-86	NA	22.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB06-07	13.5	7-31-86	NA	25.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB06-12	30.5	7-31-86	NA	34.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB06-19	46	7-31-86	NA	20.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB06-26	60.5	7-31-86	NA	24.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB06-66	21	7-31-86	NA	28.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB07-09	17.5	8-1-86	NA	24.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB07-11	32.5	8-1-86	NA	24.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB07-23	55.5	8-1-86	NA	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB07-28	66	8-1-86	NA	24.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-07	13.5	8-5-86	NA	19.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-09	27.5	8-5-86	NA	28.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-11	31.5	8-5-86	NA	30.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-14	37.5	8-5-86	NA	28.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-15	39.5	8-5-86	NA	31.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-17	43.5	8-5-86	NA	19.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-18	45.5	8-5-86	NA	25.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-22	53.5	8-5-86	NA	27.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-26	63	8-5-86	NA	23.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A26-SB08-67	21	8-5-86	NA	29.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
A27-SB01-02	4	4-4-86	4-11-86	14.7	BDL	53	BDL	204	BDL	42	221	162	BDL	56	BDL	2
A27-SB01-08	24	4-4-86	4-11-86	29.2	BDL	53	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A27-SB01-16	40	4-4-86	4-11-86	20.1	BDL	47	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A27-SB01-24	58	4-4-86	4-11-86	34.0	BDL	53	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
A27-SB01-69	21	4-4-86	4-11-86	33.3	BDL	53	BDL	204	BDL	42	BDL	162	BDL	56	BDL	2
P-01-02	42	5-22-86	NA	12.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
P-02-01	43.5	5-23-86	NA	14.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2

(1) Total weight basis. (2) BDL denotes below detection limits. (3) Dry weight basis. (4) DL denotes detection limits.

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HOFFERS - SOUTH CAVALCADE SITE

Soil Surrogate Test Results (ppm) (1),(2)

Sample No.	Sample Depth -ft-	Sample Date	Metals Test Date	Water Content, percent (3)	Arsenic (DL=88) Conc.	Arsenic std. dev.	Chromium (DL=88) Conc.	Chromium std. dev.	Copper (DL=25) Conc.	Copper std. dev.	Lead (DL=101) Conc.	Lead std. dev.	Zinc (DL=30) Conc.	Zinc std. dev.	Total Aromatic Hydrocarbons Conc.	Total Aromatic Hydrocarbons DL
P-03-02	35.5	5-27-86	NA	15.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13	2
P-04-04	43.5	5-28-86	NA	23.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2
P-05-05	51.5	5-28-86	NA	19.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL	2

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APPENDIX C

SURROGATE TESTING QUALITY ASSURANCE REPORT

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APPENDIX C
SURROGATE TESTING DATA QUALITY ASSURANCE REPORT

1.0 General

An assessment of the soil boring surrogate test data was conducted to evaluate the comparability of the surrogate testing program. The surrogate testing program generally consisted of fluorescence analysis for total aromatic hydrocarbons, headspace analysis for total organic vapors, and X-ray fluorescence analysis for metals. Results of the surrogate testing program for each sample were compared to the corresponding Spectrix analytical data based upon a qualitative presence/absence criterion to assess comparability. Surrogate testing program quality assurance/quality control (QA/QC) results were evaluated to assess precision. A 75 percent level of correlation between positive Spectrix results and positive surrogate test results for contaminated samples and a 75 percent level of correlation between negative Spectrix results and negative surrogate test results for uncontaminated samples was chosen to indicate favorable surrogate data comparability. A 75 percent level of positive correlation between duplicates was also chosen to indicate favorable data precision. QA/QC measures were not performed for the surrogate soil samples from the auger boring program.

2.0 Surrogate Testing Data Comparability

2.1 Fluorescence Surrogate Testing Program. Table C-1 presents a summary of the fluorescence surrogate data comparisons. The data are shown on the basis of surrogate data comparability. Twenty-two of a total of 26 samples in which Spectrix detected aromatic hydrocarbons disclosed positive fluorescence surrogate responses. Therefore, about 85 percent of the detected analytical results were supported by positive fluorescence surrogate test results.

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Table C-1

Summary of Soil Fluorescence Surrogate Testing Comparability

Soil Fluorescence Surrogate Response	Spectrix Analytical Response[1] Detected	Not Detected
POSITIVE	23	6
NEGATIVE	4[2]	35
COMPARABILITY (%):	85	85

Notes:

1. Reported as total aromatic organics concentrations above 1.0 mg/kg (including non-HSL organics, but excluding phthalates).

2. Four samples contained 9.7 mg/kg or less total aromatics, three of which contained less than 5 mg/kg total aromatics.

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Conversely, 35 of a total of 41 samples in which Spectrix detected no aromatic hydrocarbons disclosed a corresponding negative fluorescence surrogate response. Therefore, about 85 percent of the non-detected analytical results were supported by negative fluorescence surrogate test results.

The four samples which indicated positive Spectrix results but negative fluorescence results contained relatively small concentrations of total aromatics. The four samples contained less than 10 mg/kg (9.7 mg/kg to 1.6 mg/kg) total aromatics, three of which contained less than 5 mg/kg total aromatics.

2.2 X-ray Fluorescence Surrogate Testing Program. Table C-2 presents a summary of the X-ray fluorescence surrogate data comparisons. The data are shown on the basis of surrogate data comparability. Arsenic, chromium, copper, and lead demonstrated 0 percent comparability between positive Spectrix results and surrogate test results. Zinc tested positive for both Spectrix and surrogate analyses in four out of six samples, or approximately 67 percent. Conversely, the comparability of negative results for both Spectrix and surrogate test data ranged from 50 percent to 100 percent. However, a substantial portion of the upper-range negative matches were for samples with levels below detection limits, which incorrectly increases the negative correlation percentages.

2.3 Total Organic Vapors Surrogate Testing Program. Table C-3 presents a summary of the total organic vapors surrogate data comparisons. The data are shown on the basis of surrogate data comparability. Forty-five of a total of 60 samples in which Spectrix detected organics, including both aromatics and aliphatics, disclosed positive total organic

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Table C-2
Summary of Soil X-ray Fluorescence Surrogate Testing
Comparability

X-ray Fluorescence Surrogate Response	Spectrix Analytical Response(1) Detected					Not Detected				
	As	Cr	Cu	Pb	Zn	As	Cr	Cu	Pb	Zn
POSITIVE	0	0	0	0	4	3	0	0	4	4
NEGATIVE	1	6	2	3	2	7	5	9	4	4
COMPARABILITY (%):	0	0	0	0	67	70	100	100	50	50

Note:

1. Samples with total inorganic concentrations less than 1 mg/kg are not reported.

Table C-3
Summary of Soil Total Organic Vapors Surrogate Testing
Comparability

Soil Organic Vapors Surrogate Response (2)	Spectrix Analytical Response (1) Detected	Not Detected
POSITIVE	45	5
NEGATIVE	15	9
COMPARABILITY (%):	75 (3)	64 (3)

Notes:

1. Reported as total organics concentrations above 1.0 mg/kg (including non-HSL aromatics and aliphatics).

2. Reported as total organic vapors concentrations above 0.25 ppm naphthalene equivalents.

3. Eleven samples which had less than 0.25 ppm response for total organic vapors also had less than 1.0 mg/kg Spectrix total aromatics concentrations but greater than 1.0 mg/kg total organic concentrations. Taking this into account, the comparability increases to 92 percent for detected responses and 80 percent for not detected responses.

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vapors results. Therefore, about 75 percent of the detected Spectrix results were supported by positive total organic vapors results. Conversely, 9 of a total of 14 samples with non-detected Spectrix results disclosed corresponding negative total organic vapors results. Therefore, about 64 percent of the non-detected Spectrix results were supported by negative total organic vapors results.

Eleven samples which had greater than 1.0 mg/kg Spectrix total organics but less than 1.0 mg/kg Spectrix total aromatics also disclosed negative total organic vapors concentrations. These samples predominately contained aliphatics, for which the HNU PI 101 detector was not calibrated. When total organic vapors results are compared to Spectrix total aromatics results, the positive data comparability increases to 92 percent and the negative data comparability increases to 80 percent.

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3.0 Surrogate Testing Program QA/QC Protocol

3.1 Fluorescence Surrogate Testing QA/QC Protocol.

Quality assurance and quality control (QA/QC) protocol for the soil boring fluorescence surrogate testing program consisted of analysis of field duplicates, lab replicates, and lab rinseate blanks, as specified in SOP-HWCL-01 (Appendix D, Volume 3). Four samples per boring, or 328, were required for fluorescence surrogate analysis, but 389 samples were analyzed. Thirty-four samples, or approximately 9 percent, were analyzed as field duplicates, for a total of 423 samples analyzed. Table C-4 lists the qualitative results of the samples split for duplicate analysis. Results are based upon a qualitative response/non-response criterion. Twenty-eight of a total of 34

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Table C-4
Summary of Surrogate Program QA/QC Results
Duplicate Sample Comparisons

Sample / Duplicate	As	Cr	Cu	Pb	Zn	TAH	TOV
A01-SB03-13-25 / A01-SB03-60-20	+	-	-	-	+	+	+
A01-SB06-09-27 / A01-SB06-63-22	+	+	+	-	+	+	+
A01-SB07-09-26 / A01-SB07-64-22	-	+	-	-	+	-	+
A01-SB10-07-23 / A01-SB10-66-21	+	-	+	+	+	+	+
A02-SB02-09-24 / A02-SB02-61-21	+	-	+	+	+	+	+
A03-SB02-07-23 / A03-SB02-61-20	+	+	+	+	+	+	+
A03-SB06-23-57.5 / A03-SB06-21-21	NA	NA	NA	NA	NA	+	+
A04-SB01-08-24.5 / A04-SB01-62-22	+	+	+	-	-	+	+
A04-SB03-11-29.5 / A04-SB03-62-24	+	+	-	+	+	-	+
A04-SB05-09-29.5 / A04-SB05-64-22	+	+	+	+	+	-	+

Notes:
1. + = Split sample results match.
2. - = Split sample results do not match.
3. NA = Not applicable. Surrogate program discontinued.
4. NT = Not tested.
5. As = Arsenic, Cr = Chromium, Cu = Copper, Pb = Lead, Zn = Zinc, TAH = Total Aromatic Hydrocarbons, TOV = Total Organic Vapors.

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Table C-4 (continued)
Summary of Surrogate Program QA/QC Results
Duplicate Sample Comparisons

Sample / Duplicate	As	Cr	Cu	Pb	Zn	TAH	TOV
A04-SB06-06-24.5 A04-SB06-64-21	+	+	+	+	-	+	+
A04-SB07-24.5 A04-SB07-65-21	-	+	+	+	-	+	+
A04-SB08-08-24.5 A04-SB08-67-21	+	+	+	+	+	+	+
A04-SB10-12-23.5 A04-SB10-68-21	+	-	-	+	+	+	+
A07-SB01-14-35 A07-SB01-65-21	+	-	+	-	+	+	+
A08-SB01-07-29.5 A08-SB01-64-21	+	+	+	+	+	-	+
A08-SB02-09-26.5 A08-SB02-65-21	NA	NA	NA	NA	NA	+	+
A09-SB01-20-48 A09-SB01-65-21	+	+	+	-	+	+	+
A09-SB03-08-30.5 A09-SB03-62-21	NA	NA	NA	NA	NA	+	+
A10-SB02-13-34.5 A10-SB02-63-21	+	-	+	+	+	-	+

Notes:
1. + = Split sample results match.
2. - = Split sample results do not match.
3. NA = Not applicable. Surrogate program discontinued.
4. NT = Not tested.
5. As = Arsenic, Cr = Chromium, Cu = Copper, Pb = Lead, Zn = Zinc, TAH = Total Aromatic Hydrocarbons, TOV = Total Organic Vapors.

Table C-4 (continued)
Summary of Surrogate Program QA/QC Results
Duplicate Sample Comparisons

Sample / Duplicate	As	Cr	Cu	Pb	Zn	TAH	TOV
A12-SB01-10-26 A12-SB01-62-21	+	+	+	+	+	+	+
A12-SB02-09-19.5 A12-SB02-66-21	NA	NA	NA	NA	NA	NT	NT
A13-SB02-11-30 A13-SB02-61-21	+	-	+	+	+	-	+
A14-SB01-07-23 A14-SB01-61-30	+	-	-	-	+	-	+
A14-SB02-08-22.5 A14-SB02-69-21	-	+	+	-	+	+	NT
A14-SB04-13-25.5 A14-SB04-65-21	NA	NA	NA	NA	NA	+	+
A14-SB06-19-42 A14-SB06-66-21	NA	NA	NA	NA	NA	+	+
A14-SB07-13-29.5 A14-SB07-67-21	NA	NA	NA	NA	NA	+	+
A16-SB01-09-28.5 A16-SB01-62-21	NA	NA	NA	NA	NA	+	+
A17-SB01-07-24 A17-SB01-61-20	+	-	+	+	+	+	+

Notes:
1. + = Split sample results match.
2. - = Split sample results do not match.
3. NA = Not applicable. Surrogate program discontinued.
4. NT = Not tested.
5. As = Arsenic, Cr = Chromium, Cu = Copper, Pb = Lead, Zn = Zinc, TAH = Total Aromatic Hydrocarbons, TOV = Total Organic Vapors.

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Table C-4 (continued)
Summary of Surrogate Program QA/QC Results
Duplicate Sample Comparisons

Sample / Duplicate	As	Cr	Cu	Pb	Zn	TAH	TOV
A18-SB01-09-23.5 / A18-SB01-69-21	NA	NA	NA	NA	NA	+	+
A26-SB06-12-30.5 / A26-SB06-66-21	NA	NA	NA	NA	NA	+	+
A26-SB08-11-31.5 / A26-SB08-67-21	NA	NA	NA	NA	NA	+	+
A27-SB01-08-24 / A27-SB01-69-21	+	+	+	+	+	+	+
Totals							
+	20	14	18	15	20	28	32
-	3	9	5	8	3	5	0
NA	11	11	11	11	11	0	0
NT	0	0	0	0	0	1	2

Notes:
1. + = Split sample results match.
2. - = Split sample results do not match.
3. NA = Not applicable. Surrogate program discontinued.
4. NT = Not tested.
5. As = Arsenic, Cr = Chromium, Cu = Copper, Pb = Lead, Zn = Zinc, TAH = Total Aromatic Hydrocarbons, TOV = Total Organic Vapors.

split samples analyzed for total aromatic hydrocarbons (TAH), or about 82 percent, had positive correlations with their corresponding duplicates.

Fifty-seven soil boring surrogate samples, or about 13 percent, had replicate analysis, i.e., a second extraction aliquot was analyzed to assess instrument repeatability and reproducibility of dilutions. Forty-nine replicate analyses, or about 84 percent, were reproducible to within 10 percent of their first analyses, as shown on Table C-5. Additionally, 90 rinseate blanks, or approximately one for every five samples, were performed. Responses from the rinseate blanks were used to calculate a baseline quantity that was subtracted from the results of the previous analysis group.

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3.2 X-ray Fluorescence Surrogate Testing QA/QC Protocol. QA/QC protocol for the X-ray fluorescence surrogate testing program consisted of analysis of field duplicates, lab replicates, and an end-of-day standard analysis, as specified in SOP-HWCL-03 (Appendix D, Volume 3). Twenty-three of a total of 282 soil boring surrogate samples tested for X-ray fluorescence, or approximately 8 percent, were analyzed as field duplicates. Table C-4 lists the comparisons of the samples split for duplicate analysis. Results are based upon a qualitative response/non-response criterion. The range of positive correlations was approximately 61 percent to 87 percent. However, a substantial proportion of these positive matches were for samples with levels below detection limits, which incorrectly increases the positive correlation percentages.

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TABLE C-5
SUMMARY OF FLUORESCENCE SURROGATE REPLICATE ANALYSES

Sample	Sample-of-Record TAH (mg/kg)	Replicate TAH (mg/kg)	Relative Percent Difference[1]
A01-SB01-09	7	6	-14
A01-SB04-22	BDL	BDL	0
A01-SB06-63	80	90	13
A01-SB07-21	652	969	49
A01-SB08-25	25	20	-20
A01-SB09-07	35	33	-6
A01-SB11-06	BDL	BDL	0
A01-SB12-06	BDL	BDL	0
A02-SB02-09	19	21	11
A03-SB02-07	42	43	2
A03-SB06-05	BDL	BDL	0
A03-SB07-06	BDL	BDL	0
A04-SB01-11	5	5	0
A04-SB02-09	485	514	6
A04-SB02-25	BDL	BDL	0
A04-SB07-22	BDL	BDL	0
A04-SB08-08	BDL	BDL	0
A04-SB10-19	BDL	BDL	0
A05-SB01-19	55	56	2
A05-SB02-18	BDL	BDL	0
A06-SB01-02	164	170	4
A07-SB01-20	29	29	0
A08-SB01-18	32	24	-25
A08-SB02-17	12	11	8
A08-SB03-27	11	11	0
A09-SB01-65	BDL	BDL	0
A09-SB02-02	38	36	-5
A09-SB03-08	25	24	-4
A10-SB01-09	92	97	5
A10-SB01-21	8950	15240	70
A10-SB02-26	BDL	BDL	0
A10-SB03-23	93	93	0
A11-SB01-22	144	143	-1
A12-SB01-30	BDL	BDL	0
A12-SB02-22	BDL	BDL	0
A13-SB01-19	65	62	-5
A13-SB02-16	117	111	-5
A14-SB01-61	136	134	-1
A14-SB02-22	BDL	BDL	0
A14-SB03-28	148	148	0
A14-SB14-13	64	64	0
A14-SB06-19	BDL	BDL	0
A16-SB01-09	73	71	-3
A17-SB01-01	604	522	-14

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TABLE C-5 (continued)
SUMMARY OF FLUORESCENCE SURROGATE REPLICATE ANALYSES

Sample	Sample-of-Record TAH (mg/kg)	Replicate TAH (mg/kg)	Relative Percent Difference[1]
A17-SB02-27	70	68	-3
A18-SB01-05	BDL	BDL	0
A26-SB02-10	BDL	BDL	0
A26-SB03-08	5	6	20
A26-SB04-08	42	43	2
A26-SB05-15	77	77	0
A26-SB07-09	BDL	BDL	0
A26-SB08-07	BDL	BDL	0
A26-SB08-15	BDL	BDL	0
A27-SB01-08	BDL	BDL	0
P02-01	BDL	BDL	0
P03-02	BDL	BDL	0
P04-04	BDL	BDL	0

Notes:
1. Relative percent difference calculated according to $\frac{B-A}{A} \times 100$, where A = Sample-of-Record TAV (mg/kg) and B = Replicate TAV (mg/kg).
2. TAH = Total Aromatic Hydrocarbons.
3. BDL = Below Detection Limit.

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Forty-four lab replicate analyses were performed. Additionally, the end-of-day standard sample was analyzed 26 times. Zinc was outside two standard deviations for one test, and copper and chromium were outside two standard deviations on another test. Metals levels for all five metals on those particular test days were generally below detection limits, indicating relatively uncontaminated samples for those test groups. Therefore, no corrective actions were deemed necessary.

3.3 Total Organic Vapors Surrogate Testing QA/QC Protocol. QA/QC protocol for the total organic vapors surrogate testing program consisted of analysis of soil boring field duplicates and a comparison of lab and field results. Additionally, the HNU PI 101 detector was calibrated daily, as specified in SOP-HWCL-02 (Appendix D, Volume 3).

A total of 2052 samples were analyzed for total organic vapors in the field or the lab. Out of a total of 2044 soil boring samples analyzed in both the field and lab, 840 samples, or about 41 percent, had lab headspace readings higher than field headspace readings. Conversely, 141 samples, or about 7 percent, had field headspace readings higher than lab readings. These comparisons indicate that lab headspace readings were generally more responsive for detecting soil organic vapors than field readings. Based upon this observation, a comparison of lab and field results was performed to evaluate field readings comparability relative to lab readings.

Table C-6 presents a summary of the lab and field headspace data comparisons. Out of a total of 529 samples with laboratory responses, 493 samples, or about 93 percent,

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Table C-6
Summary of Soil Total Organics Vapors Field Reading Comparability

Field Headspace Results	Lab Headspace Results(1) Detected	Not Detected
POSITIVE	493	445
NEGATIVE	36	1070
COMPARABILITY (%):	93	71

Note:

1. Reported as total organic vapors concentrations above 0.25 ppm naphthalene equivalents.

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disclosed positive field results. Conversely, out of a total of 1515 samples with no laboratory responses, 1070 samples, or about 71 percent, disclosed negative field results.

Thirty-two of a total of 32 tested split samples, or 100 percent, had positive lab correlations. Table C-4 lists the results of the analyses of the soil boring samples split for duplicate analysis.

4.0 Surrogate Testing Program Summary and Conclusions. Based upon the results of the Spectrix/surrogate testing data comparisons and the surrogate testing QA/QC program, the following observations were made:

1. Fluorescence surrogate testing comparability met acceptable levels for samples with both positive and negative surrogate responses. Relatively high reproducibility was achieved for duplicate and replicate analyses.

2. X-ray fluorescence surrogate testing comparability was below acceptable levels and showed little correlation with Spectrix data. Although reproducibility of some of the duplicate analyses was above acceptable levels, the results were predominately based on samples with levels below detection limits, which incorrectly increased positive correlations. However, the available data may be insufficient to make statistically significant conclusions regarding the X-ray fluorescence method.

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3. Total organic vapors surrogate testing comparability met acceptable levels for soil samples with positive surrogate responses. Lab headspace readings were generally more comparable than field readings. Precision for lab readings of duplicate samples was well above acceptable levels.

Both the fluorescence and total organic vapors surrogate testing programs gave valid data for the desired levels of comparability and precision. The X-ray fluorescence program, however, gave invalid data for these same levels of comparability.

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APPENDIX D

MRA STANDARD OPERATING PROCEDURES

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STANDARD OPERATING PROCEDURE

Number:	SOP-HWF-01	Page: 1 of 6
Originated By:	WRT	Date: Jan. 1986
Approved By:	JLI	Status: Final
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SUBTASK 2D

SOIL AUGER BORING AND SAMPLING PROCEDURES

KOPPERS SOUTH CAVALCADE SITE

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1.0 Drilling and Sampling

1.1 Locate auger boring on auger boring location map. Make any location offset changes directly on map. Set up barricades and traffic cones to delineate work area.

1.2 Label each boring location using following designation:

SCK - AXX - AB01
AB02
"
"

XX refers to EPA/CDM area number referenced from Work Plan. Mark auger boring number on boring location map.

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1.3 Obtain background air measurement near boring location with photoionization detector equipped with 10.2 eV probe. Note span potentiometer setting. Verify that the photoionization detector has been calibrated before daily use.

1.4 Spread disposable plastic sheet over boring location to contain soil cuttings.

1.5 Drill borehole with solid-stem drill auger to a minimum depth of 8 ft. Advance auger in 2-ft increments or at stratigraphic changes. Do not penetrate into upper sand unit unless requested by Project Manager. Note depth of moist soils. Note depth where obstructions are encountered.

1.6 Log each auger boring based on visual classification of soil cuttings. Make careful notations for observable contaminants and depth of fill soils. Note strong or persistent creosote or diesel odors, not slight odors.

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1.7 Obtain representative soil sample at least 0.5 ft deep, or greater. Select sample to correlate with areas of greatest visual contamination. Obtain sample from bottom or tip of auger.

Obtain a minimum of one soil sample per auger boring. Additional soil samples should be obtained if significant variations in contaminant distribution are found.

1.8 Place soil sample into a single 16 oz. detergent washed, glass jar with Teflon-lined lid. Appropriate jars will be marked with a yellow or orange dot on top of lid. Use disposable, wooden tongue depressor to obtain each soil sample. Fill sample jar from two-thirds to three-quarters full to permit headspace readings.

1.9 Label each soil sample consistent with corresponding boring designation:

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SGK - AXX - AB01 - 01
02
03
"
"

Complete jar labels and indicate a single, discrete sample depth. Also mark sample number on top of lid for quick identification.

1.10 Conduct sample field headspace reading at the completion of each boring using photoionization detector equipped with 10.2 eV probe. Record reading directly on field boring log. Note span potentiometer setting.

1.11 Upon completion of each auger boring, obtain a water level measurement and caved depth. If no free water is encountered, note dry conditions on boring log.

1.12 Completely backfill each borehole with dry bentonite powder. Check for settlement after at least 1 day and add additional bentonite if

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needed. Patch or repair paving if appropriate. Spray paint borehole with enamel paint for future location reference.

1.13 At end of each day, complete chain-of-custody documentation and transport samples to MRA lab. No sample cooling provisions are required. All soil samples must be relinquished to MRA lab representative at end of each day.

2.0 Decontamination

2.1 Decontaminate augers between each soil boring using high pressure, hot water spray until visually clean. Decontaminate drilling equipment at end of each day. Use methanol for drilling equipment between boring locations if drill rig becomes visually contaminated with oily residues or free hydrocarbons.

2.2 Collect wash water in sump or metal drums for onsite waste storage.

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2.3 Collect all soil cuttings, plastic sheet, and disposable items and temporarily place into metal drum for transport to onsite waste storage area.

3.0 Documentation (all documents recorded in ink)

3.1 Chain-of-custody forms.

3.2 Daily field activity log.

3.3 Soil boring field log.

3.4 Field record notebook.

a. prevailing wind direction
b. equipment serial numbers
c. background air monitoring
d. work area air monitoring
e. unusual conditions/observations
f. photoionization detector span setting
g. OSHA safety level
h. general weather conditions
i. EPA/CDM communications.

STANDARD OPERATING PROCEDURE

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Page: 1 of 8
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SUBTASK 2D

SOIL BORING AND SAMPLING PROCEDURES

KOPPERS SOUTH CAVALCADE SITE

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1.0 Preparation

1.1 Scale soil boring location on soil boring location map. Make any offset changes on map. Set up barricades and traffic cones to delineate work area.

1.2 Number each soil boring location using the following designation:

SCK - AXX - SB01
SB02
SB03
"
"

where, XX refers to EPA/CDM designated area number referenced on soil boring location map.

1.3 Obtain background air measurement near soil boring location with photoionization detector

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equipped with 10.2 ev probe. Note span potentiometer setting. Verify that the photoionization detector has been calibrated before daily use. Obtain air measurements in breathing zone and at ground level at approximate 15-minute intervals during drilling and sampling.

2.0 Drilling and Sampling

2.1 Drill borehole using hollow-stem auger procedures. Drill water should not be used, unless excessive borehole caving and sloughing is encountered. The utilization of drill water will require prior EPA/CDM verbal approval. Petroleum-based lubricants for down-hole equipment are not permitted. Liquid soap or detergent is permitted as a lubricant.

2.2 Approximately one-half of the boreholes at a designated area shall be drilled to a depth of at least 5 ft below the base of the shallow sand unit. The remaining boreholes at a designated area shall be drilled to a depth of 50 ft. All boreholes shall be terminated in clay soils. Extend boring depths if granular soils

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are encountered at bottom of boring. Extend boring depth if visual soil contaminants or headspace organic vapors are observed at bottom of boring. Offset boring location if underground obstruction is encountered.

2.3 Soil samples should be collected at continuous 2-ft intervals. Continuous soil sampling through the upper water-bearing unit is not required if excessive flowing sand conditions are encountered. Soil samples will be obtained using a split-barrel sampler or a thin-walled tube sampler. Samplers may be advanced by hydraulically pushing or by percussion driving with a hammer. Standard penetration test (SPT) sampling procedures are optional and may be requested by the Project Manager. Note sample recoveries for each sampling attempt, discounting any cuttings that may be included with the recovered sample.

2.4 Extrude each recovered soil sample and visually classify soil type and substructure. Penetration resistance from calibrated pocket penetrometer is optional, and may be requested by

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Project Manager. Make careful notations for observable contaminants and depth of fill soils. Note strong or persistent creosote or diesel odors, not slight odors.

2.5 Select a representative 2-in. to 3-in. soil sample for the sample of record. Select the sample to correlate with areas of greatest visual contamination, if observed. Discard remaining portion of recovered soil sample into temporary metal drum for transport to onsite waste storage area. Decontaminate any reuseable tools or instruments and work area between each sampling interval.

2.6 Obtain 1 duplicate soil sample for every two soil borings. Duplicate soil samples shall be obtained from same sampling interval as a designated surrogate soil sample. Duplicate soil samples shall be labeled with any number from 60 to 69. Inform laboratory manager origin of duplicate soil sample for surrogate test assignments.

2.7 Place the selected soil sample into a single 16 oz. detergent washed, glass jar with Teflon-lined lid. Appropriate jars will be marked

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with a yellow or orange dot on top of lid. Fill the sample jar from two-thirds to three-quarters full to permit headspace readings.

2.8 Label each soil sample consistent with corresponding boring designation:

SCK - AXX - SB01 - 01
02
03
.
.

Complete jar labels and indicate a single, discrete sample depth. Also mark sample number on top of lid for quick identification.

2.9 Conduct sample field headspace reading at least five minutes after placing sample into jar by using photoionization detector equippped with 10.2 eV probe. Record reading directly on field boring log. Note span potentiometer setting.

2.10 Record depth where saturated or moist soils are first encountered.

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2.11 Completely backfill each borehole with a cement-bentonite grout. The grout shall be mixed at a ratio of 1 part bentonite: 2 to 3 parts Portland Type 1 cement. Pump grout from bottom of borehole through the auger stem simultaneously as the auger flights are withdrawn from the borehole until consistent return is observed. Check for settlement after at least 1 day and add additional grout if needed. Patch or repair paving if appropriate. Spray paint paving with enamel paint or install survey stake for future location reference. Borehole grouting may be postponed a maximum of 24 hours provided that auger flights remain in the borehole.

2.12 At end of each day, complete chain-of-custody documentation and transport samples to MRA laboratory. All soil samples should be placed in coolers packed with ice. All soil samples must be relinquished to MRA lab representative at end of each day.

3.0 Decontamination

3.1 Decontaminate drill augers (including annulus) between each soil boring using high pressure,

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hot water spray until visually clean. Decontaminate drilling equipment at end of each day. Use methanol for drilling equipment between boring locations if drill rig becomes visually contaminated with oily residues or free hydrocarbons.

3.2 Decontaminate samplers between each sampling interval by brushing with a detergent solution, followed by a clean water rinse and a methanol spray. Let air dry before subsequent use.

3.3 Collect wash water in sump or metal drums for onsite waste storage.

3.4 Do not permit soil cuttings, drill muds, and borehole grout to contact ground surface. Collect all soil cuttings, excess grout, and disposable items and temporarily place into metal drum for transport to onsite waste storage area.

3.5 Waste storage drums accessible to general public or in high traffic areas must be removed to onsite waste storage area at end of each working day.

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4.0 Documentation (all documents recorded in ink)

4.1 Chain-of-custody forms.

4.2 Daily field activity log.

4.3 Soil boring field log.

4.4 Field record notebook.

a. prevailing wind direction
b. equipment serial numbers
c. background air monitoring
d. work area air monitoring
e. unusual conditions/observations
f. photoionization detector span setting
g. OSHA safety level
h. general weather conditions
i. EPA/CDM communications.
j. record of actual sample numbers and depths of duplicate soil samples.

STANDARD OPERATING PROCEDURE

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METHOD OF FLUORESCENCE ANALYSIS OF TOTAL POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL

1.0 Scope and Application

1.1 This procedure is for the extraction of polynuclear aromatic hydrocarbons (PNA) from soil and analysis of the extract by fluorescence spectrophotometry. This procedure determines total PNA only and cannot resolve the various components of a complex matrix.

1.2. Potential causes for negative interference are paramagnetic species such as dissolved oxygen, iron, copper, and nickel. Other negative interferences are self-quenching and energy transfer quenching. Diamagnetic metals such as zinc and calcium may cause positive interferences. Changes in pH can cause positive or negative interferences. Substituents such as: $-Cl$, $-NO_2$, or $-CO_2H$ tend to quench fluorescence whereas substituents such as: $-NH_2$, $-OH$, or $-OCH_3$ tend to enhance fluorescence.

2.0 Summary of Method

2.1 A soil sample is partially homogenized manually. A portion of this sample is then completely

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homogenized. One gram of the homogenized sample is extracted in cyclohexane, and the extract is analyzed by the synchronous excitation method of fluorescence spectrophotometry to obtain a spectral response. The spectral response is compared to a standard of known PNA concentration for determination of relative total polynuclear aromatic hydrocarbon concentration.

3.0 Apparatus and Materials

3.1 Scanning fluorometer capable of simultaneously scanning the excitation wavelengths from 230 to 500+ nm and the emission wavelengths from 250 to 520+ nm.

3.2 Quartz cuvette with 10 mm path length.

3.3 Rotary tumbler, shaker, or similar device for constant agitation of soil sample.

3.4 Spectral grade cyclohexane.

3.5 Mortar and pestle.

3.6 Glass cutting board and stainless steel knife or device to grate the soil sample.

3.7 A filtering apparatus consisting of Whatman 40 filter paper, glass funnel, suction flask, suction flask adapter, aspirator pump, and tubing.

3.8 Balance capable of weighing to 0.01 mg.

4.0 Sample Collection, Preservation, and Handling

4.1 Soil samples shall be stored in detergent washed, tap water rinsed, 8 oz. or 16 oz. glass jars with Teflon-lined lids.

5.0 Procedure

5.1 Remove the soil sample from the jar (minimum 100 grams) and place on a glass cutting board. With the stainless steel knife or grating device, break down the sample to 1/4-in. sized pieces or less and thoroughly mix the pieces. Thoroughly grind and homogenize the soil with a mortar and pestle, grinder, or ball mill.

5.2 Place 1 gram of the homogenized soil sample onto a weighing paper which has been prewashed in cyclohexane and air dried.

5.3 Add 100 ml of cyclohexane and agitate the soil sample in the extraction apparatus for at least 24 hrs. The extraction apparatus should continuously agitate the sample.

5.4 Filter the extract and place 3 ml of the filtrate in the cuvette. Simultaneously scan the emission wavelengths from 250 to 500 nm and the excitation wavelengths from 270 to 520 nm. The strip chart speed, scan rate, and fixed scale should be at the same settings as for the standard against which the scan is compared.

5.5 Dilution may be necessary to keep the instrument response on scale. If dilution is necessary, place 1 ml of the extract into another glass jar, and add cyclohexane. Several dilutions may be necessary for the instrument response to remain on scale. The dilution factor is calculated as follows:

DF = extract volume x total dilution volume

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5.6 The response constant from the standard is calculated as follows:

$$RC\left(\frac{\text{mg PNA/ml}}{\text{units}}\right) = \frac{\text{mg PNA/standard dilution factor}}{\text{standard area units}}$$

5.7 Measure the area under the peaks of the spectral scan. Calculations are as follows:

$$\text{Total PNA}\left(\frac{\text{mg}}{\text{kg}}\right) = \frac{\text{sample area units x RC x DF}}{\text{sample weight (kg)}}$$

5.8 The instrument detection limit is determined by diluting a known concentration of a standard until it no longer registers a spectral response, when background corrections are made. The analytical detection limits are determined by multiplying the instrument detection limit by the dilution factor for each analysis.

5.9 Record all data and calculations on the Spectral Scan Data Sheet, which is to be attached to the fluorescence spectrum of the sample.

6.0 Equipment Cleanup

6.1 All equipment exposed to soil samples or soil extracts must be detergent washed and tap water rinsed followed by a cyclohexane rinse. This includes the knife and/or grating device, cutting board, funnel, extraction bottles, etc. The cuvette must be washed by an ammonia-based glass cleanser, tap water rinse, distilled water rinse, followed by a cyclohexane rinse. Repeat the process until no contamination is visually evident. Filters and weighing papers should be prewashed by placing in a beaker of cyclohexane for 15 minutes. Air dry filters and weighing papers overnight after washing and store to avoid dust accumulation.

7.0 Quality Assurance/ Quality Control Measures

7.1 One out of every ten samples should have a replicate analysis from the same extract. If the replicate sample results vary more than 10 percent from the original analysis, a second duplicate analysis should be conducted on a different sample.

7.2 A rinseate blank should be analyzed consisting of cyclohexane exposed to glassware, cutting board, knife, and analytical materials for every ten samples analyzed.

STANDARD OPERATING PROCEDURE

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CALIBRATION OF THE HNU PI 101 PHOTOIONIZATION ANALYZER

1.0 Scope and Application

1.1 This procedure is designed to calibrate the HNU PI 101 Photoionization Analyzer to permit direct measurement relative to isobutylene. Calibration is performed to provide a basis for using a constant napthalene response factor relative to isobutylene.

2.0 Summary of Method

2.1 Two isobutylene standards are analyzed with the instrument to determine span potentiometer settings which give direct measurement relative to isobutylene. The average of the two span potentiometer settings is used for subsequent field air quality monitoring and soil sample headspace analysis.

3.0 Apparatus and Materials

3.1 HNU PI 101 Photoionization Analyzer manufactured by HNU Systems, Cambridge, Massachussetts with 10.2 eV probe.

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3.2 Certified 10 ppm and 50 ppm isobutylene standards in nitrogen. Standards can be obtained from Scott Specialty Gases, Houston, Texas.

3.3 A flow meter calibrated in 1 standard cubic feet per hour (SCFH) increments with appropriate fittings for connection to bottled gas standards and a pressure regulator.

3.4 Teflon tubing, 3/16 in. ID and 1/8 in. ID.

3.5 Ultrasonic cleaner.

3.6 Kimwipes.

3.7 Long-stem cotton swabs.

3.8 Cleaning compound from HNU Systems, Cambridge, Massachussetts.

3.9 Phillips head screwdriver and small flat-head screwdriver.

3.10 Spectral grades of methanol and acetone. Cyclohexane may be used in place of acetone.

4.0 Probe Cleaning

4.1 Hold probe upright and remove the black end cap. The white Teflon ionization chamber will probably remain in the cap. Gently tap the end cap until the ionization chamber drops out.

4.2 Remove the UV lamp and add several drops of HNU cleaning compound to the bottom of the lamp (the metal support where the small lens is located) and on the inside rim of the metal support. Take a cotton swab and kimwipe and rub in a circular motion until visually clean.

4.3 Dip a kimwipe into the methanol and thoroughly clean the same areas. Set aside and let the lamp air dry 15 minutes.

4.4 Place the ionization chamber with wire mesh screen side facing up. Remove 4 small screws from the metal ring. The metal ring is held in place by one solder connection which must not be broken. The metal ring can be gently pivoted out of the way of the wire mesh screen. Remove wire mesh screen and gently push metal ring back in place. Rinse the screen with acetone or cyclohexane and let air dry 5 minutes. Follow with a methanol rinse.

4.5 The ionization chamber should be placed in acetone or cyclohexane in an ultrasonic cleaner for at least 5 minutes. Remove and let air dry 5 minutes.

4.6 Place the ionization chamber in a beaker of methanol for 5 minutes. Remove the ionization chamber and let it air dry for 1 hour, or place in oven at 50 to 100°C for 10 minutes. The oven must not be concurrently used for samples. Be sure that the ionization chamber is covered with a kimwipe during drying to prevent dust accumulation.

4.7 Flush the aluminum probe extension with acetone or cyclohexane. Use long-stem cotton swabs to thoroughly clean the inside of the extension, followed by a methanol rinse. Oven dry at 50 to 100 °C for 10 minutes, or air dry for 1 hour.

4.8 Reassemble the probe and attach it to the readout module. Turn the function switch to "BATT". The meter needle should be in the green area of the meter display and the low battery indicator light should not be on. Turn the function switch to "STANDBY" and statically zero the instrument using the electronic zero potentiometer. Turn the function switch to the

0-20 scale. A properly cleaned instrument will display a 0.1 to 0.5 ppm response to normal laboratory background air quality at a span potentiometer setting of 9.8. Background readings greater than about 0.5 ppm indicate that further drying of the probe elements or further cleaning may be necessary. Length of time between cleanings may vary.

5.0 Calibration

5.1 Attach the pressure regulator/flow meter assembly to the 10 ppm isobutylene calibration gas bottle.

5.2 Attach the Teflon tubing to the flow meter with a reducer so that there is a good seal.

5.3 Turn the instrument on and check the battery. If the battery charge is satisfactory, then electronically zero the instrument using the zero potentiometer. Record the initial span potentiometer setting.

5.4 Attach the free end of the Teflon tubing to the probe inlet. This inlet is accessible with the aluminum probe extension off. Open the flow meter valve so that a constant 2 SCFH reading is obtained.

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5.5 Set the meter range to the 0-200 scale for the 10 ppm isobutylene standard, and to the 0-2000 scale for the 50 ppm isobutylene standard. Record the initial measurement as one-tenth of the meter reading.

5.6 Adjust the span potentiometer, if necessary, to obtain the correct direct reading for the calibration gas concentration. Record the new span potentiometer setting and measurement reading in accordance with Step 5.5.

5.7 Close the valve to the gas bottle and the flow meter. Remove the regulator/flow meter assembly and attach to the 50 ppm isobutylene calibration gas bottle. Perform Steps 5.3 to 5.6. Calculate the average value for the final span potentiometer settings for both standards and lock the span potentiometer setting in place. Electronically zero the instrument again, if necessary.

6.0 Documentation

6.1 Record all calibration data on Photoionization Detector Calibration Record.

7.0 References

Instruction Manual for Model PI 101 Photoionization Analyzer, HNU Systems, 1975.

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PHOTOIONIZATION DETECTOR CALIBRATION RECORD

PROJECT: PROJECT NO.: CLIENT:	PHOTOIONIZATION DETECTOR MODEL SERIAL NO.	CALIBRATION GAS GAS TYPE: FLOW RATE (SCFH): LOW STANDARD (PPM): HIGH STANDARD (PPM):
CALIBRATION LOCATION: ☐ LABORATORY ☐ FIELD		SCALE SETTING

DATE / BY	ZERO CHECK (D) DYNAMIC (S) STATIC	ZERO ADJUSTMENT INITIAL YES	ZERO ADJUSTMENT INITIAL NO	ZERO ADJUSTMENT FINAL YES	ZERO ADJUSTMENT FINAL NO	LOW STANDARD CALIBRATION SPAN SETTING INITIAL	LOW STANDARD CALIBRATION SPAN SETTING FINAL	LOW STANDARD CALIBRATION READING INITIAL	LOW STANDARD CALIBRATION READING FINAL	HIGH STANDARD CALIBRATION SPAN SETTING INITIAL	HIGH STANDARD CALIBRATION SPAN SETTING FINAL	HIGH STANDARD CALIBRATION READING INITIAL	HIGH STANDARD CALIBRATION READING FINAL	AVERAGE SPAN SETTING	PROBE CLEANED (Y) YES (N) NO

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Number:	SOP-HWCL-03	Page:	1 of 7
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		Rev.:	0

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METHOD OF X-RAY FLUORESCENCE ANALYSIS OF METALS IN SOIL

1.0 Scope and Application

1.1 This procedure is for the qualitative analysis of metals in soil using an X-ray fluorescence analyzer. A radioactive source is chosen which emits X-rays to obtain spectral responses from metal compounds in a soil media. Metals can be identified and quantified by the characteristic energies which they re-emit. Typical lower detection limits are 25 to 50 ppm in complex soil media.

2.0 Summary of Method

2.1 A dried and homogenized soil sample is placed in a calibrated X-ray fluorescence analyzer and subjected to X-rays. Re-emitted X-rays are detected and analyzed to identify metals and their concentrations.

3.0 Apparatus and Materials

3.1 A Columbia Scientific Industries X-Met 840 Portable X-Ray Analyzer with powder/liquid sample probe.

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3.2 Analytical balance capable of weighing to 0.1gm.

3.3 Plastic sample cups and mylar film from Columbia Scientific Industries.

3.4 Drying oven capable of maintaining a constant temperature of 105° C.

3.5 Grinder, ball mill grinder, mortar and pestle, or similar apparatus capable of reducing dry soils to fine powders.

3.6 Glass cutting board and stainless steel knife or device to grate the sample.

3.7 U.S. Standard Sieve No. 10 (2.00 mm) and U.S. Standard Sieve No. 200 (0.075 mm).

4.0 Sample, Preservation, and Handling

4.1 Samples shall be stored in detergent washed, tap water rinsed 8 oz. or 16 oz. glass jars with Teflon-lined lids at 4°C. Maximum holding time for soil samples is 6 months. At least 100 gm of soil is required.

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5.0 Procedure

5.1 Remove the sample from the jar and place it on a glass cutting board. With a stainless steel knife or grating device, break the sample down to 1/4-in. pieces or less and thoroughly mix the samples.

5.2 Fill a weighing dish with about 50 gm of soil and record the weight of the soil. Dry the soil for 24 hours at a constant temperature of 105°C. Weigh the dried soil and compute the moisture content on a dry weight basis, in accordance with ASTM D 2216.

5.3 Grind the samples in the grinding apparatus until they are fine powders. Samples with gravel and large organic materials should be sieved first with a U.S. Standard Sieve No. 10. Weigh and record the weight of material retained on the sieve. After grinding is complete, the powders should be sieved with a U.S. Standard Sieve No. 200. Materials passing the U.S. Standard Sieve No. 200 are to be used for the analysis. Samples with high concentrations of organic compounds may not pass the No. 200 sieve and should be sieved with a U.S. Standard Sieve No. 10 if less than 5 gm pass the No. 200 sieve.

5.4 Prepare the sample cup by placing a piece of the mylar film over the bottom of the larger half of the sample cup. Snap the smaller half of the sample cup over the bottom of the larger half. This clamps the mylar film in place. The film should be tight, without wrinkles.

5.5 Fill the cup with the dried, pulverized samples. Tap the cup on a hard surface until no more settling is observed to occur and the sample surface is visually flat and uniform. A 1/4 in. to 1/2 in. layer of sample should be in each cup.

5.6 Turn the X-MET 840 on. The LCD should read "SELF TEST COMPLETE" and the ">" sign should be displayed. This display may be replaced by "GAIN CONTROL: COUNT RATE TOO LOW". This is normal. Allow the machine to warm up for at least 1/2 hour with the probe lid closed. Open up the lid and wait an additional 5 minutes for gain control stabilization. The instrument is ready to measure samples. Keep the lid of the probe open for gain control between the sample analyses.

5.7 Place the sample cup in the probe, making sure the lid is completely closed, and press "START".

After it has finished scanning, "ASSAYS" will appear and the metals of interest and their concentrations (mg/kg dry weight basis) will appear on the screen. Record the results on the X-ray Analysis Data Sheet. Enter "STD" on the keypad after each measurement and record the standard deviation of counting statistics for each metal. Store the samples in glass storage vials for future reference. Report results by total wet weight. Calculations are as follows:

$$\frac{\text{Sample Dry wt.}}{\text{Sample Wet wt.}} \times \text{Results (mg/kg)} = \text{Corrected Results (mg/kg)}$$

For samples that were sieved with a U.S. Standard Sieve No. 10, the weight of materials retained should be subtracted from the sample dry weight in the calculations:

$$\frac{\text{Sample Dry wt.} - \text{Retained Sample wt.}}{\text{Sample Wet wt.}} \times \text{Results (mg/kg)} = \text{Corrected Results (mg/kg)}$$

6.0 Equipment Cleanup

6.1 The knife, grating device, and cutting board should be detergent washed and tap water rinsed to

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remove all dirt and air dried between samples. The cups should be detergent washed and tap water rinsed between samples and air dried. Replace the mylar film between each analysis.

7.0 Quality Assurance/Quality Control Measures

7.1 Ten percent of the samples will have a replicate analysis to evaluate analytical precision. Randomly choose 1 sample and prepare a separate aliquot and perform analysis in accordance with Section 5.0. Record the results on the X-Ray Analysis Data Sheet. Record the respective standard deviations of counting statistics.

7.2 Compute the differences for each metal concentration between the original analysis and the replicate analysis. If any values differ by greater than 2 reportable standard deviations, then conduct a second relicate analysis on a third aliquot from the same sample. Reportable standard deviation is defined as the greater of the two values of the standard deviation of counting statistics and the calibration model standard deviation.

7.3 To check for instrument precision, perform an analysis of a known standard. This should be performed once per day. If the average of the standard results vary greater than 2 reportable standard deviations, then open the lid of the probe to allow it to undergo gain control for 15 minutes. Remeasure the sample.

8.0 References

8.1 Operating Instructions: X Met 840 Portable XRF Analyzer, Columbia Scientific Industries, 1985.

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X-RAY ANALYSIS DATA SHEET

PROJECT NO.:	PROJECT:	CLIENT:

DATE TESTED:	BY:						METALS CONCENTRATION/SAMPLE STANDARD DEVIATION				
			TARE WEIGHT	CAN PLUS WET SOIL	CAN PLUS DRY SOIL	WATER CONTENT	ARSENIC	CHROMIUM	COPPER	LEAD	ZINC
SAMPLE NO.	DEPTH	SAMPLE DATE					MODEL SD=32 MODEL DL=60	MODEL SD=204 MODEL DL=58	MODEL SD=42 MODEL DL=25	MODEL SD=162 MODEL DL=101	MODEL SD=56 MODEL DL=30

REPLICATE SAMPLE NO.	METAL	STANDARD VALUE / END-OF-DAY VALUE	DEV.						
				REPLICATE 1 RESULTS					
	As	1578 ± 67		DIFFERENCE					
STANDARD SAMPLE NO.	Cr	1435 ± 200		LESS THAN 2 STANDARD DEVIATIONS ?	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO
CHECKED BY:	Cu	427 ± 37		REPLICATE 2 RESULTS					
DATE:	Pb	174 ± 63		DIFFERENCE					
STATUS: ☐ DRAFT ☐ FINAL	Zn	2612 ± 56		LESS THAN 2 STANDARD DEVIATIONS ?	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO

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APPENDIX E

ANALYTICAL DATA VALIDATION CRITERIA

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APPENDIX E

ANALYTICAL DATA VALIDATION CRITERIA

1.0 General

Data from soil, sediment, groundwater, surface water, duplicates, and field blanks collected during the RI were subjected to data validation to evaluate their completeness as outlined in the Quality Assurance/Quality Control Plan. Matrix spike/matrix spike duplicate (MS/MSD) samples were not validated.

The data generated by the analytical laboratory was evaluated based on criteria developed by NUS Corporation, Superfund Division, for the EPA. Technical Directive Documents No. HQ-8410-01 "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" were used to aid in developing validation criteria pertinent to this project. Data validation was based on the following criteria:

a. correct sample containers
b. completeness of chain-of-custody
c. samples extracted and analyzed within proper holding times
d. use of proper internal standards
e. percent recovery of surrogates and matrix spikes
f. RPD between matrix spike duplicates or replicate samples
g. tuning and calibration of instruments
h. proper use of blanks
i. proper reporting of results

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The results are divided into three categories. The first category is valid (V) results. These are results that were judged to have been obtained with no question as to the validity of the data. The second category is qualitative (Q) results, which were judged to be acceptable for identification purposes only, due to problems with the sample itself or its respective quality control data. The last category included invalid (I) results. These are results that were judged to be unusable due to problems with the sample or its respective quality control data. An audit checklist for each fraction is included in Section 5.0 of this appendix.

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2.0 Organics Analyses

For each sample, the criteria listed as follows were utilized to classify and describe affected analytical data as qualitative (Q) for each organic analysis:

- If holding times were exceeded, all positive and undetected reported values for compounds in both sample fractions are considered qualitative.

- For an acid and base/neutral extractables analysis, any common phthalate ester that was detected in the blank at a concentration greater than five times the required detection limit and in the sample at a concentration of less than ten times of that found in the blank is considered qualitative at the new quantitation limit, set at the reported value.

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- For a volatiles analysis, any common laboratory solvent contaminant, such as methylene chloride, acetone and toluene, that was detected in the blank at a concentration greater than five times the required detection limit and in the sample at a concentration of less than ten times of that found in the blank is considered qualitative at the new quantitation limit, set at the reported value.

- For either acid, base/neutral, or volatile analyses, compounds other than the common phthalate esters or laboratory solvents that were detected in the blank and in the sample at less than five times the concentration in the blank are considered qualitative at the new quantitation limit, set at the reported value.

- Any compound that was found to be improperly blank corrected for that sample was evaluated as being qualitative.

- If any two surrogate spike recoveries within an acid or base/neutral fraction or any one surrogate in a volatile fraction were out of the control limits, but have recoveries greater than ten percent, all compounds in the affected fraction are considered qualitative.

- If any one surrogate in an acid, base/neutral, or volatile fraction showed less than ten percent recovery, all compounds in the affected fraction are considered qualitative.

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- If all surrogates in any one fraction were not quantitated due to sample dilution, all reported values, positive or negative, in the affected fraction are considered qualitative.

- For the blank, if any two surrogate recoveries within an acid or base/neutral fraction or at least one surrogate in a volatile fraction were out of the control limits or any surrogate showed less than ten percent recovery, the reviewer must determine if this problem is an isolated occurrence, or if there is a fundamental problem with the analytical process before any data can be considered qualitative.

- If the chain-of-custody documentation was found to be incomplete but the sample can be traced to field notes, all compounds for that analysis and/or sample are considered qualitative.

The criteria listed as follows was used to classify the analytical data for each organic analysis as invalid (I):

- If the chain-of-custody documentation was found to be incomplete and not traceable through analysis or field notes, all compounds for that analysis and/or sample are considered unusable.

- If incorrect units were reported, all compounds affected are classified as invalid.

- If discrepancies were found for reported values between the analysis data sheet and the quantitation report for either detected or undetected compounds, all compounds reported as two different values are determined to be invalid.

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- If no blanks were analyzed as per the requirements for that analysis batch, all compounds for each sample in the entire test batch with positive results are classified as invalid.

- If any compound was detected as a gross contaminant in the blank (i.e., saturated peaks by GC/MS), the data for those same compounds with positive reported values in any sample included in that batch are considered invalid.

- If any two or more surrogate recoveries, within a fraction, were less than ten percent, the compounds for that sample fraction are considered invalid.

- If no matrix and matrix spike duplicates were analyzed per 20 samples of the same matrix, all samples for that batch are considered invalid.

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3.0 Inorganic Analysis

If any one or more of the following statements was found to be true, the affected data for each inorganic analysis as described as follows was classified as qualitative (Q):

- If holding times were exceeded, all positive and negative reported values for elements affected in that sample are considered qualitative.

- If contaminant analytes were detected in samples at a concentration of less than five times the concentration found in the associated

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blank, those elements are considered qualitative at the new quantitation limit, set at the reported value.

- If a laboratory duplicate analysis result for a particular element fell outside the control windows of 20 relative percent difference (RPD) or percentage contract required detection limit, whichever is appropriate for water samples; or 35 RPD or percentage contract required detection limit, whichever is appropriate, for soil/sediment samples, the results for that analyte in all other samples of the same matrix and samples analysis batch are considered qualitative.

- If a laboratory spike analysis recovery result was found to be greater than 125 percent for any element analyzed by ICP or cold vapor AA for mercury and greater than 145 percent for any element analyzed by furnace AA (antimony, arsenic, lead, selenium, and thallium), any positive reported results for that element, within the sample batch, are classified as qualitative data.

- If a laboratory spike analysis recovery result for an element analyzed by ICP or cold vapor AA for mercury fell between 30 and 74 percent or 40 and 84 percent for any element analyzed by furnace AA, all positive and/or negative reported results for that analyte, within the representative sample batch, are considered qualitative.

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- If the chain-of-custody documentation was found to be incomplete, but the sample can be traced to field notes, all elements for that analysis and/or sample are considered qualitative.

- If spike recovery results fell below 30 percent for ICP elements and cold vapor AA for mercury, or below 40 percent for elements analyzed by furnace AA, all data for that element in every sample included in the batch represented by that spike sample are considered qualitative.

Any sample analytical data for inorganic analyses that met the criteria described as follows was classified as invalid (I):

- If the chain-of-custody documentation was found to be incomplete and not traceable through analysis or field notes, all elements for that analysis and/or sample are considered invalid.

- If for water samples, any undetected elements with a dilution factor of 1 was reported at a detection limit different than the contract required detection limits, the affected element for that particular sample is classified as invalid.

- If incorrect units were reported, all elements affected are classified as invalid.

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- If no blank was analyzed for the sample analysis batch (20 samples), all elements for each sample in the entire test batch with positive reported results are classified as invalid.

- If no duplicate or spike sample was analyzed for the sample analysis batch, all data in that batch are considered invalid.

- If duplicate sample results for any element were found to have RPD greater than 50 in a water sample or greater than 100 in a soil sample, for a sample with a concentration level in the duplicate greater than five times the required detection limit, the results for the element in every sample in that represented batch is classified as invalid.

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4.0 Data Quality

Tables E-1 through E-4 reflect the completeness of each media sampled. Completeness of the sample was based on validation criteria discussed in Sections 2.0 and 3.0. Only those samples that were evaluated as valid were considered complete. Completeness goals were established in the QA/QC Plan for each media sampled. A completeness goal of 75 percent was established for inorganic and organic data from groundwater and surface water samples. A 60 percent completeness goal was established for inorganic and organic data generated from soil and sediment samples. The actual completeness of each parameter is a measure of the total number of valid samples out of the total number of samples analyzed.

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4.1 Groundwater. Table E-1 shows the calculated completeness data for groundwater samples collected at the site. Samples were analyzed for volatile organic compounds, acid and base/neutral extractables, pesticides/PCBs, and priority pollutant metals.

4.2 Surface Water. Table E-2 shows the calculated completeness data of surface water samples. Surface water samples were analyzed for volatile organic compounds, acid and base/neutral extractables, and priority pollutant metals.

4.3 Soil Samples. The completeness data for soil samples is shown on Table E-3. Soil samples were analyzed for acid and base/neutral extractables, five priority pollutant metals and iron.

4.4 Sediment Samples. Table E-4 summarizes the completeness data for sediment samples. The sediment samples (one-third) were analyzed for volatile organic compounds, acid and base/neutral extractables, priority pollutant metals, and iron.

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TABLE E-1

SUMMARY OF COMPLETENESS FOR GROUNDWATER SAMPLES

Parameter	Total Samples Analyzed	Total Samples Validated	Total Samples Valid (V)	Completeness Goal	Actual Completeness
Volatile Organic Compounds	42	42	35	75%	83.3%
Acid Extractables	60	60	28	75%	46.7%
Base/Neutral Extractables	60	60	30	75%	50.0%
Pesticides/PCBs	44	44	41	75%	93.2%
Antimony	42	42	17	75%	40.5%
Arsenic	60	60	50	75%	83.3%
Cadmium	42	42	24	75%	57.1%
Iron	41	41	25	75%	61.0%
Lead	60	60	50	75%	83.3%
Mercury	42	42	27	75%	64.3%
Selenium	42	42	22	75%	52.4%
Silver	42	42	24	75%	57.1%
Thallium	42	42	29	75%	69.1%
Other Metals[1]	60	60	52	75%	86.7%

Notes:
1. Includes beryllium, chromium, copper, nickel, and zinc evaluated cumulatively.
2. Totals do not include field blanks, trip blanks, or duplicates.

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TABLE E-2

SUMMARY OF COMPLETENESS FOR SURFACE WATER SAMPLES

Parameter	Total Samples Analyzed	Total Samples Validated	Total Samples Valid (V)	Completeness Goal	Actual Completeness
Volatile Organic Compounds	6	6	4	75%	66.7%
Acid Extractables	10	10	10	75%	100%
Base/Neutral Extractables	10	10	10	75%	100%
Metals[1]	10	10	10	75%	100%
Cyanide	10	10	10	75%	100%

Notes:
1. Includes antimony, arsenic, beryllium, cadmium, chromium, copper, iron, silver, selenium, thallium, lead, mercury, nickel, and zinc evaluated cumulatively.
2. Totals do not include field blanks, trip blanks, or duplicates.

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TABLE E-3

SUMMARY OF COMPLETENESS FOR SOIL SAMPLES

Parameter	Total Samples Analyzed	Total Samples Validated	Total Samples Valid (V)	Completeness Goal	Actual Completeness
Acid Extractables	82	82	75	60%	91.5%
Base/Neutral Extractables	82	82	75	60%	91.5%
Metals[1]	84	82	82	60%	97.6%
Cyanide	84	82	80	60%	95.2%

Notes:
1. Includes arsenic, copper, chromium, iron, lead, and zinc.
2. Totals do not include duplicates.

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TABLE E-4

SUMMARY OF COMPLETENESS FOR SEDIMENT SAMPLES

Parameter	Total Samples Analyzed	Total Samples Validated	Total Samples Valid (V)	Completeness Goal	Actual Completeness
Volatile Organic Compounds	7	7	7	60%	100%
Acid Extractables	12	12	8	60%	66.7%
Base/Neutral Extractables	12	12	8	60%	66.7%
Iron	5	5	5	60%	100%
Other Metals[1]	12	12	12	60%	100%
Cyanide	12	12	12	60%	100%

Notes:
1. Includes antimony, arsenic, beryllium, cadmium, chromium, copper, lead, silver, selenium, thallium, mercury, nickel, zinc, evaluated cumulatively.
2. Totals do not include field blanks, trip blanks, or duplicates.

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5.0 AUDIT CHECKLISTS

VOLATILE ORGANIC COMPOUNDS DATA AUDIT CHECKLIST

SAMPLE NUMBER_____
SAMPLE IDENTIFICATION_____
SAMPLE MATRIX_____
DATE COLLECTED_____

1. Was the sample collected in the proper container?

2. Were samples properly preserved on ice from time of collection?

3. Is the chain of custody complete, as follows:
   a) Dates and signatures for each transfer of custody?
   b) Chain of custody tape used?
      1/ if so , intact upon receipt into the laboratory?

4. Are there any discrepancies between the chain-of-custody form and the report forms?

5. Were the analyses performed within the proper holding times?
   ie. (7 days for water samples)
   (10 days for soil samples)

6. Were the results reported in the correct units?
   ie. (ug/L for water samples)
   (ug/Kg for soil samples)

7. Were there any discrepancies between the analysis data sheet and the quantitative report for reported values?

8. Were bromochloromethane, 1,4-difluorobenzene and chlorobenzene-d5 used as internal standards at 50 ug/L?

9. Were toluene-d8, p-bromofluorobenzene and 1,2-dichloroethane-d4 used as surrogates at 50 ug/L?

10. Was one matrix spike sample and one matrix spike sample duplicate analyzed?

11. Was a laboratory blank run?

12. Was one matrix spike and matrix spike duplicate fortified with 1,1-dichloroethane, trichloroehtene, chlorobenzene, toluene and benzene at 50 ug/L?

13. Did the blank contain no greater than 5 times the detection limit of common laboratory solvents: methylene chloride, acetone and toluene?

14. Were surrogates found to be within the expected ranges?

15. If any one surrogate was found to be outside the required limit, is there any evidence of corrective action?

16. Were the matrix spike and matrix spike duplicate recoveries within the advisory EPA limits?

17. Were the RPDs (relative percent difference) between the matrix spike and matrix spike duplicate within the advisory EPA limits?

18. Were the required detection limits reported?

METALS DATA CHECKLIST

SAMPLE NUMBER_____
SAMPLE IDENTIFICATION_____
SAMPLE MATRIX_____
DATE COLLECTED_____

1. Was the sample collected in the proper container (either polyethylene or glass)?

2. Were the samples properly preserved at the time of collection? (With nitric acid (HNO_3) and to a pH of less than 2.)

3. Is the chain-of-custody complete as follow:
   a) Dates and signatures for each transfer of custody?
   b) Chain of custody tape used?
      -If so, was it intact upon receipt into the laboratory?

4. Are there any discrepancies between the chain-of-custody form and the report form?

5. Were the analyses performed within 6 months of sample collection?

6. Were the results reported in the correct units?
   ie.(ug/L for a water sample)
   (ug/Kg for a soil sample)

7. Was one matrix spike analyzed?

8. Was one duplicate sample analyzed?

9. Was a method blank analyzed?

10. Were the recoveries of elements added in the matrix spike between 75 ans 125 percent?

11. Were the required detection limits reported?

12. If any value obtained in the duplicate sample was greater than 5 times the required detection limit, was the RPD plus or minus 20 percent?

13. If any value obtained in the duplicate sample was less than 5 times the required detection limit, was the RPD plus or minus the required detection limit?

14. Were any elements found to be above the required detection limit in the bank?

15. If so, do any of the samples contain values less than the required detection limit?

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ACID, BASE-NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS DATA AUDIT CHECKLIST

SAMPLE NUMBER _____
SAMPLE IDENTIFICATION _____
SAMPLE MATRIX _____
DATE COLLECTED _____

1 Was the sample collected in the proper container:
1-liter amber glass bottle for a water sample?
glass amber jar for a soil sample?

2. Were samples properly preserved on ice from time of collection?

3. Is the chain-of-custody complete as follows:
dates and signatures for each transfer of custody?
chain-of-custody tape used?
if so, intact on receipt into laboratory?

4. Are there any discrepancies between the chain-of-custody form and the report forms?

5. Was the extraction performed within the proper holding times:
5 days for water samples?
10 days for soil samples?

6. Was the sample extract analyzed within 40 days of extraction?

7. Were the results reported in the correct units:
ug/L for a water sample?
ug/Kg for a soil sample?

8. Are there any discrepancies between the analysis data sheet and the quantitative report for the reported values?

9. Were 1,4-dichlorobenzene-d4, naphthalene-d8, acenaphthene-d10, phenanthrene-d10, chrysene-d12, and perylene-d12 used as internal standards?

10. Were nitrobenzene-d5, 2-fluorobiphenyl and p-terphenyl-d14 used as surrogates at 50 ug in the sample extract?

11. Were phenol-d5, 2-fluorophenol and 2,4,6-tribromophenol used as surrogates at 100 ug in the sample extract?

12. Was one matrix spike and one matrix duplicate sample analyzed?

13. Was a method blank run?

14. Were the matrix spike and matrix spike duplicate fortified with 1,2,4-trichlorobenzene, acenaphthalene, 2,4-dinitrotoluene, di-n-butylphthalate, pyrene, N-nitrosodi-n-propylamine and 1,4-dichlorobenzene?

15. Did the blank contain no greater than 5 times the required detection limit of common phthalate esters?

16. Were the compounds found in the blank properly noted on the data sheet?

17. Were surrogates found to be in the expected ranges?

18. If two surrogates from either base/neutral or acid fraction are out of the limits or if recovery of any one surrogate is below 10%, is there evidence of corrective action?

19. Were the matrix spike and matrix spike duplicate recoveries within the advisory EPA limits?

20. Were the RPDs (relative percent difference) between the matrix spike and matrix spike duplicate results within the advisory EPA limits?

21. Were the required detection limits reported?

PESTICIDE DATA AUDIT CHECKLIST

SAMPLE NUMBER _____
SAMPLE IDENTIFICATION _____
SAMPLE MATRIX _____
DATE COLLECTED _____

1. Was the sample collected in the proper container:
   1-liter amber glass bottle for water sample?
   glass amber jar for a soil sample?

2 Were samples properly preserved on ice from time of collection?

3. Is the chain-of-custody complete as follows:
   dates and signatures for each transfer of custody?
   chain-of-custody tape used?
   if so, intact on receipt into laboratory?

4. Are there any discrepancies between the chain-of-custody form and the report form?

5. Was the extraction performed within the proper holding times:
   5 days for water samples?
   10 days for soil samples?

6. Was the sample extract analyzed within 40 days of extraction?

7. Were the results reported in the proper units:
   ug/L for a water sample?
   ug/Kg for a soil sample?

8. Are there any discrepancies between the analysis data sheet and the quantitative report for the reported values?

9. Was dibutylchlorendate used as a surrogate in the sample extract?

10. Was one matrix spike and one matrix spike duplicate sample analyzed?

11. Was a method blank run?

12. Were the matrix spike and matrix spike duplicate fortified with lindane, heptachlor, aldrin, dieldrin, endrin, and 4,4'-DDT?

13. Were the compounds found in the blank properly noted on the data sheet?

14. Was the surrogate found to be in the expected range?

15. If the surrogate was found to be out of the expected range, is there any evidence of corrective action?

16. Were the matrix spike and matrix spike duplicate recoveries within the advisory EPA limits?

17. Were the RPDs (relative percent difference) between the matrix spike and matrix spike duplicate results within the advisory EPA limits?

18. Were the required detection limits reported?

APPENDIX F - GROUNDWATER MONITORING WELL LOGS

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MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-1

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

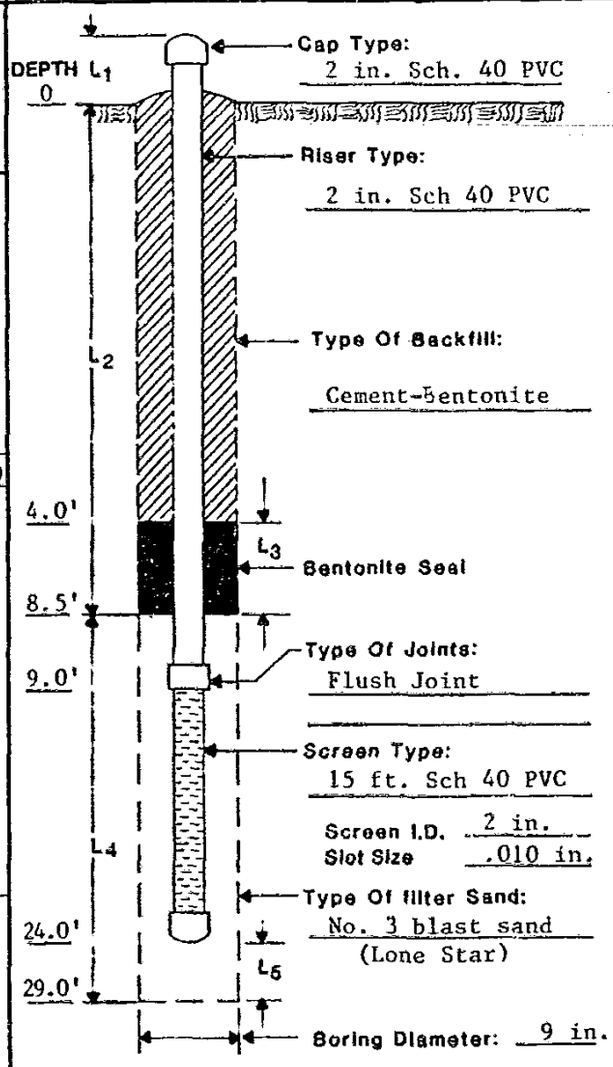
TECHNICAN: P.C. Moore

N 733,700 E 3,157,490

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION TOP OF RISER ELEV.53.24'
						Brownish Gray SANDY CLAY (CL)
5						-tan @ 4'
						Tan CLAYEY SAND (SC)
10		01S	0	4	X	Light gray & tan SAND (SP) wet
15						
20						Reddish brown CLAY (CH)
25		02A	0	3	▼	
						Bottom @ 29'

MONITORING WELL NO. SCK-MW01



REMARKS

COMPLETION DATE: 7-28-86
WELL DEVELOPMENT DATE: 8-11-86
DEPTH TO WATER : 9.2 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 2.9 ft. L_4 = 20.5 ft.
L_2 = 8.5 ft. L_5 = 5 ft.
L_3 = 4.5 ft.

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MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-2

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

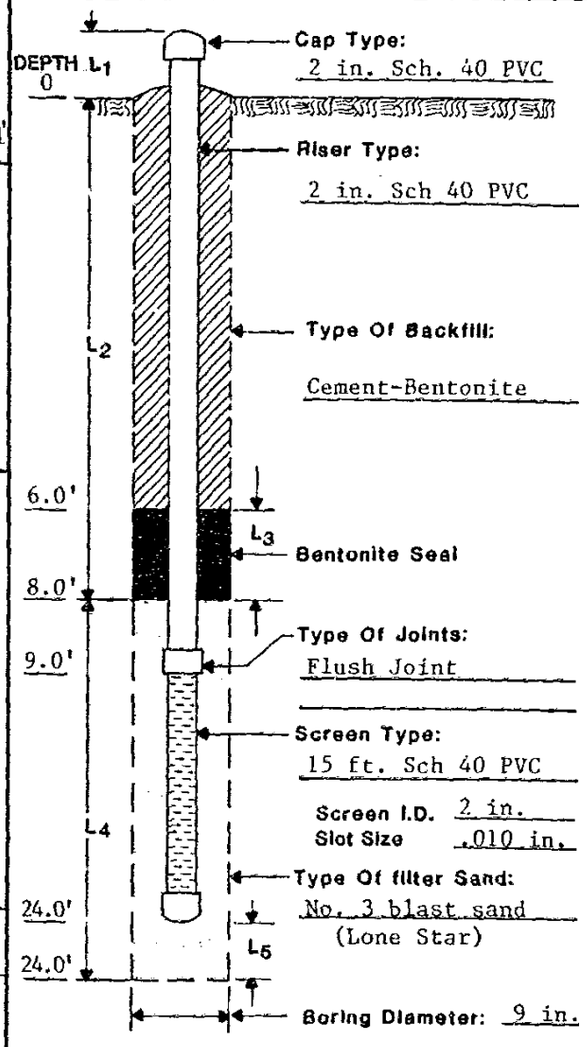
TECHNICAN: P.C. Moore

N 733,230 E 3,157,830

LOG OF BORING NO.

MONITORING WELL NO. SCK-MW02

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 52.81'
5						Lt. gray & tan SANDY CLAY (CL)
10		01S	0	0		Light gray SILTY FINE SAND (SM) wet, w/creosote odor
15						
20						Reddish brown CLAY (CH)
25						Bottom @ 24'



REMARKS

COMPLETION DATE: 7-30-86
WELL DEVELOPMENT DATE: 8-11-86
DEPTH TO WATER : 8.8 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow stem auger

CONSTRUCTION DATA

L_1 = 3 ft. L_4 = 16 ft.
L_2 = 8 ft. L_5 = 0 ft.
L_3 = 2 ft.

McBride-Ratcliff and Associates, Inc.

007290

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-3

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

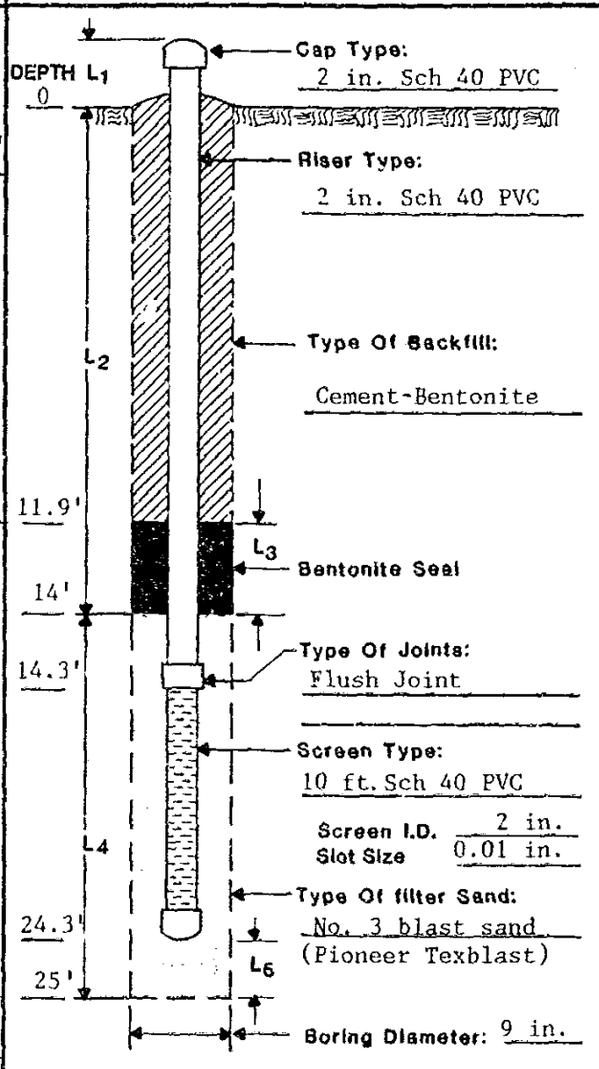
TECHNICAN: W. Turney

N 734,110 E 3,158,440

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.20'
5						
						Light gray and tan SANDY CLAY (CL)
10		01T	0	0		Tan and light gray SILTY SAND (SM) w/bio-turbation
15						
20						
25						Reddish brown CLAY (CH)
						Bottom @ 25'

MONITORING WELL NO. SCK-MW03



REMARKS

COMPLETION DATE: 11-4-86
WELL DEVELOPMENT DATE: 11-7-86
DEPTH TO WATER : 5.3 ft.
WATER MEASUREMENT DATE: 11-21-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 2.3 ft.
L_2 = 14.0 ft.
L_3 = 2.1 ft.
L_4 = 11.0 ft.
L_6 = 0.7 ft.

McBride-Ratcliff and Associates, Inc.

007291

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site **FIGURE:** F-4

CLIENT: Koppers Company, Inc. **PROJECT NO.** 85-317

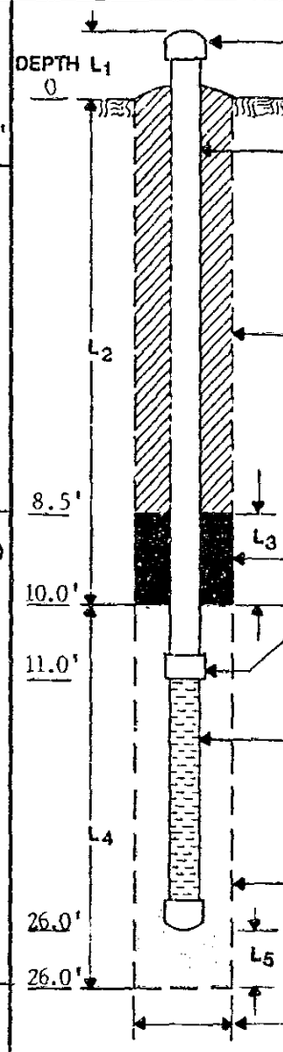
DRILLER: Layne-Western Company, Inc. **TECHNICAN:** P.C. Moore

N 731,480 E 3,158,350

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 48.55'
5						Tan SANDY CLAY (CL)
10		01S	0	0	X	Light gray CLAYEY SAND (SC) grading to slightly silty sand to sand w/ sandy clay pockets
15						
20						
25						Reddish brown CLAY (CH)
						Bottom @ 26'

MONITORING WELL NO. SCK-MW04



Cap Type: 2 in. Sch. 40 PVC

Riser Type: 2 in. Sch 40 PVC

Type Of Backfill: Cement-Bentonite

Bentonite Seal

Type Of Joints: Flush Joint

Screen Type: 15 ft. Sch 40 PVC

Screen I.D. 2 in.

Slot Size .010 in.

Type Of filter Sand: No. 3 blast sand (Lone Star)

Boring Diameter: 9 in.

REMARKS Well constructed in manhole flush with paving.

COMPLETION DATE: 7-31-86
WELL DEVELOPMENT DATE: 8-8-86
DEPTH TO WATER : 3.6 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 0 ft. L_4 = 16 ft.

L_2 = 10 ft. L_5 = 0 ft.

L_3 = 1.5 ft.

McBride-Ratcliff and Associates, Inc.

007292

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-5

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

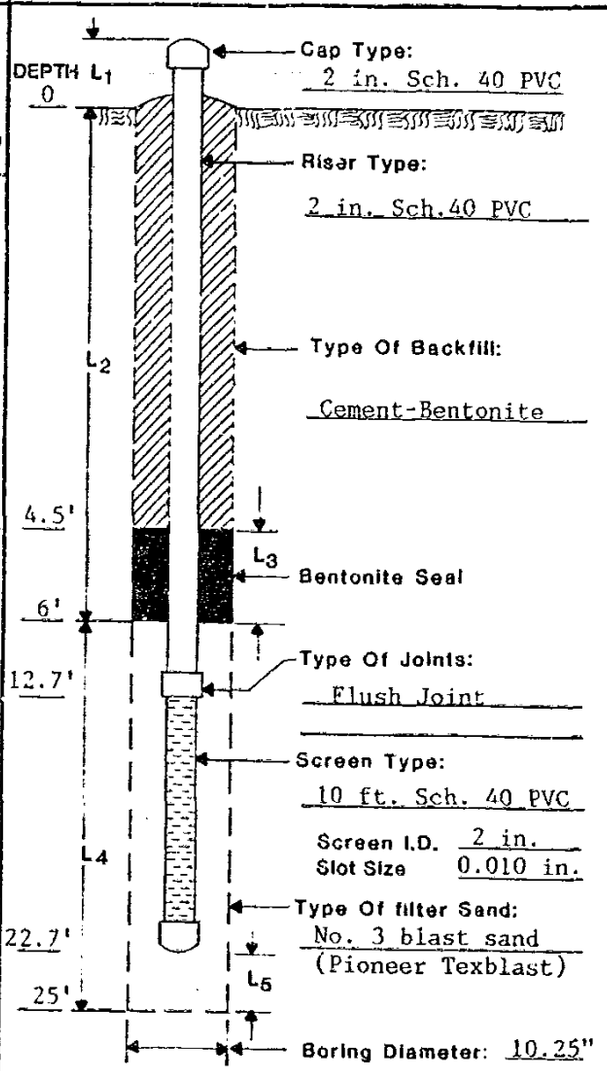
TECHNICAN: W. Turney

N733,430 E3,157,120

LOG OF BORING NO.

MONITORING WELL NO. SCK-MW05

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV.52.69'
5						
10		01S	0	0		Light gray & tan SANDY CLAY (CL)
						Tan & gray SILTY SAND (SM)
15						
20						
		02T	0	0		Reddish brown CLAY (CH) w/silt seams
25						Bottom @ 25'



REMARKS

COMPLETION DATE: 8-11-87
WELL DEVELOPMENT DATE: 8-13-87
DEPTH TO WATER : 11.25
WATER MEASUREMENT DATE: 8-28-87
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 1.9 ft.
L_2 = 6 ft.
L_3 = 1.5 ft.
L_4 = 19 ft.
L_5 = 2.3 ft.

McBride-Ratcliff and Associates, Inc.

007293

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-6

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

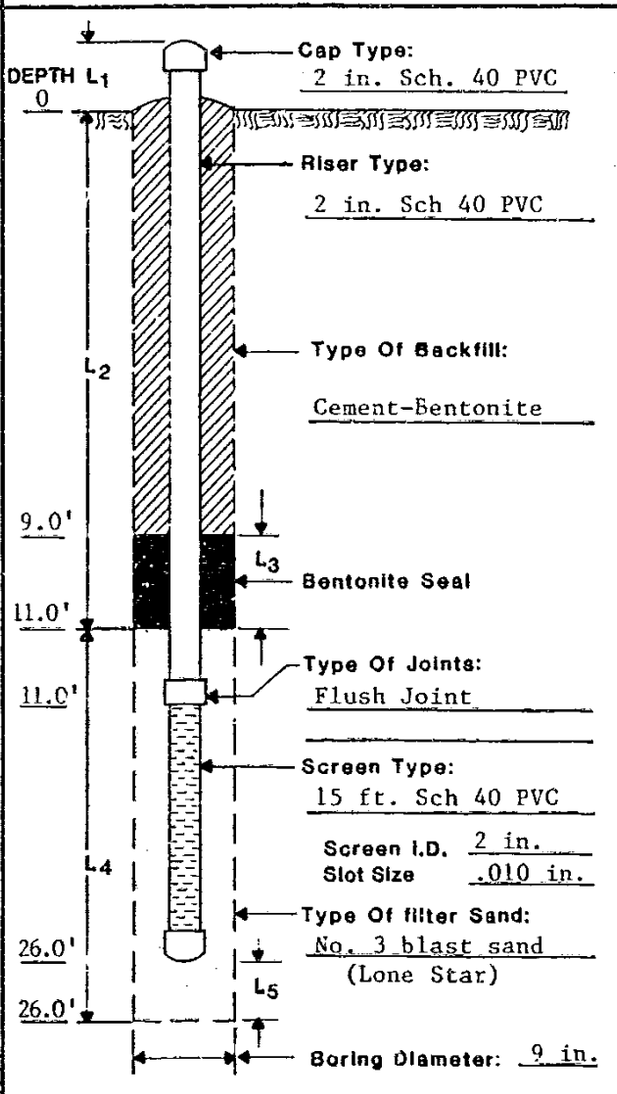
TECHNICAN: P. C. Moore

N 730,820 E 3,158,440

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 48.04'
5						
10						Light gray & tan SANDY CLAY (CL)
						Light gray and brownish gray FINE SAND (SP) wet, w/clay pockets, creosote odor and oily residue
15		01S	22	4	X	
20						
25						Reddish brown CLAY (CH)
						Bottom @ 26'

MONITORING WELL NO. SCK-MW06



REMARKS Well constructed in manhole flush with paving.

COMPLETION DATE: 8-4-86
WELL DEVELOPMENT DATE: 8-8-86
DEPTH TO WATER : 4.5 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 0 ft. L_4 = 15 ft.
L_2 = 11 ft. L_5 = 0 ft.
L_3 = 2 ft.

McBride-Ratcliff and Associates, Inc.

007294

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-7

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

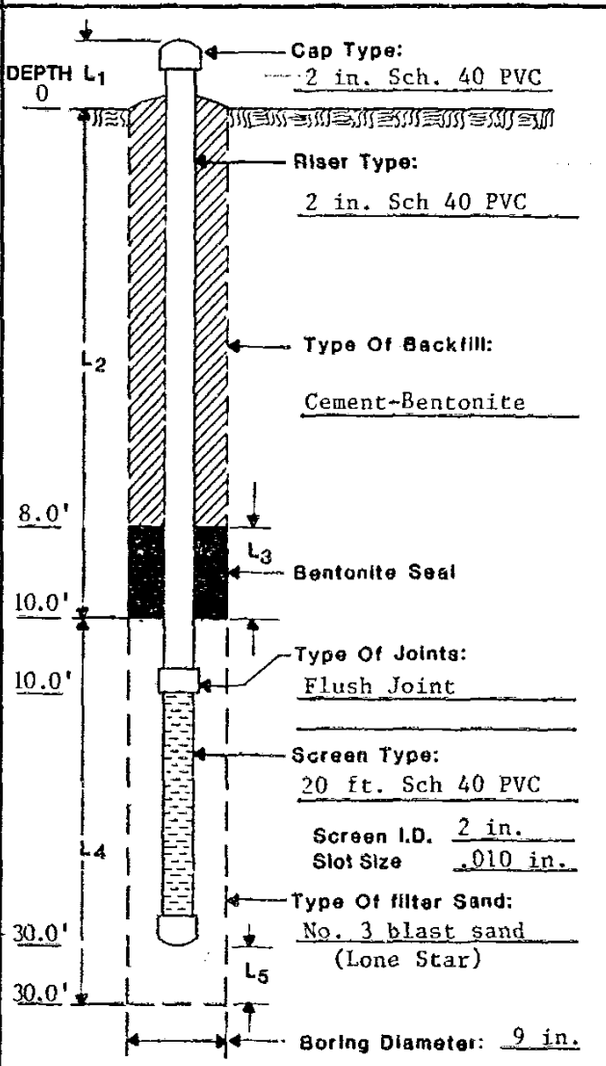
TECHNICAN: P.C. Moore

N 730,690 E 3,159,020

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.97
5						
10						Tan SANDY CLAY (CL)
						Light gray FINE SAND (SP) w/occasional clay pockets, wet
15		01S		0		
20						
						Reddish brown CLAY (CH)
25						Bottom @ 30'

MONITORING WELL NO. SCK-MW 07



REMARKS

COMPLETION DATE: 8-5-86
WELL DEVELOPMENT DATE: 8-8-86
DEPTH TO WATER : 6.3 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 3 ft.
L_2 = 10 ft.
L_3 = 2 ft.
L_4 = 20 ft.
L_5 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007295

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-8

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

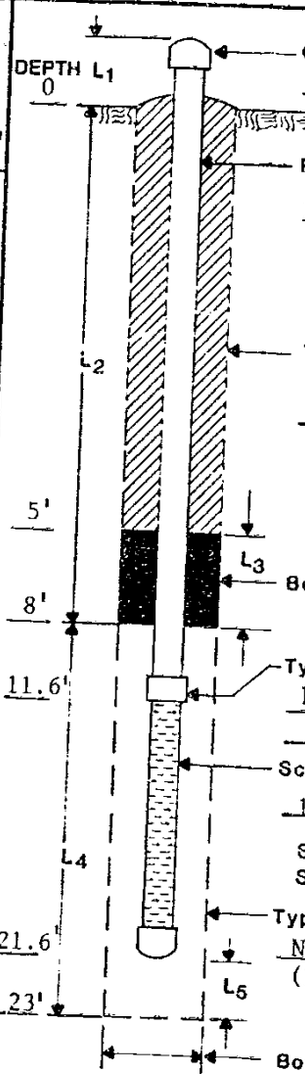
TECHNICAN: W. Turney

N730,650 E3,157,590

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV.47.94'
5						
10		01S	0	0	X	Tan & light gray VERY SANDY CLAY (CL)
						Tan & light gray CLAYEY SAND (SC)
15						
20		02S	2.5	4.0	X	Reddish brown CLAY (CH) w/slickensides, creosote odor
25						Bottom @ 23'

MONITORING WELL NO. SCK-MW08



Cap Type: 2 in. Sch. 40 PVC

Riser Type: 2 in. Sch. 40 PVC

Type Of Backfill: Cement-Bentonite

Bentonite Seal

Type Of Joints: Flush Joint

Screen Type: 10 ft. Sch. 40 PVC

Screen I.D. 2 in.

Slot Size 0.010 in.

Type Of filter Sand: No. 3 blast sand (Pioneer Texblast)

Boring Diameter: 10.25"

REMARKS Well constructed in manhole flush with pavement.

COMPLETION DATE: 8-11-87
WELL DEVELOPMENT DATE: 8-13-87
DEPTH TO WATER : 8.9 ft.
WATER MEASUREMENT DATE: 8-28-87
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 0 ft.
L_2 = 8 ft.
L_3 = 3 ft.
L_4 = 15 ft.
L_5 = 1.4 ft.

McBride-Ratcliff and Associates, Inc.

007296

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-9

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

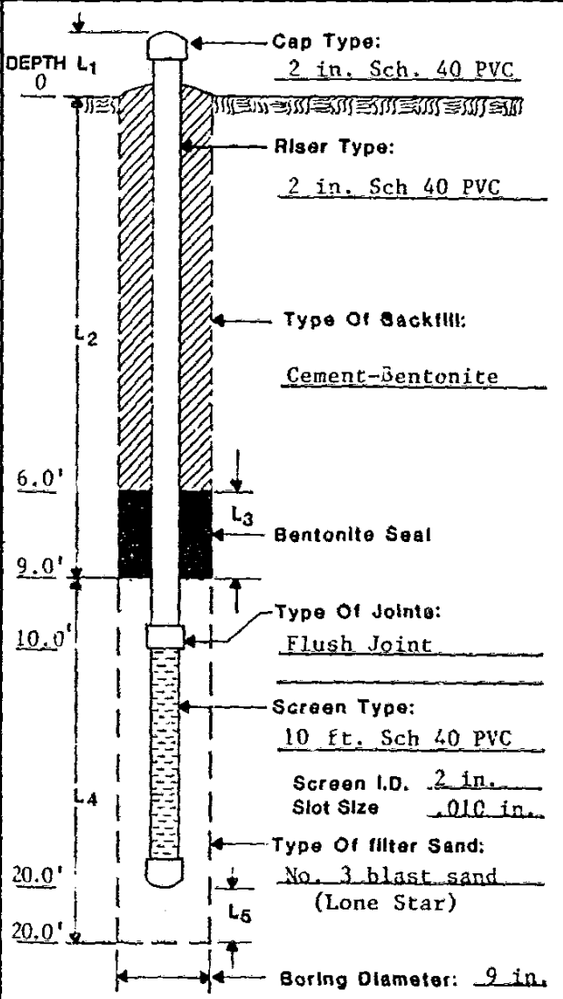
TECHNICAN: P.C. Moore

N 730,250 E 3,157,870

LOG OF BORING NO.

MONITORING WELL NO. SCK-MW09

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 46.34
5						Light gray & tan VERY SANDY CLAY (CL) w/calcareous & ferrous nodules
10		01S	0	0	X	
						Light gray CLAYEY SAND (SC) w/calcareous nodules
15						
						Reddish brown CLAY (CH)
20						Bottom @ 20'
25						



REMARKS Well constructed in manhole flush with paving

COMPLETION DATE: 8-5-86
WELL DEVELOPMENT DATE: 8-8-86
DEPTH TO WATER : 0.4 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 0 ft.
L_2 = 9 ft.
L_3 = 3 ft.
L_4 = 11 ft.
L_5 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007297

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-10

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

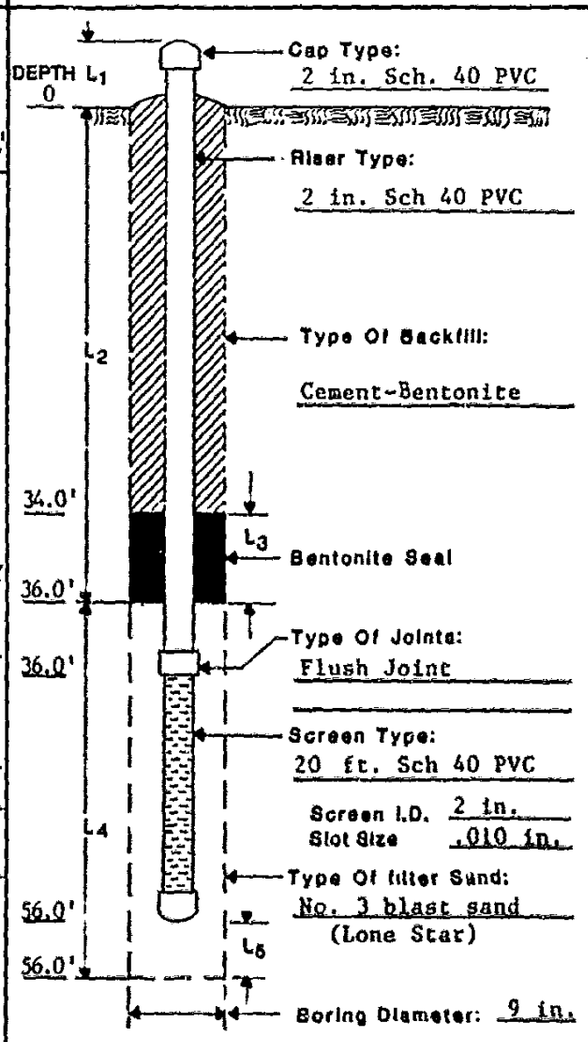
TECHNICAN: P.C. Moore

N 733,240 E 3,157,800

LOG OF BORING NO.

MONITORING WELL NO. SCK-MW10

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 52.74'
40						
45						
50		01S	1	1	X	Light gray CLAYEY SAND (SC) w/silty sand & sandy clay interbeds, creosote odor, oily residue @ interbed interfaces
55						Reddish brown CLAY (CH)
						Bottom @ 56'
60						



REMARKS

COMPLETION DATE: 7-31-86
WELL DEVELOPMENT DATE: 8-11-86
DEPTH TO WATER: 18.3 ft.
WATER MEASUREMENT DATE: 8-15-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 3.5 ft.
L_2 = 36 ft.
L_3 = 2 ft.
L_4 = 20 ft.
L_5 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007298

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-11

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

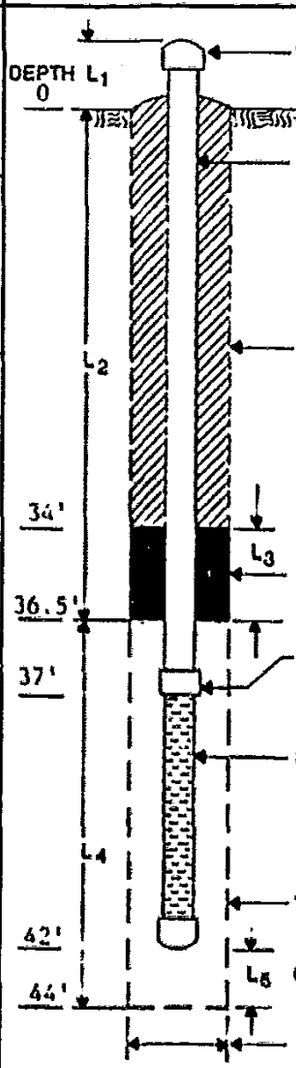
TECHNICAN: W. Turney

N 734,120 E 3,158,440

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.66'
						Reddish brown CLAY (CH)
30		01S	0	0	X	Tan and light gray SANDY CLAY (CL) w/calcareous nodules
35						
						-w/sand pockets @ 39'
40		02S	0	0	X	
						CLAYEY SAND (SC)
						Light gray and reddish brown CLAY (CH)
45						Bottom @ 44'
50						

MONITORING WELL NO. SCK-MW11



Cap Type: 2 in. Sch 40 PVC

Riser Type: 2 in. Sch 40 PVC

Type Of Backfill: Cement-Bentonite

Bentonite Seal

Type Of Joints: Flush Joint

Screen Type: 5 ft. Sch 40 PVC

Screen I.D. 2 in.

Slot Size 0.01 in.

Type Of filter Sand: No. 3 blast sand (Pioneer Texblast)

Boring Diameter: 9 in.

REMARKS Duct tape/plastic sheet cap lost in borehole at about 42 ft.

COMPLETION DATE: 11-6-86

WELL DEVELOPMENT DATE: 11-7-86

DEPTH TO WATER : 16.6 ft.

WATER MEASUREMENT DATE: 11-21-86

INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 2.9 ft.

L_2 = 36.5 ft.

L_3 = 2.5 ft.

L_4 = 7.5 ft.

L_5 = 2.0 ft.

McBride-Ratcliff and Associates, Inc.

007299

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-12

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

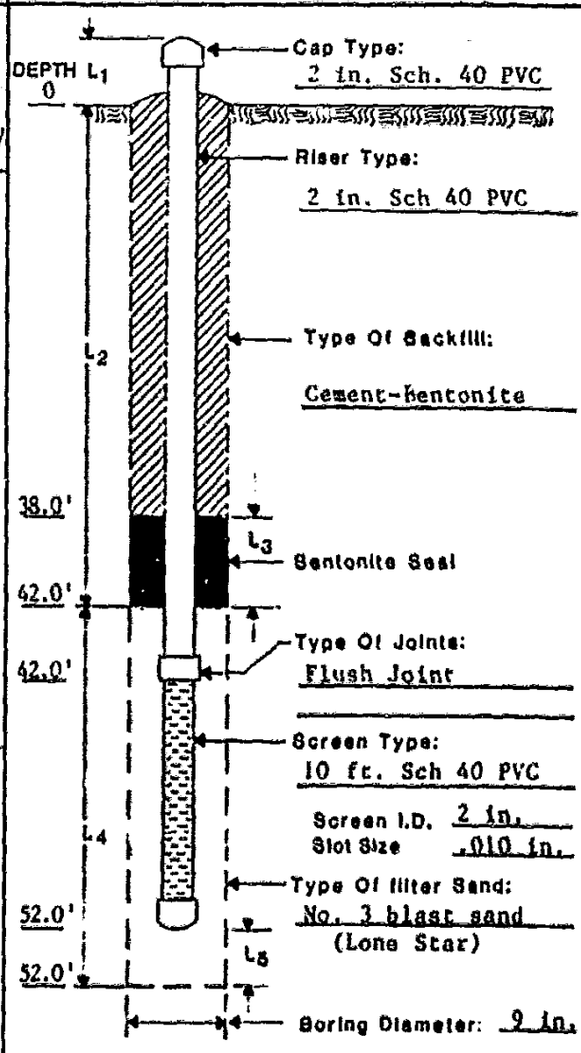
TECHNICAN: P.C. Moore

N 733,690 E 3,157,800

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 53.67
40						
45						Light gray SILTY SAND (SM) w/sandy clay pockets, grading to clayey sand @ 48.5', oily residue w/creosote odor
50		01S	6	8		
						Bottom @ 52'
55						
60						

MONITORING WELL NO. SCK-MW12



REMARKS

COMPLETION DATE: 7-30-86
WELL DEVELOPMENT DATE: 8-11-86
DEPTH TO WATER : 18.9 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 3.2 ft. L_4 = 10 ft.
L_2 = 42 ft. L_5 = 0 ft.
L_3 = 4 ft.

McBride-Ratcliff and Associates, Inc.

007300

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-13

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

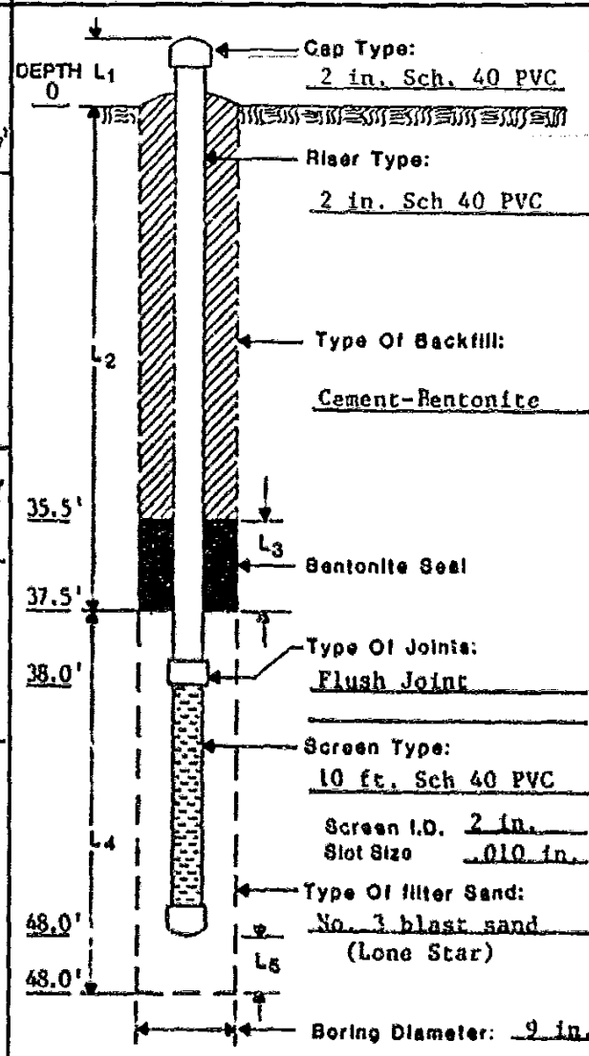
TECHNICAN: P.C. Moore

N 730,820 E 3,158,450

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 48.17'
40						
45		01S	4	3		Tan SAND (SP) grades to clayey sand below 44.5' oily residue and creosote odors
						Reddish brown & light gray CLAY (CH) w/clayey sand pockets
50						
						Bottom @ 48'
55						
60						

MONITORING WELL NO. SCK-MW14



REMARKS Well constructed in manhole flush with paving

COMPLETION DATE: 8-4-86
WELL DEVELOPMENT DATE: 8-8-86
DEPTH TO WATER : 14.2 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 0 ft. L_4 = 10.5 ft.
L_2 = 37.5 ft. L_5 = 0 ft.
L_3 = 2 ft.

McBride-Ratcliff and Associates, Inc.

007301

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-14

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Layne-Western Company, Inc.

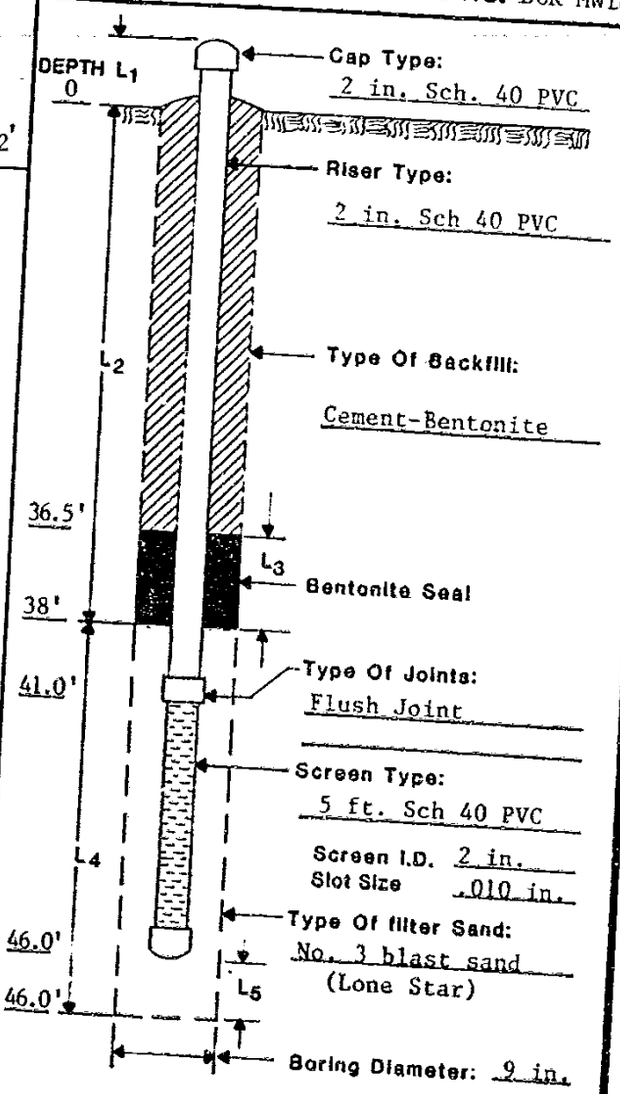
TECHNICAN: P.C. Moore

N 730,240 E 3,157,870

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 46.2'
30						
35						
40						
45		01S	0	0		Reddish brown & light gray CLAY (CH) w/clayey sand & sandy clay pockets slickensides
						Bottom @ 46'
50						

MONITORING WELL NO. SCK-MW16



REMARKS Tremied sand in boring with potable water. Well constructed in manhole flush with paving.

COMPLETION DATE: 8-1-86
WELL DEVELOPMENT DATE: 8-8-86
DEPTH TO WATER : 3.2 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 0 ft.
L_2 = 38 ft.
L_3 = 1.5 ft.
L_4 = 8 ft.
L_5 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007302

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-15

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

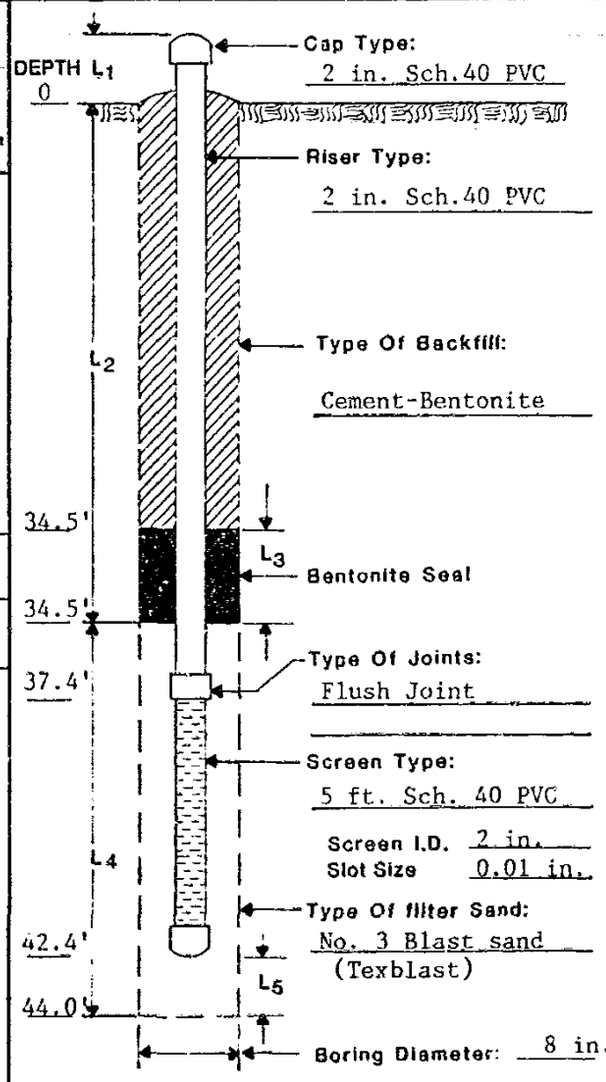
TECHNICAN: W.D. Turney

N 731,340 E 3,159,130

LOG OF BORING NO.

MONITORING WELL NO. SCK-MW23

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV49.03'
35						
		01S	5	3	X	Light gray & reddish brown CLAY (CH)
40		02S	5	3	X	Reddish brown SILTY SAND (SM)
		03T	5	0	■	Light gray & reddish brown CLAY (CH)
45						Bottom @ 44'
50						
55						



REMARKS Well constructed in manhole flush with ground surface. No bentonite seal was placed due to space restrictions.

COMPLETION DATE: 11-19-87
WELL DEVELOPMENT DATE: 11-23-87
DEPTH TO WATER : 6.1 ft.
WATER MEASUREMENT DATE: 11-30-87
INSTALLATION METHOD: Hollow stem auger

CONSTRUCTION DATA

L_1 = 0 ft. L_4 = 9.5 ft.
L_2 = 34.5 ft. L_5 = 1.5 ft.
L_3 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007303

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-16

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

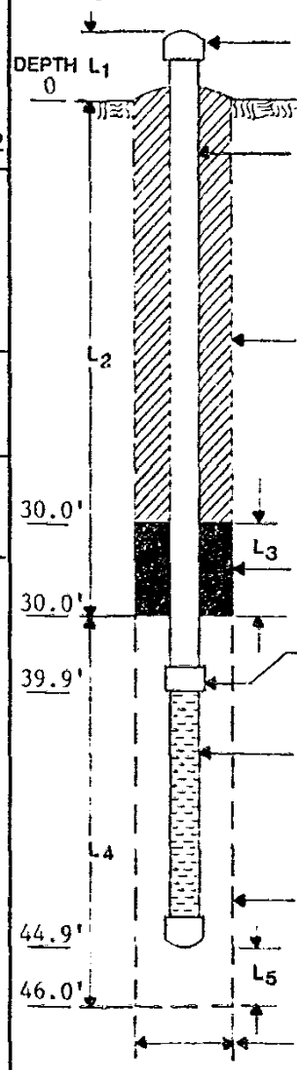
TECHNICAN: W. Turney

N 733,270 E 3,157,500

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.82
		01T	0	0	■	Tan and light gray very SANDY CLAY (CL)
40		02T	0	0		Tan and light gray CLAYEY SAND (SC)
		03T	0	0	■	Tan and light gray SANDY CLAY (CL)
45		04T	0	0		
						Bottom @ 46'
50						
55						
60						

MONITORING WELL NO. SCK-P01



Cap Type: 2 in. Sch 40 PVC

Riser Type: 2 in. Sch 40 PVC

Type Of Backfill: Cement - Bentonite

Bentonite Seal

Type Of Joints: Flush Joint

Screen Type: 5 ft. Sch 40 PVC

Screen I.D. 2 in.

Slot Size 0.01 in.

Type Of filter Sand: No. 3 (F.W. Gartner)

Boring Diameter: 8 in.

REMARKS no bentonite seal was placed due to space restrictions.

COMPLETION DATE: 5-22-86
WELL DEVELOPMENT DATE: 6-3-86
DEPTH TO WATER : 17.1 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 3.3 ft. L_4 = 16 ft.

L_2 = 30 ft. L_5 = 1.1 ft.

L_3 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007304

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-17

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

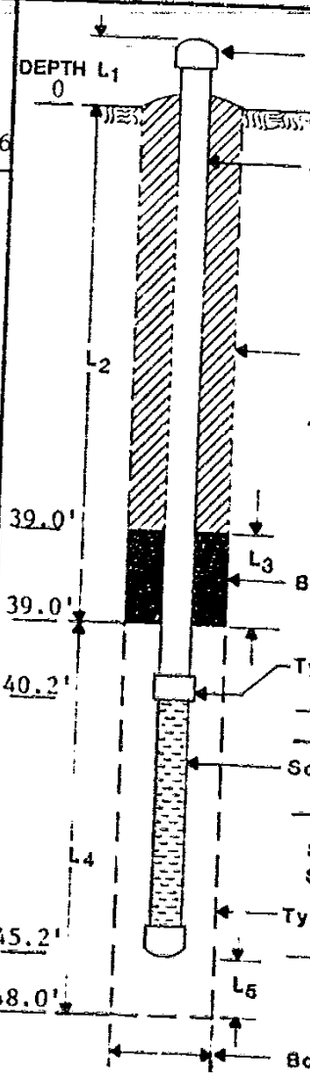
TECHNICAN: W. Turney

N 730,870 E 3,157,870

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 50.86
40						
		01T	1	0		Tan SANDY CLAY (CL)
45		02T	3	8		Tan and light gray SILTY SAND (SM) w/oily residue and creosote odors
						Bottom @ 48'
50						
55						
60						

MONITORING WELL NO. SCK-P02



Cap Type: 2 in. Sch. 40 PVC

Riser Type: 2-in. Sch. 40 PVC

Type Of Backfill: Cement-Bentonite

Bentonite Seal

Type Of Joints: Flush Joint

Screen Type: 5 ft. Sch. 40 PVC

Screen I.D. 2 in.

Slot Size 0.01 in.

Type Of filter Sand: No. 3 (F.W. Gartner)

Boring Diameter: 8 in.

REMARKS no bentonite seal was placed due to space restrictions

COMPLETION DATE: 5-23-86
WELL DEVELOPMENT DATE: 6-4-86
DEPTH TO WATER : 15.8 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 2.6 ft.
L_2 = 39 ft.
L_3 = 0 ft.
L_4 = 9 ft.
L_5 = 2.8 ft.

McBride-Ratcliff and Associates, Inc.

007305

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-'8

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

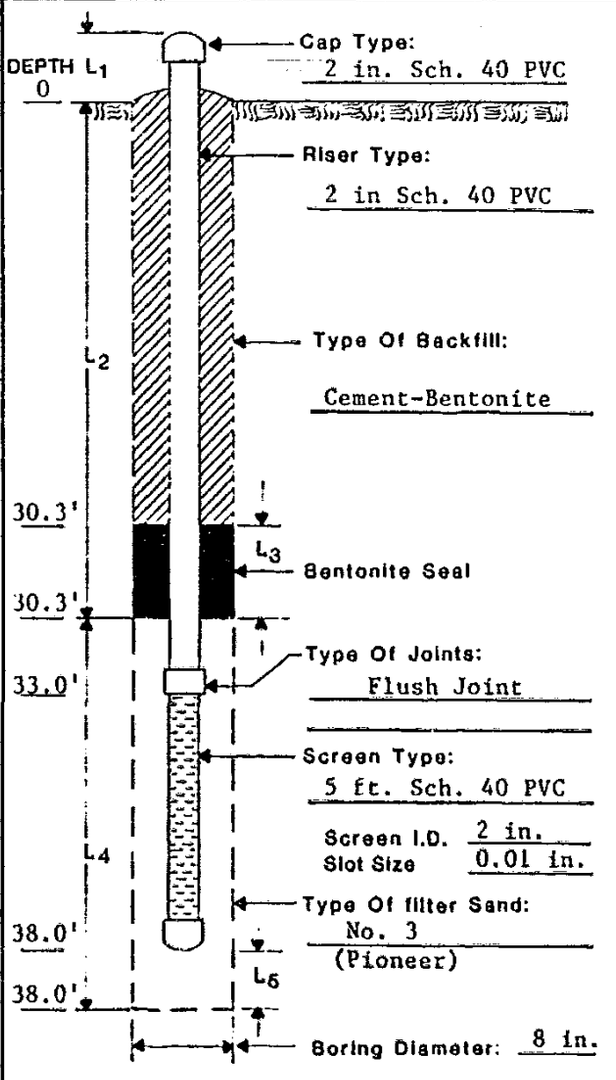
TECHNICAN: W. Turney

N 731,370 E 3,158,750

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.76
						Reddish brown and light gray CLAY (CH)
		01T		0		
		02S		3		Tan and light gray SILTY SAND (SM) w/oily residue and creosote odor
35						
		03T		1		Tan and light gray SANDY CLAY (CL) w/creosote odor
						Bottom @ 38'
40						
45						
50						
55						

MONITORING WELL NO. SCK-P03



REMARKS no bentonite seal placed due to space restrictions

COMPLETION DATE: 5-27-86
WELL DEVELOPMENT DATE: 6-5-86
DEPTH TO WATER : 18.0 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 3.1 ft. L_4 = 7.7 ft.

L_2 = 30.3 ft. L_5 = 0 ft.

L_3 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007306

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-19

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

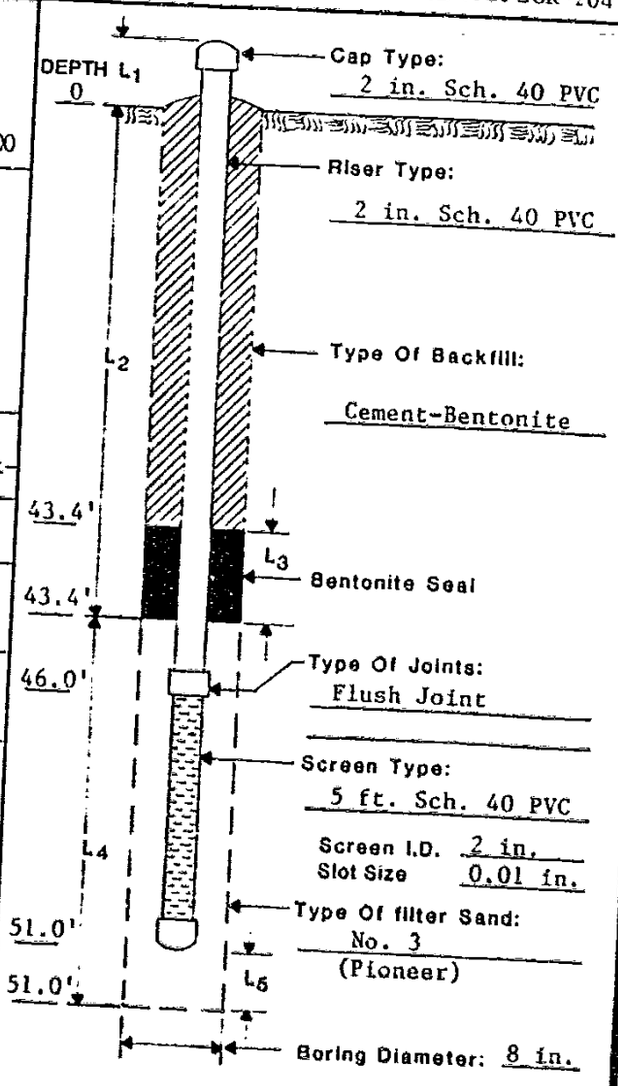
TECHNICAN: W. Turney

N 734,240 E 3,157,720

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 53.00
40		01T		0		Tan and light gray SANDY CLAY (CL)
		02T		0		Light gray and reddish brown CLAY (CH) w/slickensides
45		03T		0		Light gray and reddish brown SANDY CLAY (CL)
		04T		0		Light gray and reddish brown SILTY SAND (SM)
50		05T		0		Light gray and reddish brown CLAY (CH) w/slickensides
						Bottom @ 51'
55						
60						

MONITORING WELL NO. SCK-F04



REMARKS no bentonite seal placed due to space restrictions

COMPLETION DATE: 5-28-86
WELL DEVELOPMENT DATE: 6-3-86
DEPTH TO WATER : 17.8 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 2.6 ft.
L_2 = 43.3 ft.
L_3 = 0 ft.
L_4 = 7.6 ft.
L_5 = 0 ft.

McBride-Ratcliff and Associates, Inc.

007307

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-20

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

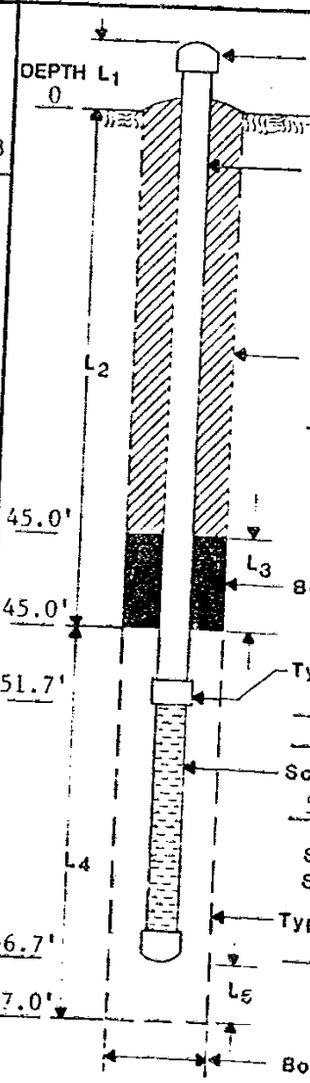
TECHNICAN: W. Turney

N 732,180 E 3,158,500

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 53.53
		01T	0	6		Tan and light gray SANDY CLAY (CL) w/creosote odor
40						
		02T	0	1		Light gray and reddish brown CLAY (CH) w/creosote odor
45						
		03T	0	0		Tan and light gray CLAYEY SAND (SC)
		04T	0	0		
50						
		05T	0	5		
		06T	0	0		Tan and light gray SILTY SAND (SM)
55						
		07T	0	0		Light gray and reddish brown CLAY (CH) w/slickensides
						Bottom @ 57'
60						

MONITORING WELL NO. SCK-P05



Cap Type: 2 in. Sch. 40 PVC

Riser Type: 2 in. Sch. 40 PVC

Type Of Backfill: Cement-Bentonite

Bentonite Seal

Type Of Joints: Flush Joint

Screen Type: 5 ft. Sch. 40 PVC

Screen I.D. 2 in.

Slot Size 0.01 in.

Type Of filter Sand: No. 3 (Pioneer)

Boring Diameter: 8 in.

REMARKS no bentonite seal placed due to space restrictions

COMPLETION DATE: 5-29-86
WELL DEVELOPMENT DATE: 6-4-86
DEPTH TO WATER : 16.6 ft.
WATER MEASUREMENT DATE: 8-12-86
INSTALLATION METHOD: Hollow-stem auger

CONSTRUCTION DATA

L_1 = 2.4 ft.
L_2 = 45 ft.
L_3 = 0 ft.
L_4 = 12 ft.
L_5 = 0.3 ft.

McBride-Ratcliff and Associates, Inc.

007308

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-21

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

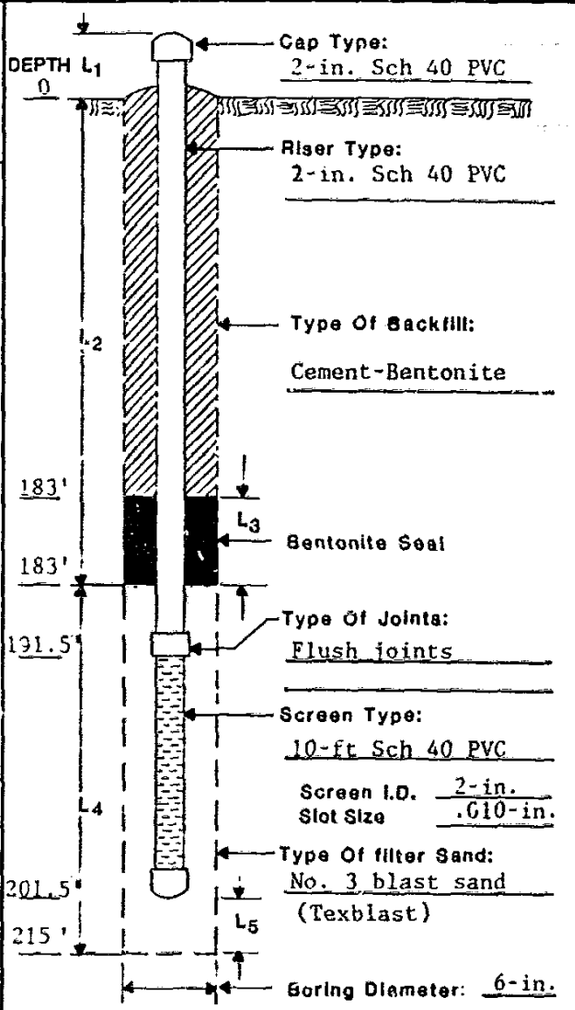
TECHNICAN: G. Hassett

N 729,290 E 3,158,200

LOG OF BORING NO.

MONITORING WELL NO. SCK-P06

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV.50.47'
160						
170						
180						
190						
		01S			X	SAND (SP-SM)
200						
						Bottom @ 215'



REMARKS no bentonite seal placed due to space restrictions

COMPLETION DATE: 3-25-87
WELL DEVELOPMENT DATE: 3-30-87
DEPTH TO WATER : 143.5 ft
WATER MEASUREMENT DATE: 4-2-87
INSTALLATION METHOD: Wet Rotary

CONSTRUCTION DATA

L_1 = 1.5 ft L_4 = 32 ft
L_2 = 183 ft L_5 = 13.5 ft
L_3 = 0 ft

McBride-Ratcliff and Associates, Inc.

007309

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-22

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Van and Sons

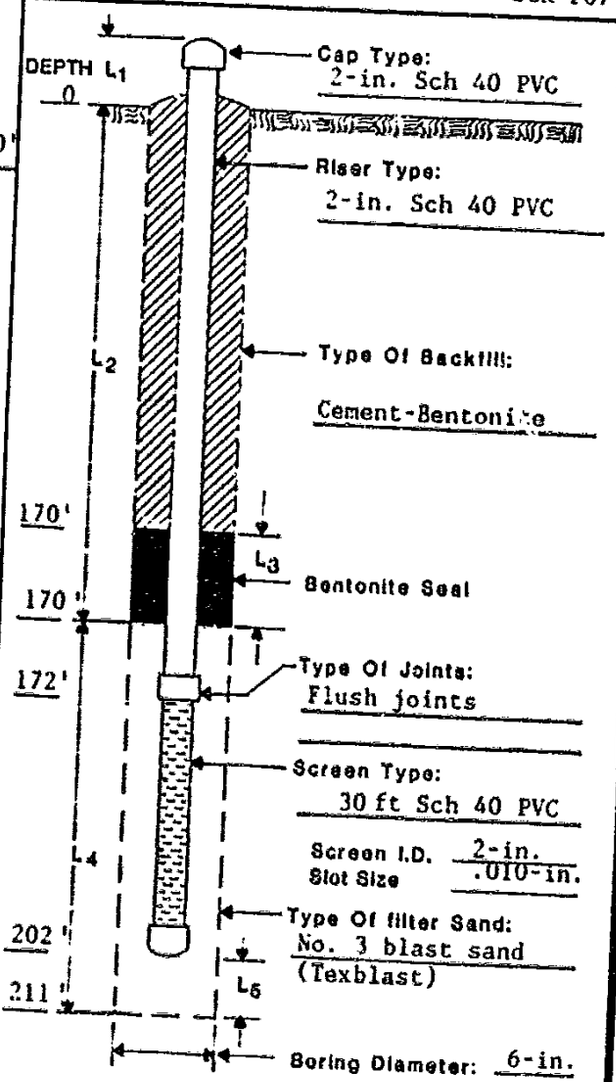
N 734,180 E 3,155,650

TECHNICAN: G. Hassett

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV.50.30'
160						
170						
180		01S			X	SILTY SAND (SM)
190						
200						
						Bottom @ 211'

MONITORING WELL NO. SCK-P07



REMARKS no bentonite seal placed due to space restriction

COMPLETION DATE: 3-27-87
WELL DEVELOPMENT DATE: 3-30-87
DEPTH TO WATER : 139.7 ft
WATER MEASUREMENT DATE: 4-2-87
INSTALLATION METHOD: Wet Rotary

CONSTRUCTION DATA

L_1 = 0 ft
L_2 = 170 ft
L_3 = 0 ft
L_4 = 41 ft
L_5 = 9 ft

McBride-Ratcliff and Associates, Inc.

007310

007310

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-23

CLIENT: Koppers Company, Inc.

PROJECT NO. 85-317

DRILLER: Southwestern Laboratories, Inc.

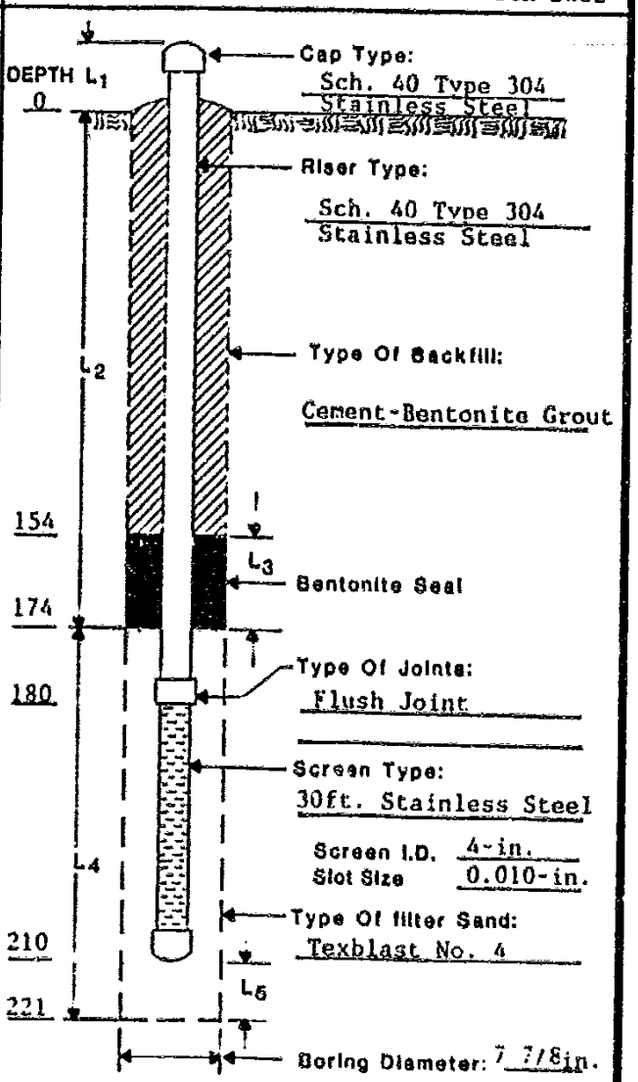
TECHNICAN: W. Turney

N730,350 E3,157,930

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV.50.92'
						Tan & gray SANDY CLAY (CL)
		33T		1		Tan & gray CLAY (CH)
		34T		1		
170						
		35T		1		
						Gray SILTY SAND (SM)
180						-w/clay seams
		36T		0		
		37T		0		Gray CLAYEY SAND (SC)
190						Gray medium SAND (SP)
		38T		0		
		39T		0		w/gravel
		40T		0		-w/clay seams
		41T		0		
200						
210		42S		0		-tan coarse w/ gravel
						CLAY
						SAND
		43S		1		Tan & gray CLAY (CH)
		44T		0		Bottom @ 221'

MONITORING WELL NO. SCK-DW02



REMARKS 13 3/8-in. O.D. surface casing installed to 72-ft., 8 5/8-in. O.D. intermediate casing installed to 141.5-ft.

COMPLETION DATE: 5-10-87
WELL DEVELOPMENT DATE: 5-12-87
DEPTH TO WATER : 141.6 ft
WATER MEASUREMENT DATE: 7-1-87
INSTALLATION METHOD: Wet Rotary

CONSTRUCTION DATA

L_1 = 3.8 ft.
L_2 = 174 ft.
L_3 = 20 ft.
L_4 = 47 ft.
L_5 = 11 ft.

McBride-Ratcliff and Associates, Inc.

007311

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site — **FIGURE:** F-24

CLIENT: Houston Transit Consultants — **PROJECT NO.** 85-317

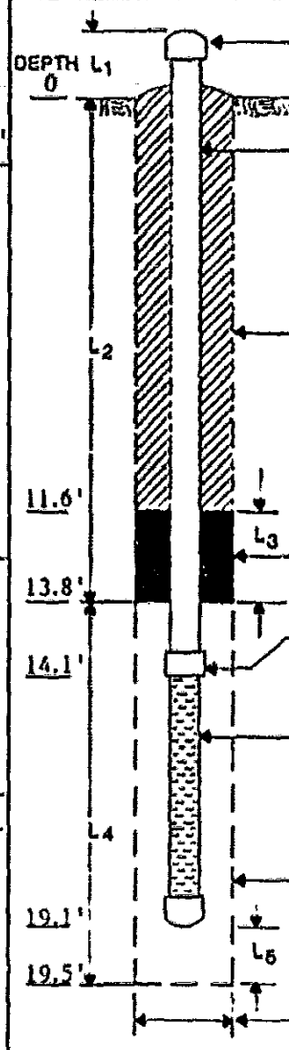
DRILLER: McClelland Engineers, Inc. — **TECHNICAN:**

N 732,152 E 3,158,563

LOG OF BORING NO.

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.48'
						CLAY (CH), and SANDY CLAY (CL) -w/rubble to 2'
5						
10						
						Brown and gray FINE SAND (SP)
15						
						Brown CLAY (CH)
20						Bottom @ 19.5'
25						

MONITORING WELL NO. CAV-OW-01



Cap Type: 2 in. PVC

Riser Type: 2 in. PVC

Type Of Backfill: Cement Grout

Bentonite Seal

Type Of Joints: Threaded

Screen Type: 5 ft. PVC

Screen I.D. 2 in.

Slot Size 0.02 in.

Type Of filter Sand: No. 2 Clemtex

Boring Diameter: 5 in.

REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1983).

COMPLETION DATE: 2-7-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 1.6 ft.
WATER MEASUREMENT DATE: 2-8-83
INSTALLATION METHOD: wet rotary

CONSTRUCTION DATA

L_1 = 2.0 ft. L_4 = 5.7 ft.

L_2 = 13.8 ft. L_5 = 0.4 ft.

L_3 = 2.2 ft.

McBride-Ratcliff and Associates, Inc.

007312

MONITORING WELL INSTALLATION REPORT

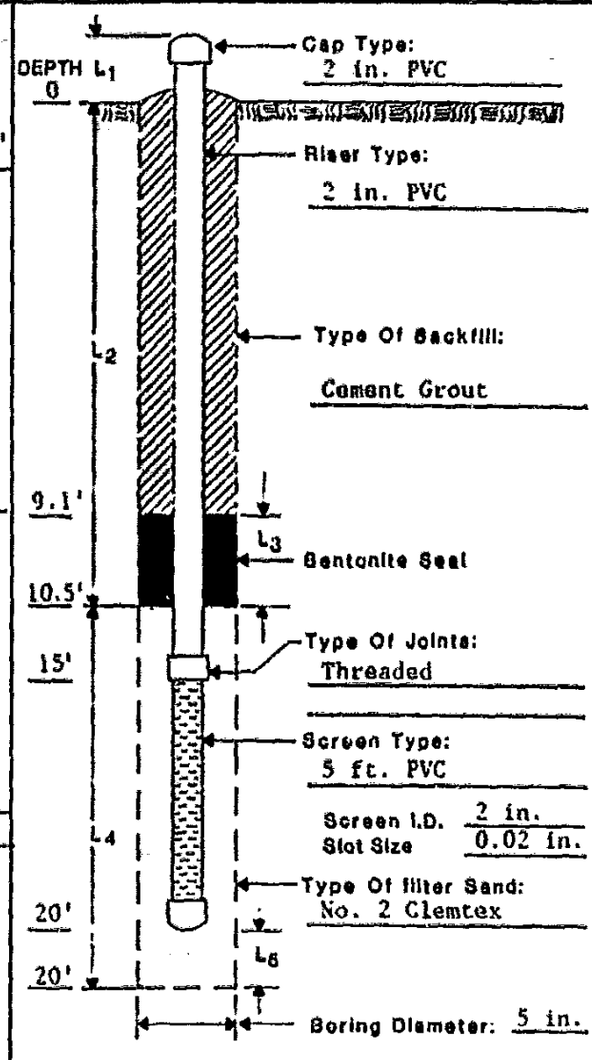
PROJECT: South Cavalcade Site — **FIGURE:** F-25

CLIENT: Houston Transit Consultants — **PROJECT NO.** 85-317

DRILLER: McClelland Engineers, Inc. — **TECHNICAN:** N 733,695 E 3,157,796

LOG OF BORING NO. — **MONITORING WELL NO.** CAV-OW-02

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELE' .52.95'
						CLAY (CH)
5						
10						Brown and gray FINE SAND (SP)
15						
20						Brown CLAY (CH) Bottom @ 20'
25						



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1983).

COMPLETION DATE: 2-5-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 3.6 ft.
WATER MEASUREMENT DATE: 2-8-83
INSTALLATION METHOD: wet rotary

CONSTRUCTION DATA

L_1 = 2.2 ft. L_4 = 9.5 ft.
L_2 = 10.5 ft. L_5 = 0.0 ft.
L_3 = 1.4 ft.

McBride-Ratcliff and Associates, Inc.

007313

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site **FIGURE:** F-26

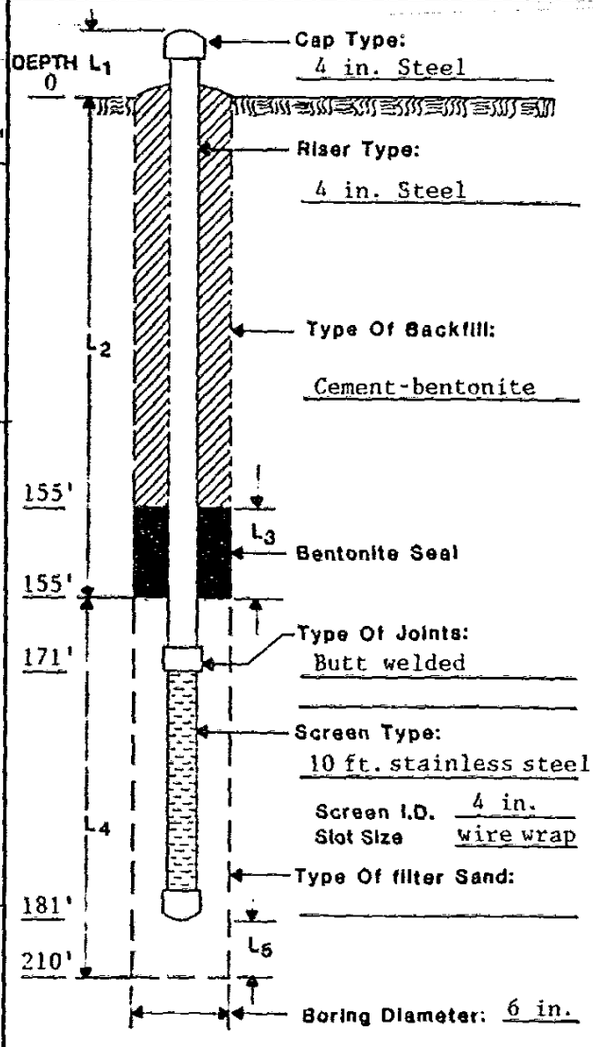
CLIENT: Houston Transit Consultants **PROJECT NO.** 85-317

DRILLER: Underground Resource Management **TECHNICAN:**

N 733,670 E 3,158,050

LOG OF BORING NO. **MONITORING WELL NO.** CAV-OW-06

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 53.67'
		13T				Greenish gray CLAY (CH) w/calcareous nodules
150		14T				
						Gray FINE SAND (SP)
160		15T				
170		16T				
180		17T				
						Gray SANDY CLAY (CL)
190		18T				
		19T				
						Bottom @ 210'



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1983) 6 in. steel casing installed to 120 ft.

COMPLETION DATE: 5-11-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 140.5 ft.
WATER MEASUREMENT DATE: 1-18-85
INSTALLATION METHOD: wet rotary

CONSTRUCTION DATA

L_1 = 2.67 ft. L_4 = 55 ft.

L_2 = 155 ft. L_5 = 29 ft.

L_3 = 0.0 ft.

McBride-Ratcliff and Associates, Inc.

007314

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-27

CLIENT: Houston Transit Consultants

PROJECT NO. 85-317

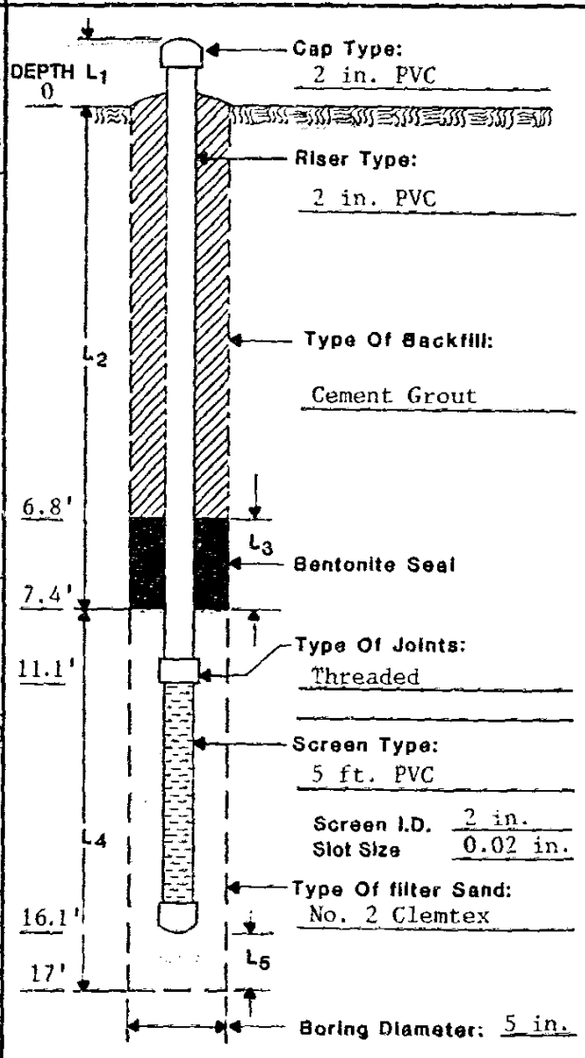
DRILLER: McClelland Engineers, Inc.

TECHNICAN: N 734,241 E 3,157,700

LOG OF BORING NO.

MONITORING WELL NO. CAV-OW-07

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 53.61'
						Brown SANDY CLAY (CL)
5						
10						
						Brown FINE SAND (SP)
15						
						Gray SANDY CLAY (CL) Bottom @ 17'
20						
25						



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (red. CDM draft report dated July 11, 1983).

COMPLETION DATE: 5-3-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 8.0 ft.
WATER MEASUREMENT DATE: 5-9-83
INSTALLATION METHOD: wet rotary w/no recirculation of drilling fluid

CONSTRUCTION DATA

L_1 = 2.0 ft. L_4 = 9.6 ft.
L_2 = 7.4 ft. L_5 = 0.9 ft.
L_3 = 0.6 ft.

McBride-Ratcliff and Associates, Inc.

007315

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-28

CLIENT: Houston Transit Consultants

PROJECT NO. 85-317

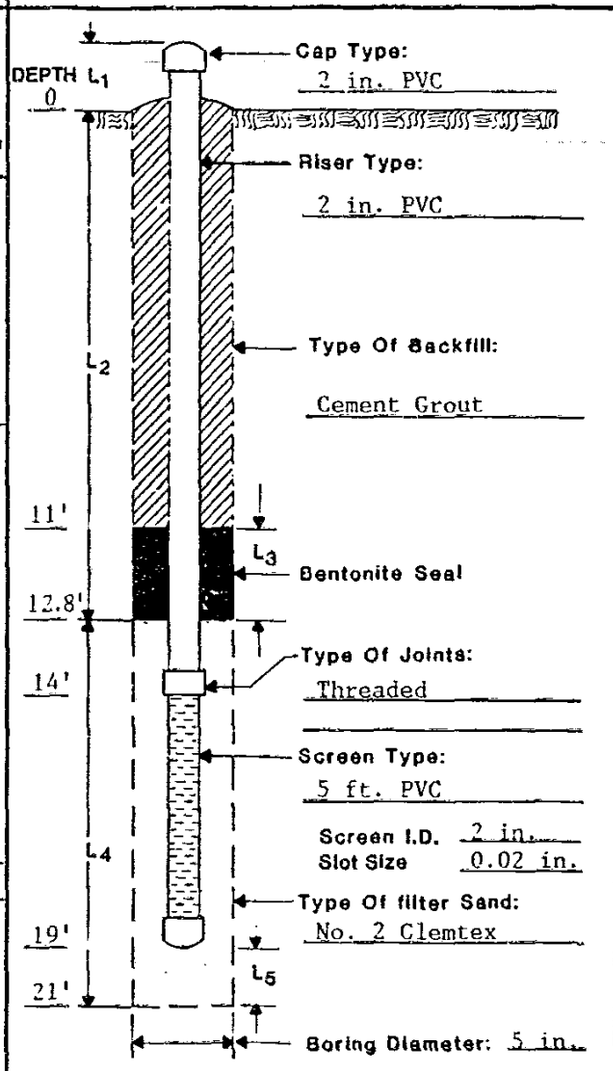
DRILLER: McClelland Engineers, Inc.

TECHNICAN: N 733,241 E 3,157,488

LOG OF BORING NO.

MONITORING WELL NO. CAV-OW-08

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.84'
						Brown SANDY CLAY (CL)
5						
						Brown FINE SAND (SP)
10						
15						
20						Brown CLAY (CH)
						Bottom @ 21'
25						



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1983).

COMPLETION DATE: 5-3-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 7.9 ft.
WATER MEASUREMENT DATE: 5-9-83
INSTALLATION METHOD: wet rotary w/no recirculation of drilling fluid

CONSTRUCTION DATA

L_1 = 2.0 ft. L_4 = 8.2 ft.
L_2 = 12.8 ft. L_5 = 2.0 ft.
L_3 = 1.8 ft.

McBride-Ratcliff and Associates, Inc.

007316

MONITORING WELL INSTALLATION REPORT

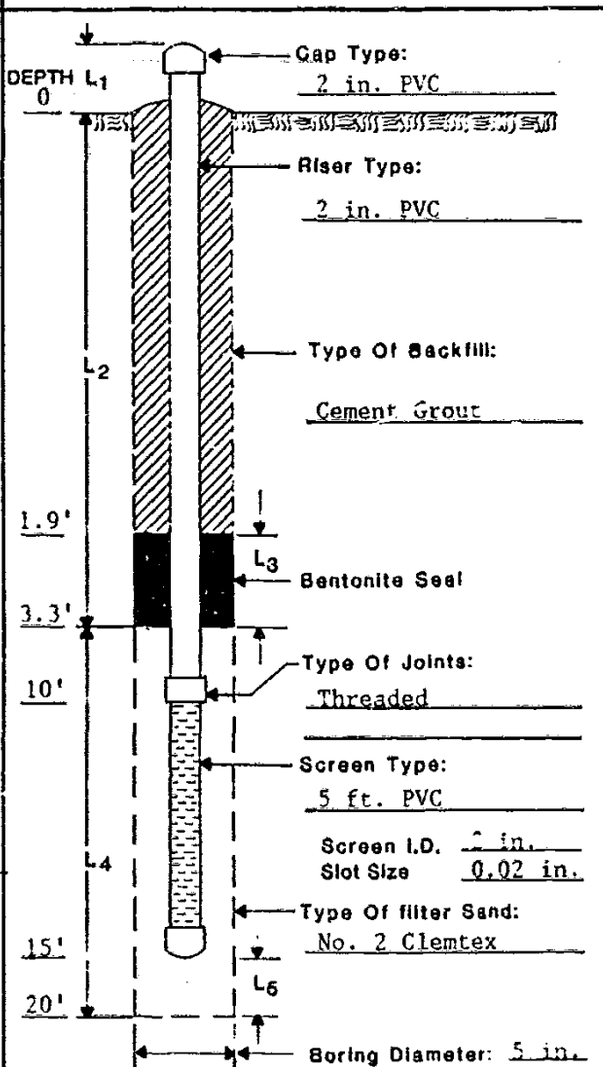
PROJECT: South Cavalcade Site **FIGURE:** F-29

CLIENT: Houston Transit Consultants **PROJECT NO.** 85-317

DRILLER: McClelland Engineers, Inc. **TECHNICAN:** N 732,465 E 3,157,665

LOG OF BORING NO. **MONITORING WELL NO.** CAV-OW-09

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.7'
						Brown SANDY CLAY (CL)
5						
						Brown FINE SAND (SP)
10						
						-gray below 14'
15						
						Brown CLAY (CH)
20						Bottom @ 20'
25						



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1986).

COMPLETION DATE: 5-5-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 7.5 ft.
WATER MEASUREMENT DATE: 5-9-83
INSTALLATION METHOD: wet rotary w/no recirculation of drilling fluid

CONSTRUCTION DATA

L_1 = 2.0 ft. L_4 = 16.7 ft.
L_2 = 3.3 ft. L_5 = 5.0 ft.
L_3 = 1.4 ft.

McBride-Ratcliff and Associates, Inc.

007317

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site **FIGURE:** F-30

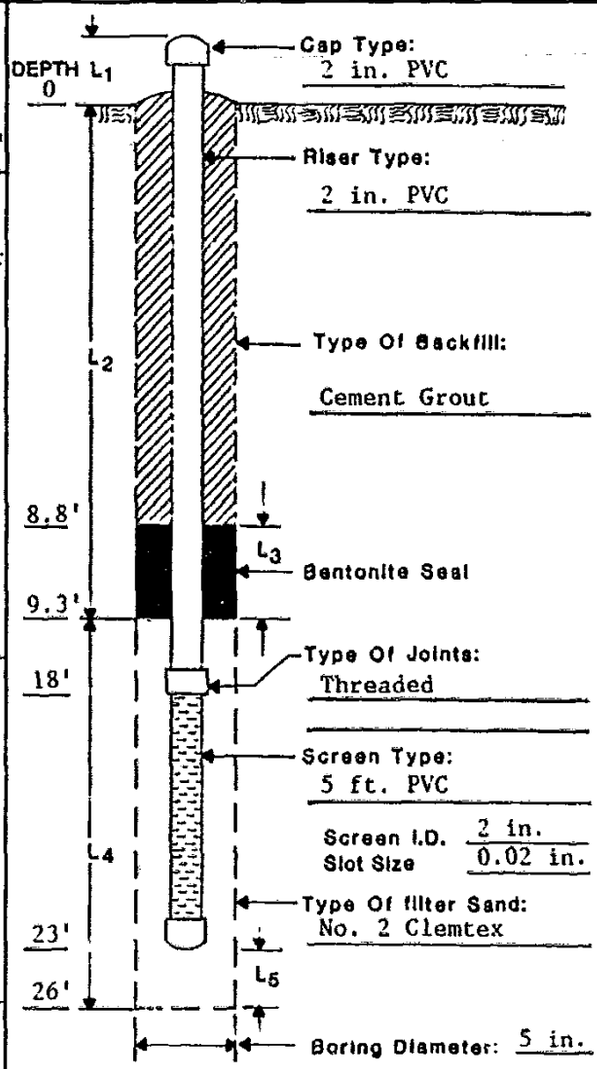
CLIENT: Houston Transit Consultants **PROJECT NO.** 85-317

DRILLER: McClelland Engineers, Inc. **TECHNICAN:**

N 730,827 E 3,157,878

LOG OF BORING NO. **MONITORING WELL NO.** CAV-OW-10

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 49.73'
						Brown SANDY CLAY (CL) w/creosote odor
5						
10						
15						Brown FINE SAND (SP) w/creosote odor
20						
25						Brown CLAY (CH)
						Bottom @ 26'



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1983).

COMPLETION DATE: 5-4-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 8.2 ft.
WATER MEASUREMENT DATE: 5-9-83
INSTALLATION METHOD: wet rotary w/no recirculation of drilling fluid

CONSTRUCTION DATA

L_1 = 2.0 ft. L_4 = 16.7 ft.
L_2 = 9.3 ft. L_5 = 3.0 ft.
L_3 = 0.5 ft.

McBride-Ratcliff and Associates, Inc.

007318

007318

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-31

CLIENT: Houston Transit Consultants

PROJECT NO. 85-317

DRILLER: McClelland Engineers, Inc.

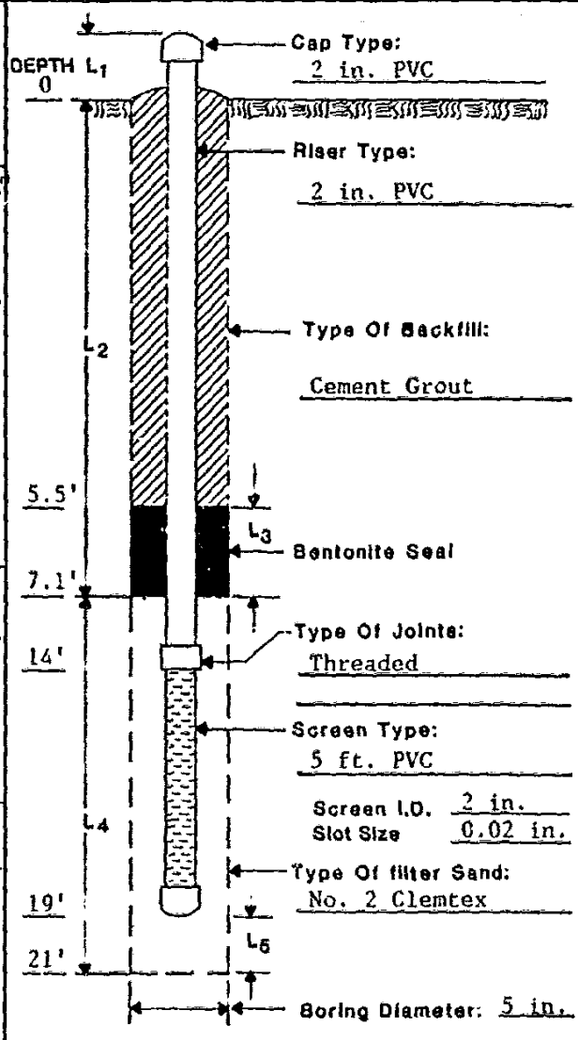
TECHNICAN:

N 731,400 E 3,158,750

LOG OF BORING NO.

MONITORING WELL NO. CAV-OW-11

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 50.91'
						SANDY CLAY (CL) "FILL" w/rubble
5						Brown SANDY CLAY (CL) w/creosote odor
10						
						Brown FINE SAND (SP) w/creosote odor
15						
20						Brown CLAY (CH)
						Bottom @ 21'
25						



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11 1983).

COMPLETION DATE: 5-5-83
WELL DEVELOPMENT DATE: ----
DEPTH TO WATER : 5.1 ft.
WATER MEASUREMENT DATE: 5-9-83
INSTALLATION METHOD: wet rotary w/no recirculation of drilling fluid

CONSTRUCTION DATA

L_1 = 2.0 ft.
L_2 = 7.1 ft.
L_3 = 1.6 ft.
L_4 = 13.9 ft.
L_5 = 2.0 ft.

McBride-Ratcliff and Associates, Inc.

007319

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site

FIGURE: F-32

CLIENT: Houston Transit Consultants

PROJECT NO. 85-317

DRILLER: McClelland Engineers, Inc.

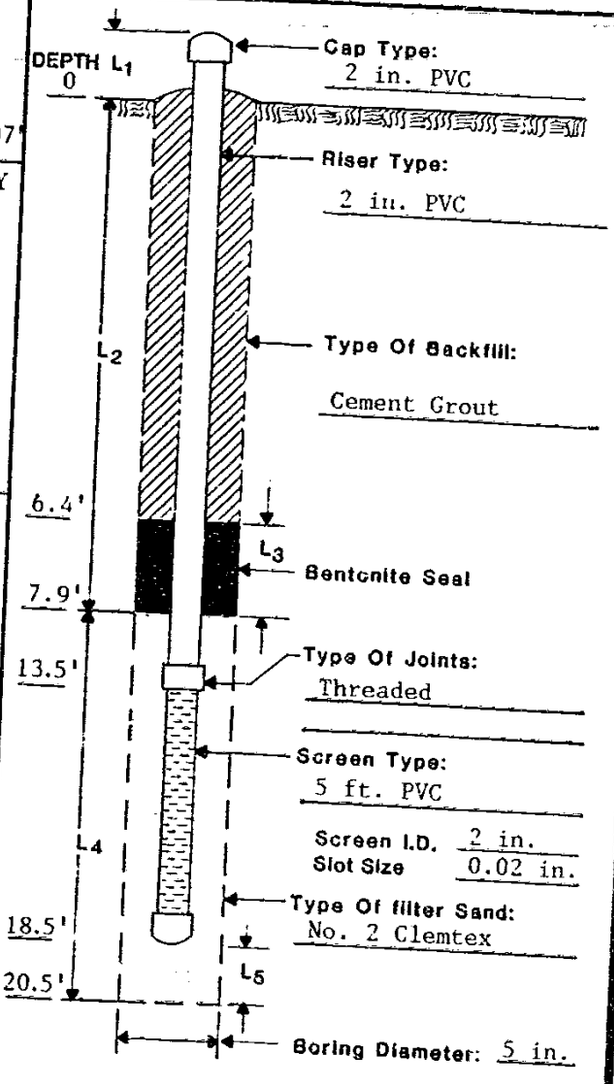
TECHNICAN:

N 733,216 E 3,158,329

LOG OF BORING NO.

MONITORING WELL NO. CAV-OW-13

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.07'
						Brown SANDY CLAY (CL)
5						
10						Brown FINE SAND (SP)
15						
20						Brown CLAY (CH)
						Bottom @ 20.5'
25						



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1983).

COMPLETION DATE: 5-6-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 4.5 ft.
WATER MEASUREMENT DATE: 5-9-83
INSTALLATION METHOD: wet rotary w/no recirculation of drilling fluid

CONSTRUCTION DATA

L_1 = 2.0 ft.
L_2 = 7.9 ft.
L_3 = 1.5 ft.
L_4 = 12.6 ft.
L_5 = 2.0 ft.

McBride-Ratcliff and Associates, Inc.

007320

MONITORING WELL INSTALLATION REPORT

PROJECT: South Cavalcade Site **FIGURE:** F-33

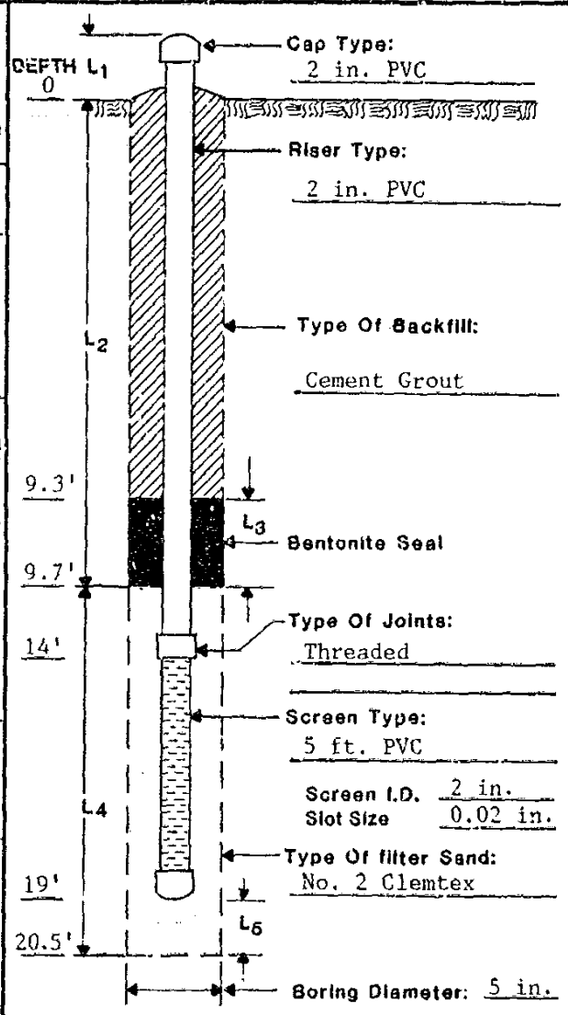
CLIENT: Houston Transit Consultants **PROJECT NO.** 85-317

DRILLER: McClelland Engineers, Inc. **TECHNICAN:**

N 733,720 E 3,158,200

LOG OF BORING NO. **MONITORING WELL NO.** CAV-OW-14

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 51.47'
						Dark gray SILTY CLAY (CL)
						Gray SANDY CLAY (CL)
5						
						Intermixed gray SANDY CLAY (CL) and CLAYEY SAND (SC) w/ creosote odors
10						
						Brown FINE SAND (SP) w/creosote odor
15						
						Brown CLAY (CH)
20						
						Bottom @ 20.5'
25						



REMARKS Well installed by Camp, Dresser & McKee during previous contaminant survey (ref. CDM draft report dated July 11, 1983).

COMPLETION DATE: 5-2-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 5.4 ft.
WATER MEASUREMENT DATE: 5-9-86
INSTALLATION METHOD: wet rotary w/no recirculation of drilling fluid

CONSTRUCTION DATA

L_1 = 2.0 ft. L_4 = 10.8 ft.

L_2 = 9.7 ft. L_5 = 1.5 ft.

L_3 = 0.4 ft.

McBride-Ratcliff and Associates, Inc.

007321

007321

MONITORING WELL INSTALLATION REPORT

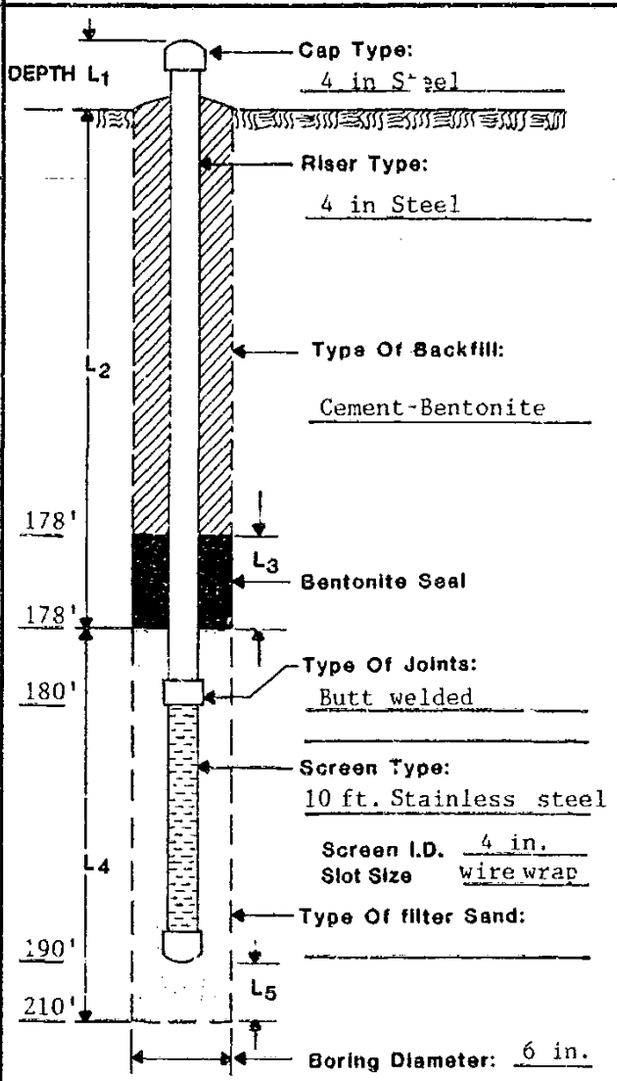
PROJECT: South Cavalcade Site **FIGURE:** F-34

CLIENT: Houston Transit Consultants **PROJECT NO.** 85-317

DRILLER: Underground Resource Management **TECHNICAN:** N 740,300 E 3,156,240

LOG OF BORING NO. **MONITORING WELL NO.** CT-OW-01

DEPTH - FT	SYMBOL	SAMPLE NO.	FIELD HEADSPACE READING, PPM	LAB HEADSPACE READING, PPM	SAMPLES	MATERIAL DESCRIPTION
						TOP OF RISER ELEV. 60.18'
		16T			■	Greenish gray SILTY CLAY (CL) w/calcareous nodules
165						
						Tan SILTY SAND (SM)
170		17T			■	
175						
180		18T			■	
185						
						Interlayered SAND and CLAY
						Bottom @ 210'



REMARKS Well installed by Camp Dresser & McKee, Inc. during previous containment survey (ref. CDM draft report dated July 11, 1986). 6 in. steel casing installed to 120 ft.

COMPLETION DATE: 6-4-83
WELL DEVELOPMENT DATE:
DEPTH TO WATER : 141.8 ft.
WATER MEASUREMENT DATE: 11-21-86
INSTALLATION METHOD: wet rotary

CONSTRUCTION DATA

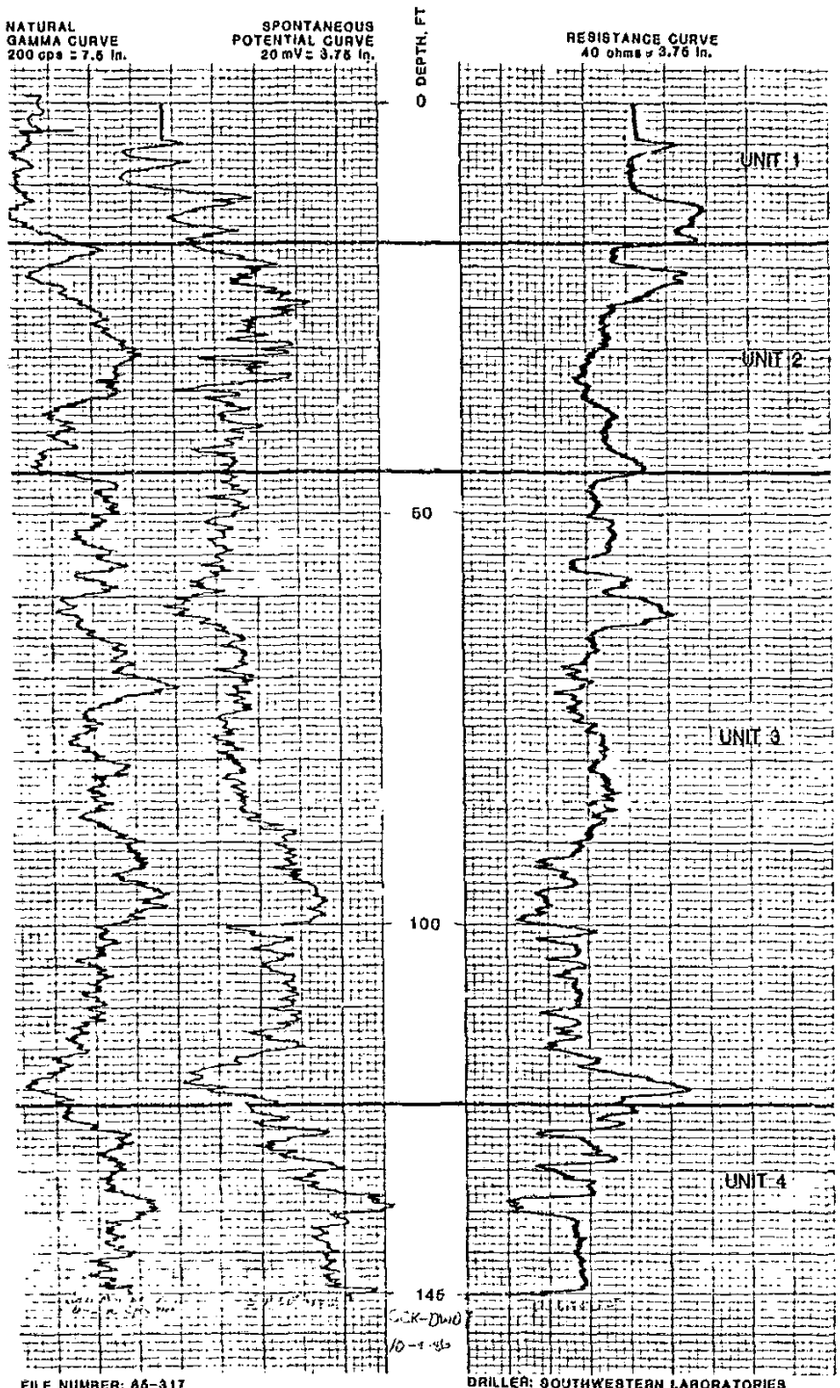
L_1 = 2.8 ft. L_4 = 32.0 ft.
L_2 = 178 ft. L_5 = 20.0 ft.
L_3 = 0.0 ft.

McBride-Ratcliff and Associates, Inc.

007322

APPENDIX G - GEOPHYSICAL WELL LOGS

007323



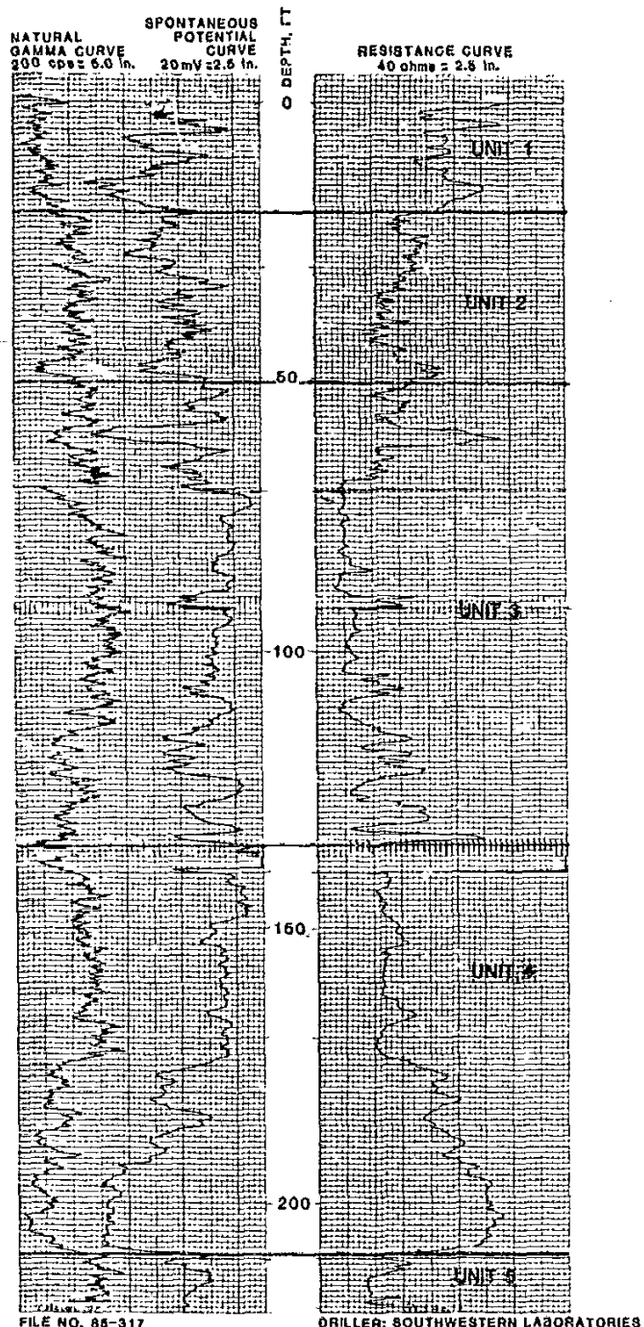
FILE NUMBER: 86-317
FIGURE:

DRILLER: SOUTHWESTERN LABORATORIES
DATE: 10-8-86
BORING NUMBER: SGK-DW01
ELEVATION: 49.5'

LOG OF GEOPHYSICAL BORING
SOUTH CAVALCADE SITE
HOUSTON, TEXAS

McBride-Ratcliff and Associates, Inc.

007324



FILE NO. 86-317
FIGURE:

DRILLER: SOUTHWESTERN LABORATORIES
DATE: 6-8-87
BORING NUMBER: SGK-DW02
ELEVATION: 48.6'

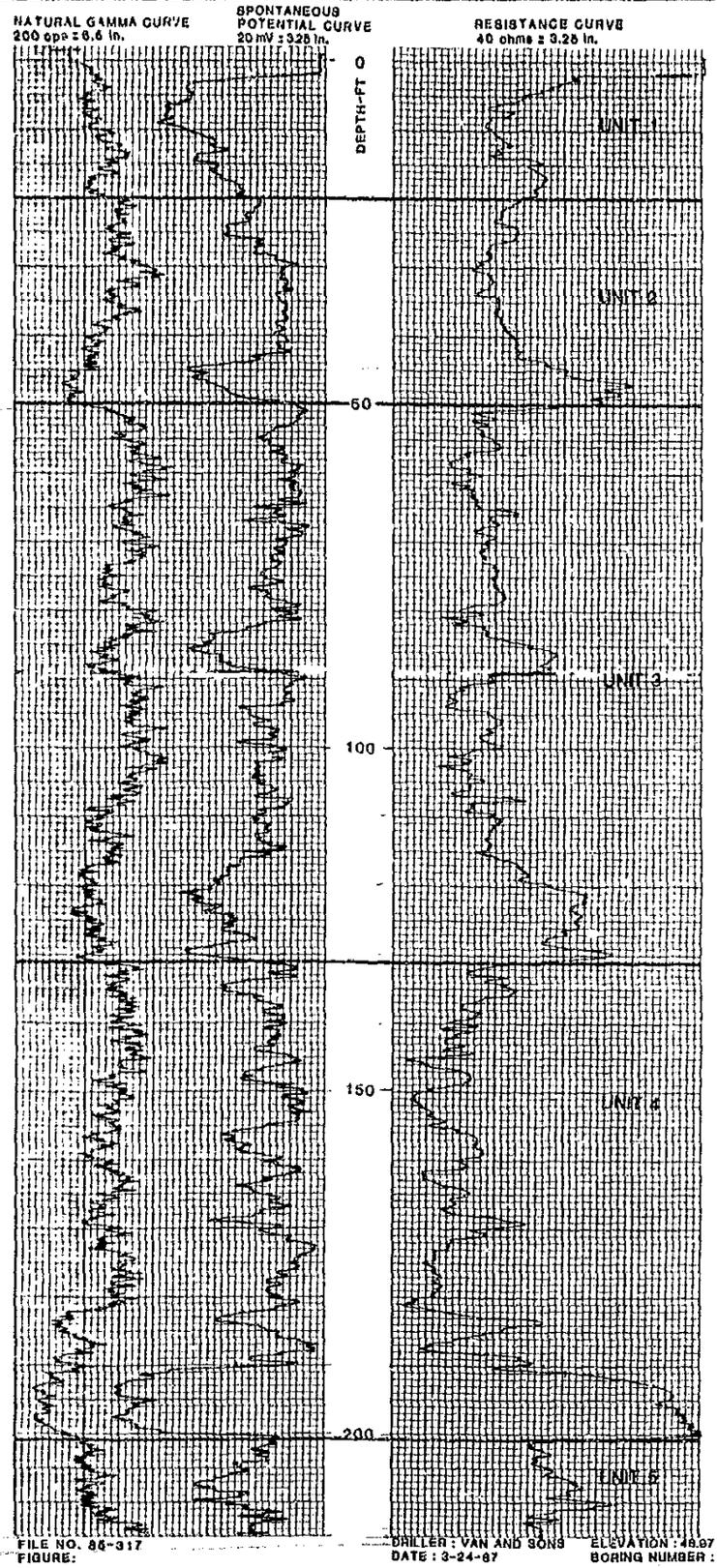
LOG OF GEOPHYSICAL BORING

SOUTH CAVALCADE SITE

HOUSTON, TEXAS

McBride-Ratcliff and Associates, Inc.

007325



FILE NO. 86-317
FIGURE:

DRILLER : VAN AND SONS
DATE : 3-24-87

ELEVATION : 48.97
BORING NUMBER : SCK-P06

LOG OF GEOPHYSICAL BORING

SOUTH CAVALCADE SITE
HOUSTON, TEXAS

McBride-Ratcliff and Associates, Inc.

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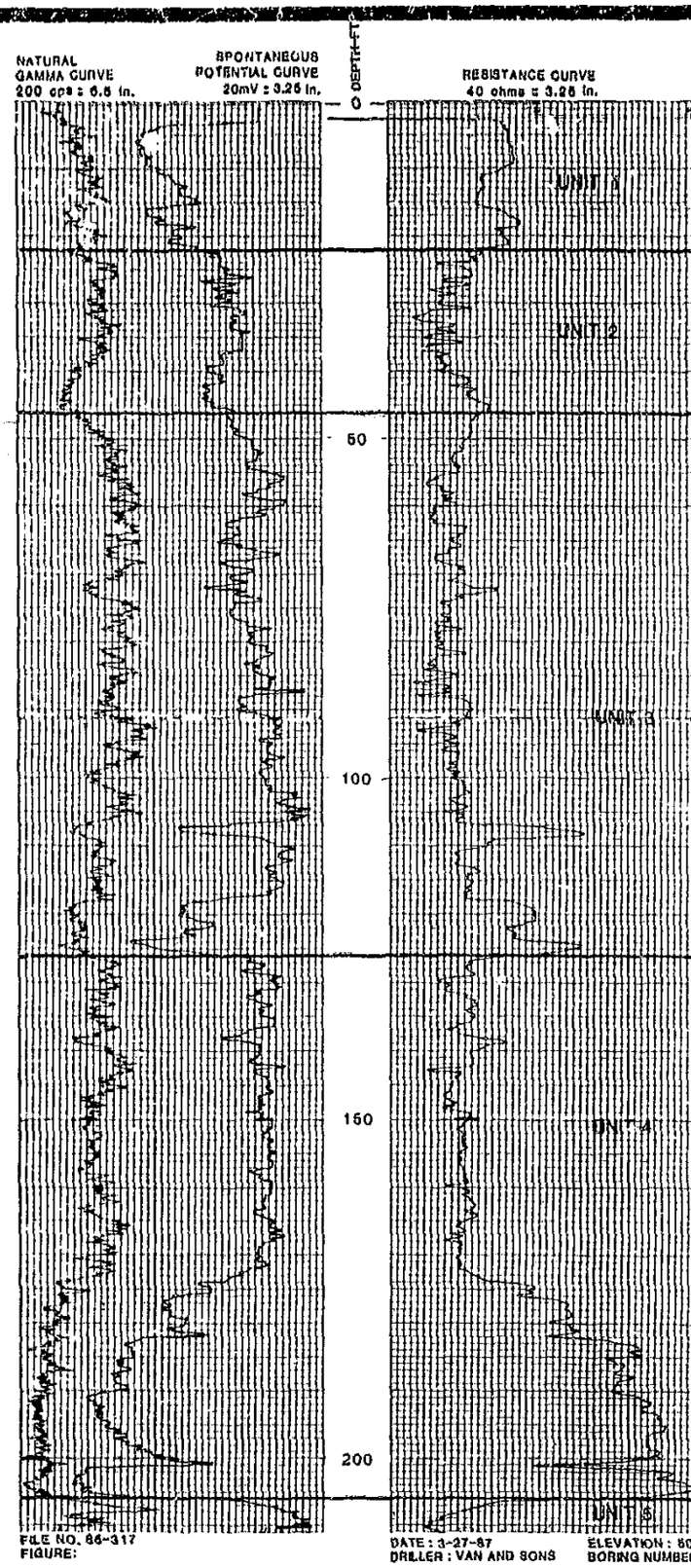

FILE NO. 86-317
FIGURE:

DATE : 3-27-87
DRILLER : VAN AND SONS

ELEVATION : 50.44
BORING NUMBER : SCK-P07

LOG OF GEOPHYSICAL BORING
SOUTH CAVALCADE SITE
HOUSTON, TEXAS

McBride-Ratcliff and Associates, Inc.

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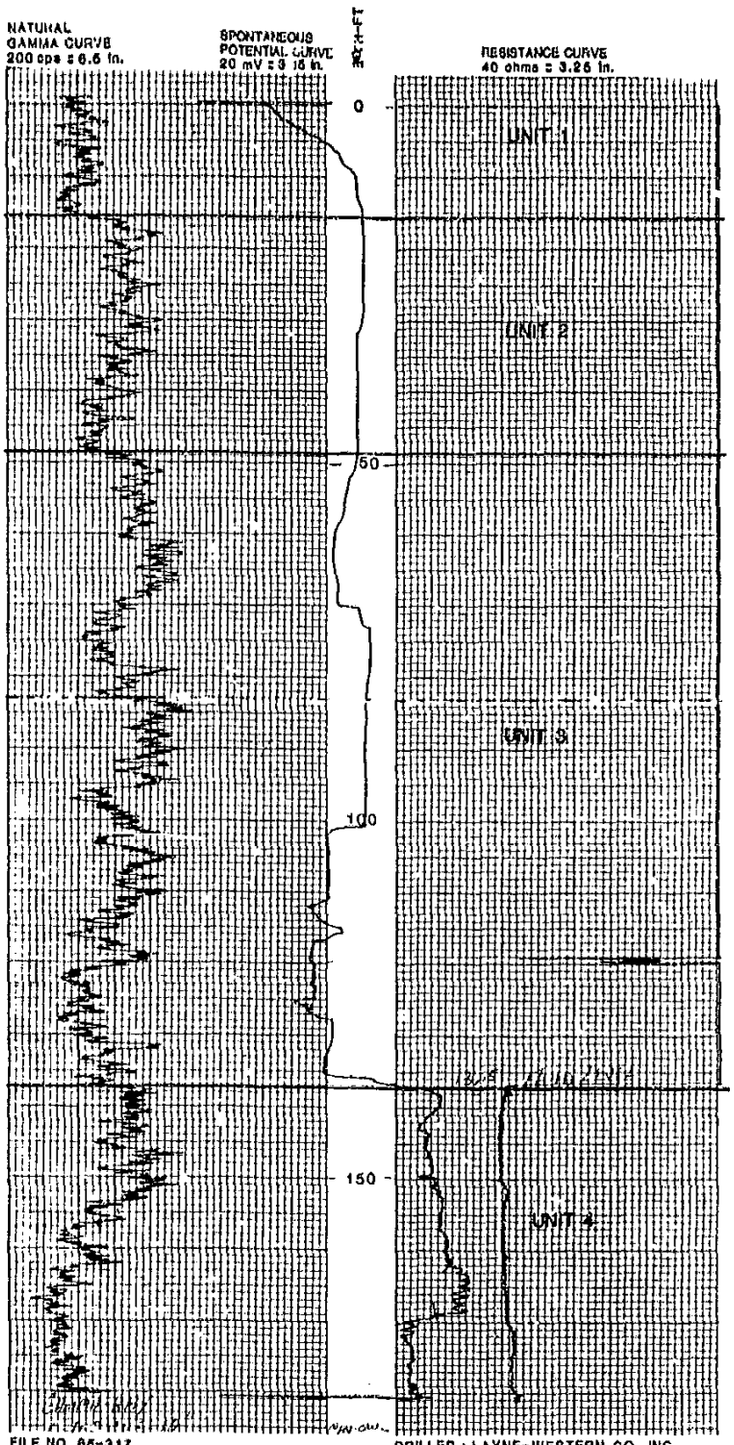

FILE NO. 86-317
FIGURE:

DRILLER : LAYNE-WESTERN CO., INC.
DATE LOGGED: 3-24-87
WELL NUMBER: SCK-OW-06
ELEVATION: 51.0

GEOPHYSICAL γ LOG OF EXISTING MONITORING WELL
SOUTH CAVALCADE SITE
HOUSTON, TEXAS

McBride-Ratcliff and Associates, Inc.

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APPENDIX H - WATER-LEVEL HYDROGRAPHS

007329

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-1

WELL NO.: OW-01

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 51.48 ft.

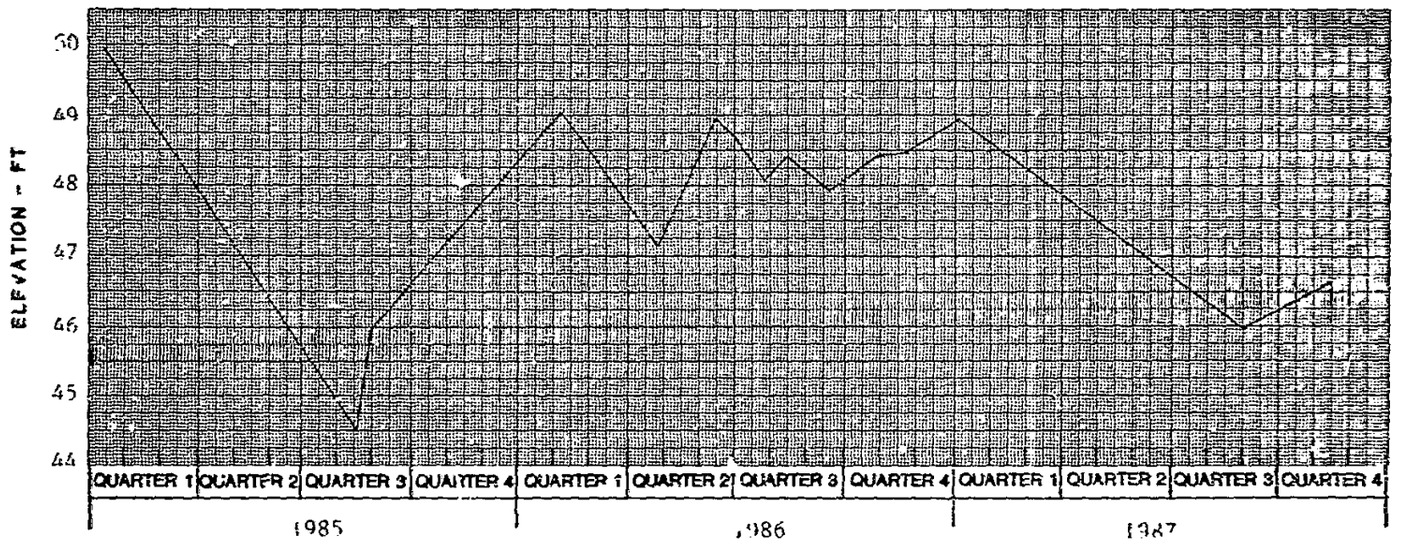
INSTALLATION DATE: February 7, 1983

MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007330

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-2
WELL NO.: OW-02

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

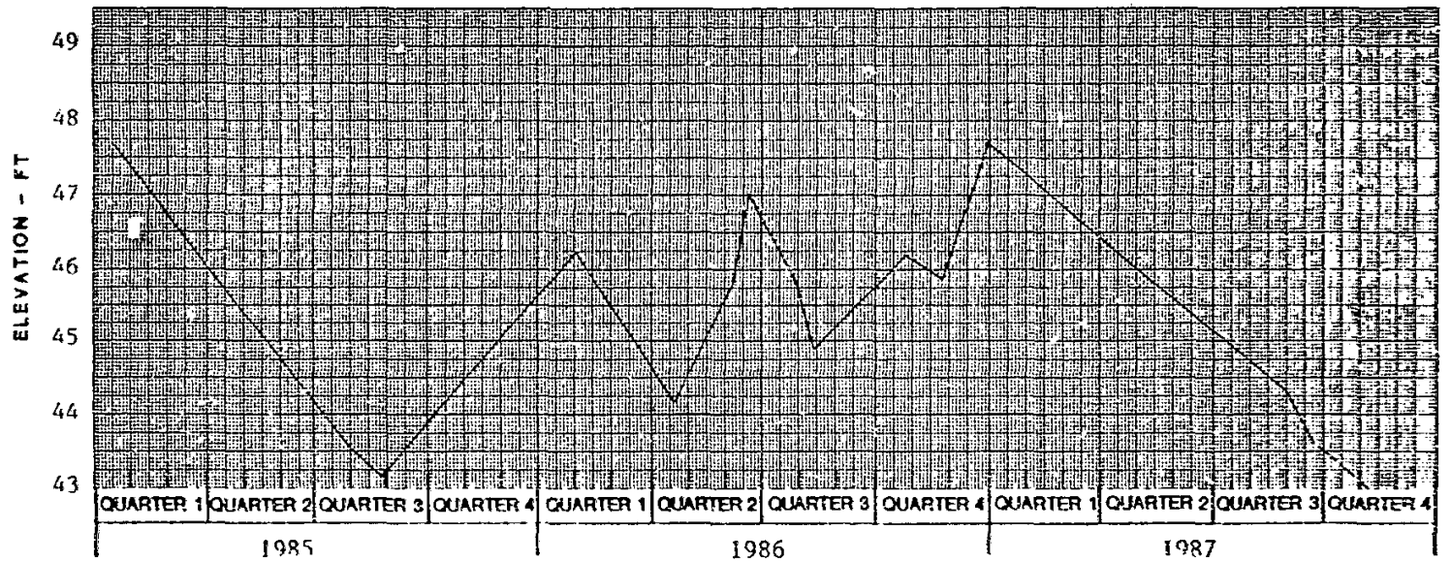
PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 52.95 ft.
INSTALLATION DATE: February 5, 1983
MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007331

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: II-3

WELL NO.: OW-06

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 53.67 ft.

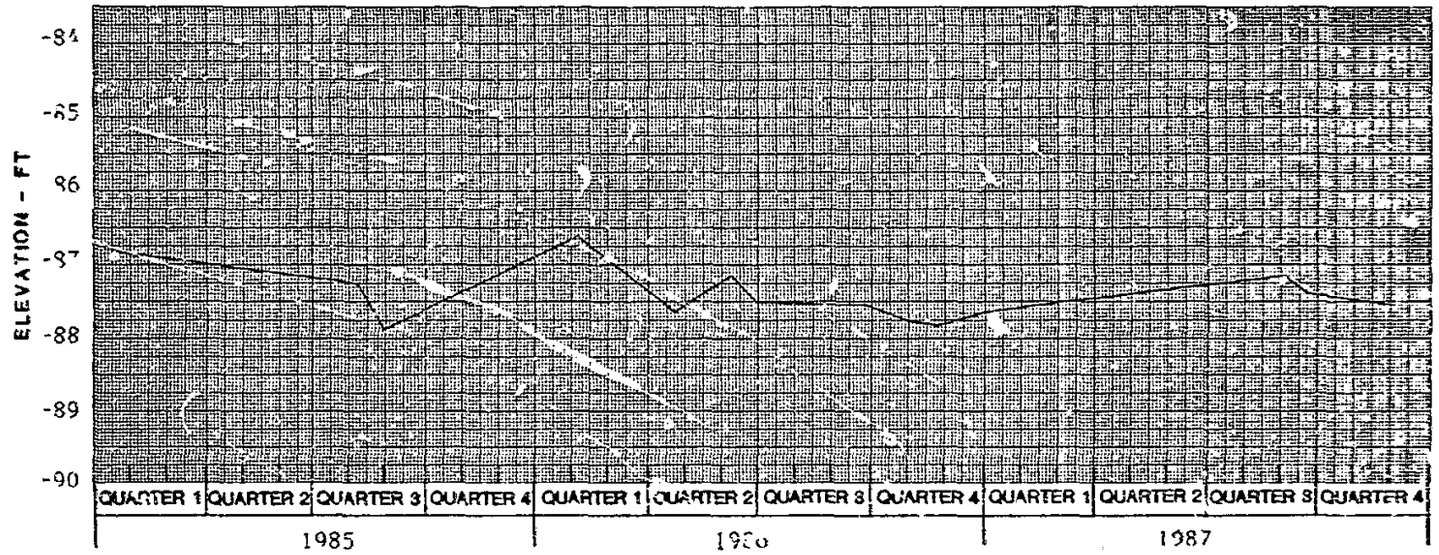
INSTALLATION DATE: May 11, 1983

MEASUREMENT METHOD: Weighted Tape and Electrical Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH – FT.	WATER ELEVATION – FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007332

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-4
WELL NO.: OW-07

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

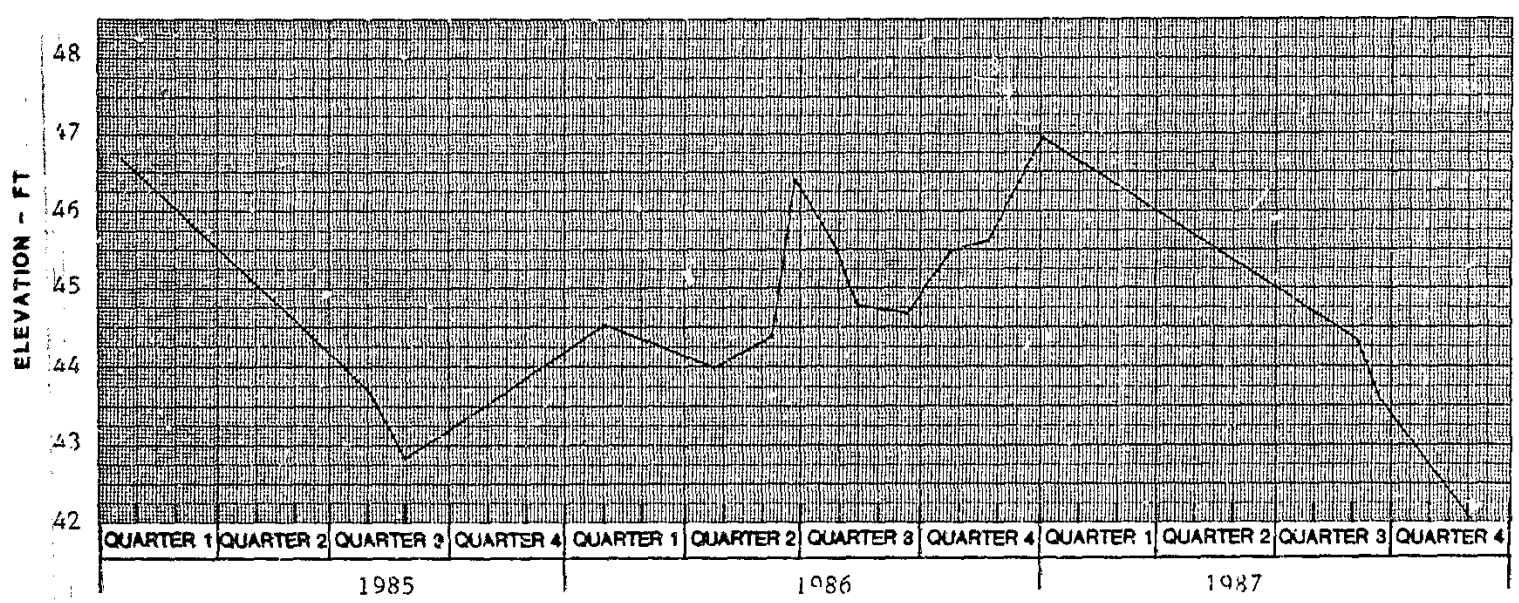
TOP OF CASING ELEVATION: 53.61 ft.

INSTALLATION DATE: May 3, 1983

MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA			
DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007333

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-5

WELL NO.: OW-10

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 49.73 ft.

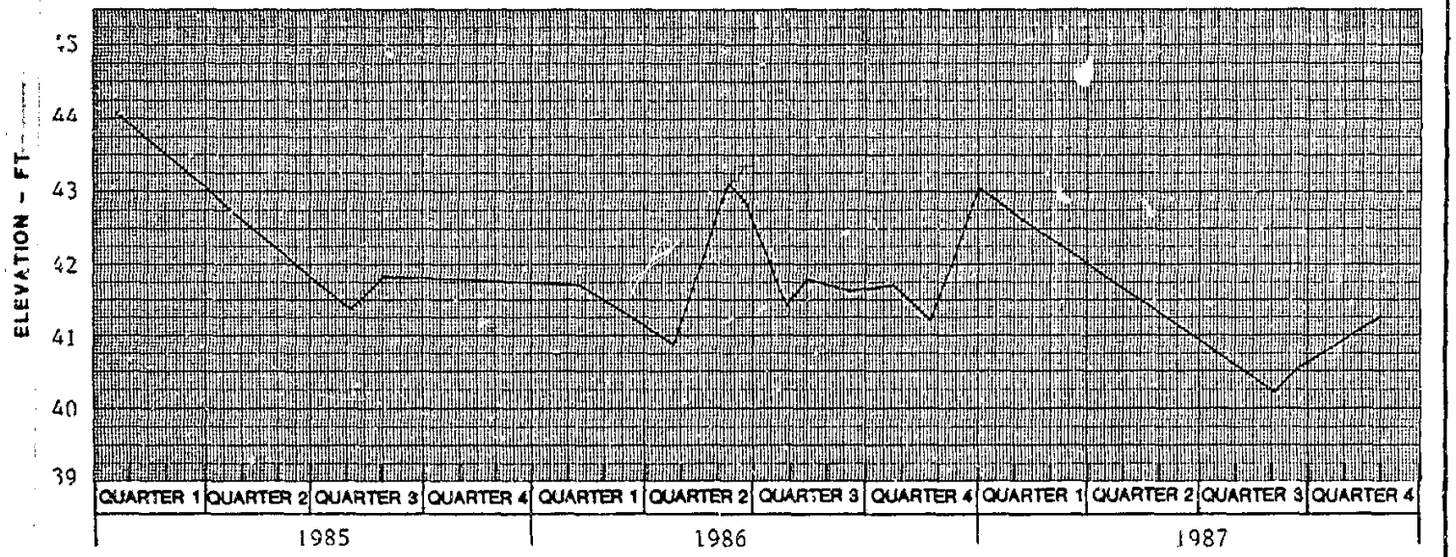
INSTALLATION DATE: May 4, 1983

MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007334

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-6

WELL NO.: OW-13

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc

PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 51.07 ft.

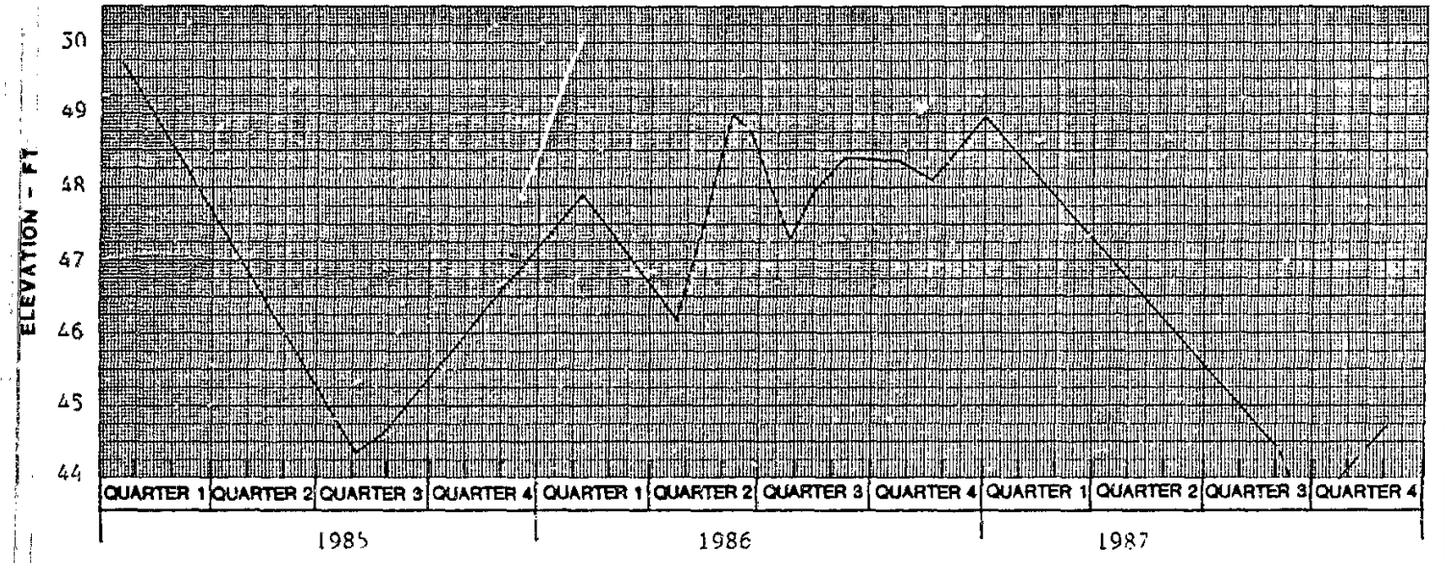
INSTALLATION DATE: May 6, 1983

MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007335

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-7

WELL NO.: OW 14

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 51.47 ft.

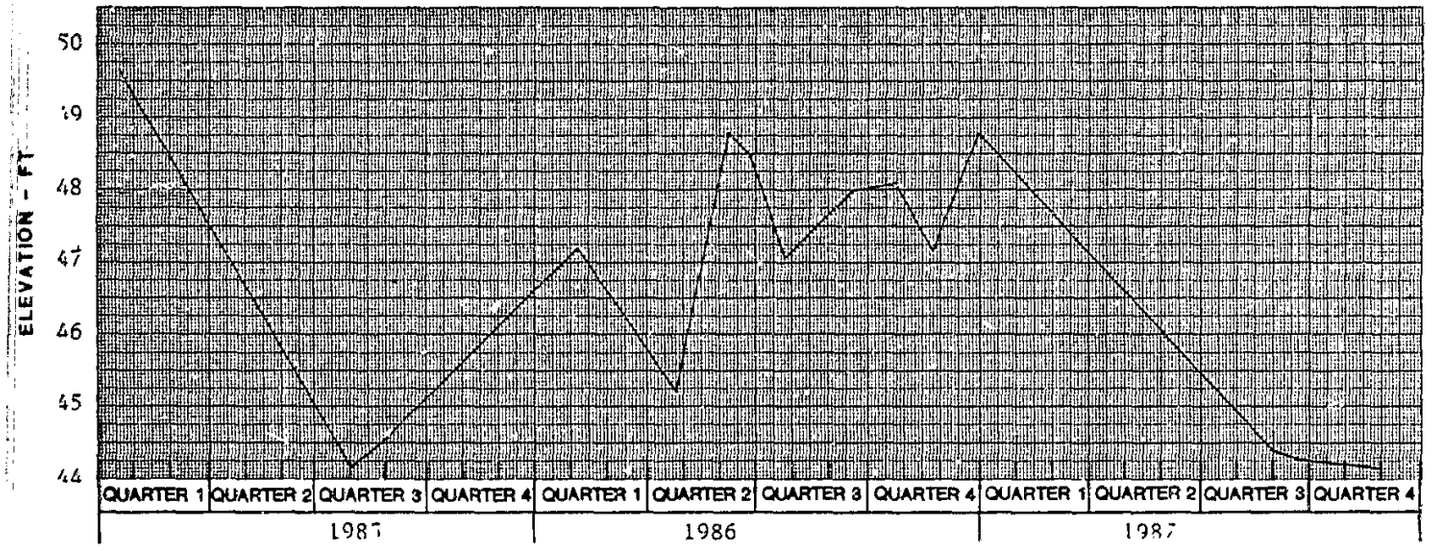
INSTALLATION DATE: May 2, 1983

MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007336

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-8

WELL NO.: P06

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 50.47 ft.

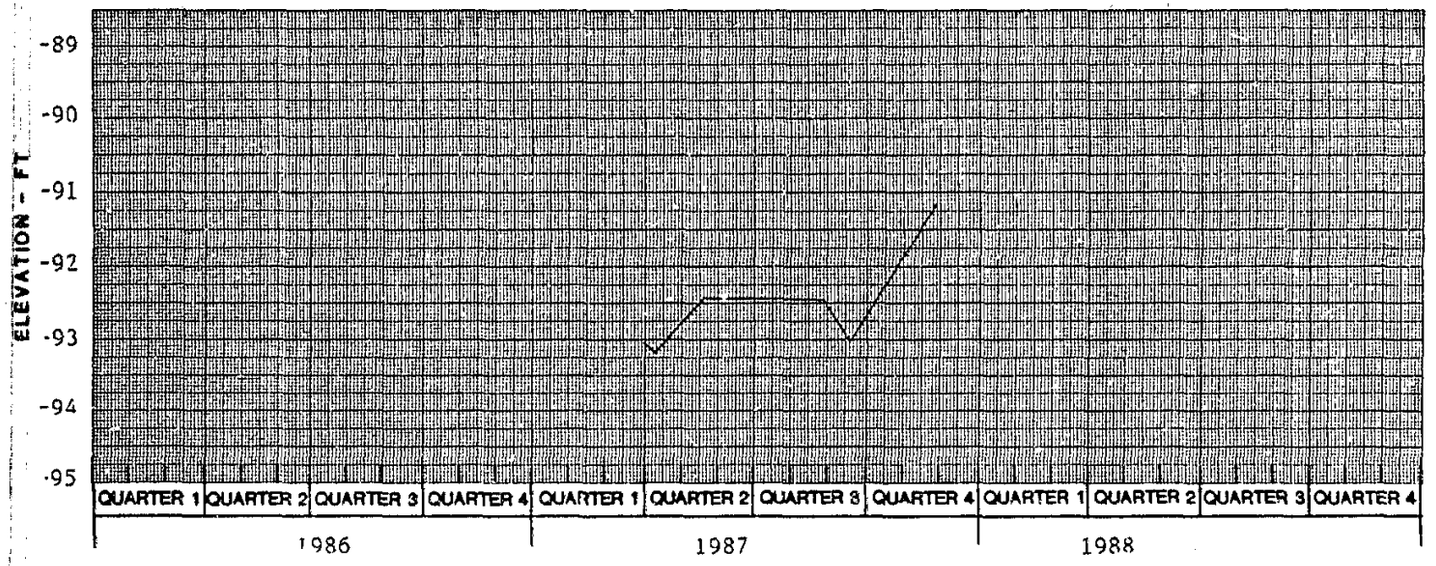
INSTALLATION DATE: March 25, 1987

MEASUREMENT METHOD: Weighted Tape and Electrical Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007337

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-9

WELL NO.: P02

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 50.86 ft.

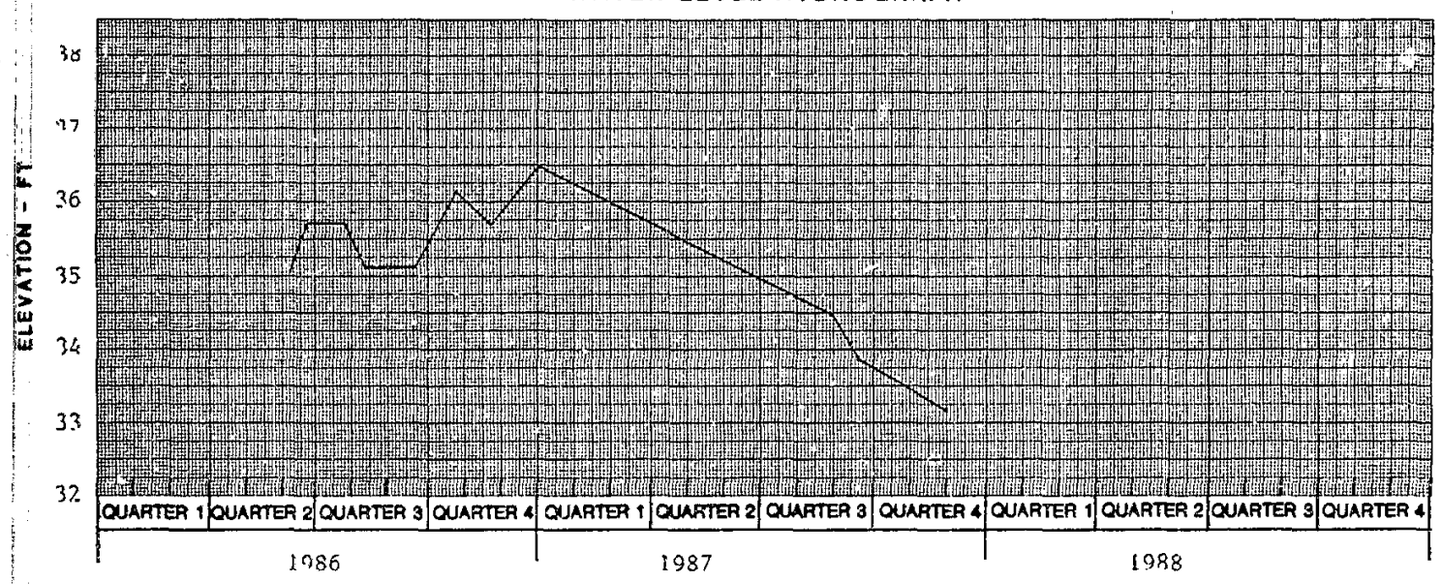
INSTALLATION DATE: May 23, 1986

MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007338

SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-10

WELL NO.: P03

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

PROJECT NO.: 85-317

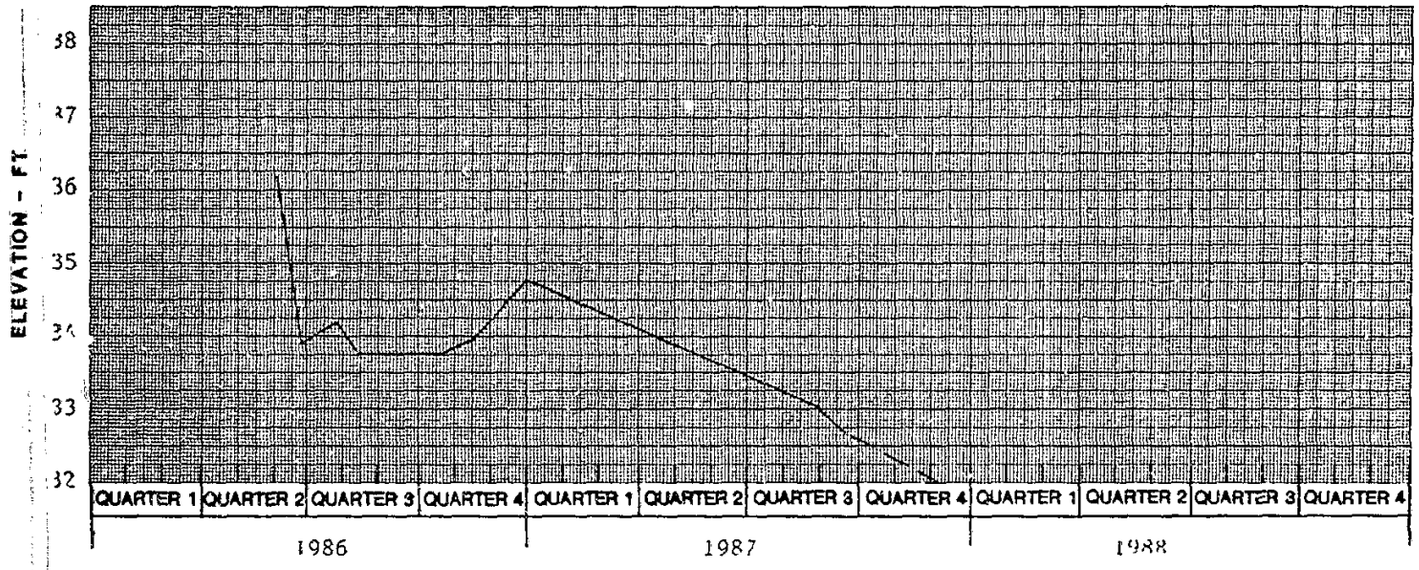
TOP OF CASING ELEVATION: 51.76 ft.

INSTALLATION DATE: May 27, 1986

MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA			
DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

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SUMMARY OF WATER LEVEL MEASUREMENTS

FIGURE NO.: H-11
WELL NO.: P05

PROJECT: South Cavalcade Site

LOCATION: Houston, Texas

CLIENT: Koppers Company, Inc.

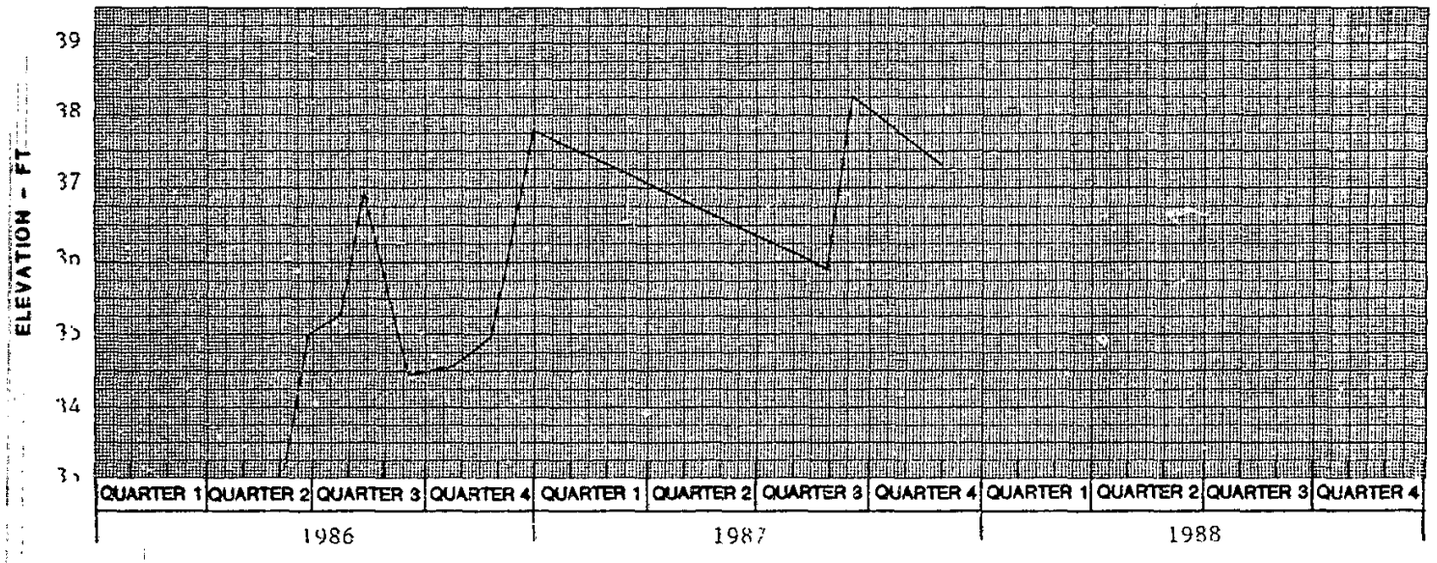
PROJECT NO.: 85-317

TOP OF CASING ELEVATION: 53.53 ft.
INSTALLATION DATE: May 29, 1986
MEASUREMENT METHOD: Weighted Tape

WATER LEVEL DATA

DATE	TIME	WATER DEPTH - FT.	WATER ELEVATION - FT.

WATER LEVEL HYDROGRAPH



McBride-Ratcliff and Associates, Inc.

007340

APPENDIX I - FIELD PERMEABILITY TEST DATA

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APPENDIX I
FIELD HYDRAULIC CONDUCTIVITY TESTING

1.0 Field Program

Hydraulic conductivity field testing was conducted at the South Cavalcade site on February 18 through 22, 1987. The field program was designed to evaluate hydraulic conductivity of the shallow groundwater zone identified during the Remedial Investigation. The hydraulic conductivity test program was performed in general accordance with EPA Method 9100, "Saturated Hydraulic Conductivity, Saturated Leachate Conductivity, and Intrinsic Permeability Methods," 1986.

Falling-head hydraulic conductivity tests were run in four fully cased monitoring wells screened over the test strata. Monitoring well designations for each test are presented in Table I-1. Monitoring well test locations were selected to assess spacial variability in hydraulic conductivity within the shallow groundwater zone.

Each well was developed using filtered compressed air; development continued until the water expelled from the well appeared visually clear. The test zone was saturated prior to testing by maintaining a constant head at the top of the well casing. The flow of water was discontinued when air bubbles were no longer visible rising within the flooded well casing.

For the falling-head tests, excess heads were induced by rapidly injecting a known volume of water into each well. Water-level recovery data was then obtained with an electric water-level indicator. Water-level measurements

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TABLE I-1

FIELD HYDRAULIC CONDUCTIVITY TEST RESULTS

SHALLOW GROUNDWATER ZONE

Monitoring Well	Soil Type	Screen Interval (ft)	Measured Horizontal Hydraulic Conductivity (cm/sec)
SCK-MW01	Sand	9.0 - 24.0	2.4×10^{-4}
SCK-MW02	Sand	9.0 - 24.0	4.5×10^{-4}
CAV-OW07	Sand	11.0 - 16.0	4.3×10^{-4}
CAV-OW08	Sand	14.0 - 19.0	2.2×10^{-3}

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were taken at intervals ranging from 3 minutes to 10 minutes depending on the rate of water-level decline. Water levels were measured until approximately 85 percent of the original excess head had dissipated.

The validity of the test data was evaluated in the field by plotting the log of excess head versus arithmetic time. Data was assumed reasonable when the plotted data points approximated a straight-line fit (Bouwer, 1976). This excludes data points from the late stages of the test interval which frequently deviate from the best-line fit of earlier points as equilibrium is approached. Plots of the field test data are presented in Figures I-1 through I-4.

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2.0 Results

Groundwater recovery data were analyzed by the methods of Hvorslev (1951) for determining permeability in piezometers. This method accounts for the time lag that occurs from the time water is injected into a piezometer, until the time the excess head equals the surrounding pore pressure. The analysis accounts for a gravel pack or developed zone surrounding the well which, for the present evaluation, was assumed to be the width of the borehole in which filter sand was placed.

A summary of calculated hydraulic conductivities and field parameters for each test well is presented in Table I-1. Shown in the table, hydraulic conductivities calculated for the shallow groundwater zone fall within an order of magnitude, ranging from 2.4×10^{-4} cm/sec to 2.2×10^{-3} cm/sec.

3.0 Analysis

Hydraulic conductivities computed for the shallow zone are consistent with the uniformity of soils tested within this

007344

FIELD PERMEABILITY TEST DATA

FIGURE NO.: I-1

PROJECT: South Cavalcade Site

PIEZOMETER NO.: SCK-MW01 **PROJECT NO.:** 85-317

TEST DATA

TEST DATE: 2-19-87

TIME: 1230

TECHNICIAN: D.T. Coffin

TEST METHOD: Falling - head

PARAMETERS

H_O = 7.7' d = 2"

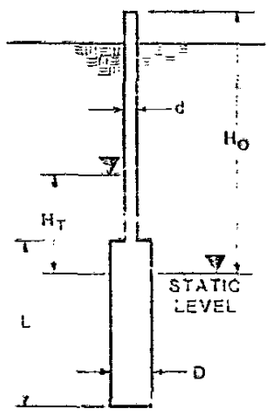
L = 144" T = 156 sec.

D = 9"

PERMEABILITY EQUATION:

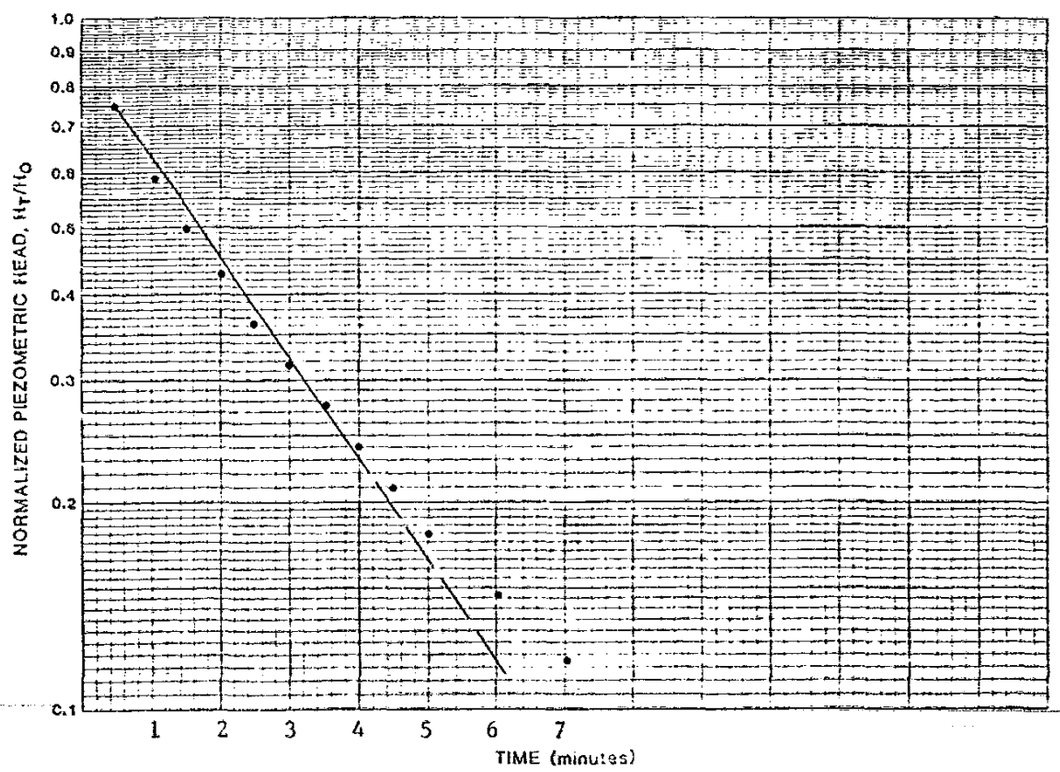
$$K_h = \frac{d^2 \cdot \ln(4L/D)}{8LT}$$ (Ref. Hvorslev)

SKETCH



MEASUREMENTS

ELAPSED TIME (minutes)	WATER DEPTH (feet)
.5	2.00
1	3.14
1.5	3.87
2	4.40
2.5	4.91
3	5.26
3.5	5.57
4	5.85
4.5	6.06
5	6.30
6	6.57
7	6.78
8	6.97
9	7.15
10	7.25
15	7.57
20	7.58



McBride-Ratcliff and Associates, Inc.

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FIELD PERMEABILITY TEST DATA

FIGURE NO.: I-2

PROJECT: South Cavalcade Site

PIEZOMETER NO.: SCK-MW02 **PROJECT NO.:** 85-317

TEST DATA

TEST DATE: 2-18-87

TIME: 1400

TECHNICIAN: D.T. Coffin

TEST METHOD: Falling - head

PARAMETERS

H_O = 8.45' d = 2"

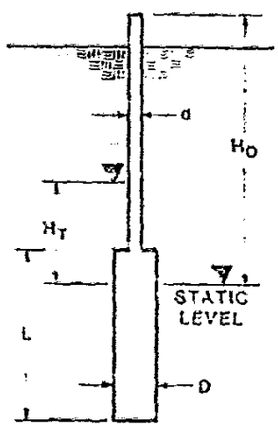
L = 156' T = 76.8 sec.

D = 9"

PERMEABILITY EQUATION:

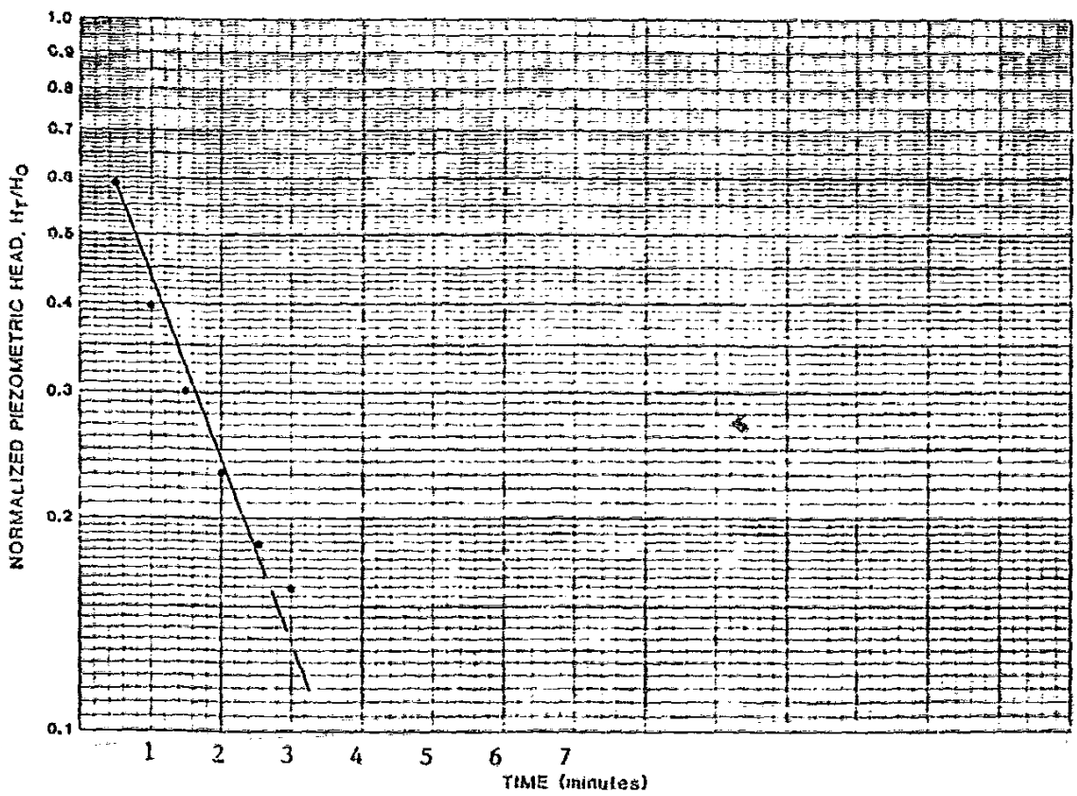
$$K_h = \frac{d^2 \cdot \ln(4L/D)}{8LT}$$ (Ref. Hvorslev)

SKETCH



MEASUREMENTS

ELAPSED TIME (minutes)	WATER DEPTH (feet)
.5	3.5
1.0	5.1
1.5	5.9
2.0	6.5
2.5	6.9
3.0	7.1



McBride-Ratcliff and Associates, Inc.

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FIELD PERMEABILITY TEST DATA

FIGURE NO.: I-3

PROJECT: South Cavalcade Site

PIEZOMETER NO.: CAV-OW-07 PROJECT NO.: 85-317

TEST DATA

TEST DATE: 2-19-87

TIME:

TECHNICIAN: D.T. Coffin

TEST METHOD: Falling - head

PARAMETERS

H_O = 7.87' d = 2"

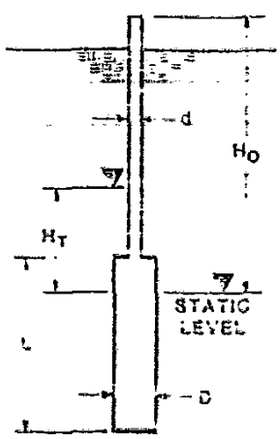
L = 48" T = 225 sec.

D = 5"

PERMEABILITY EQUATION:

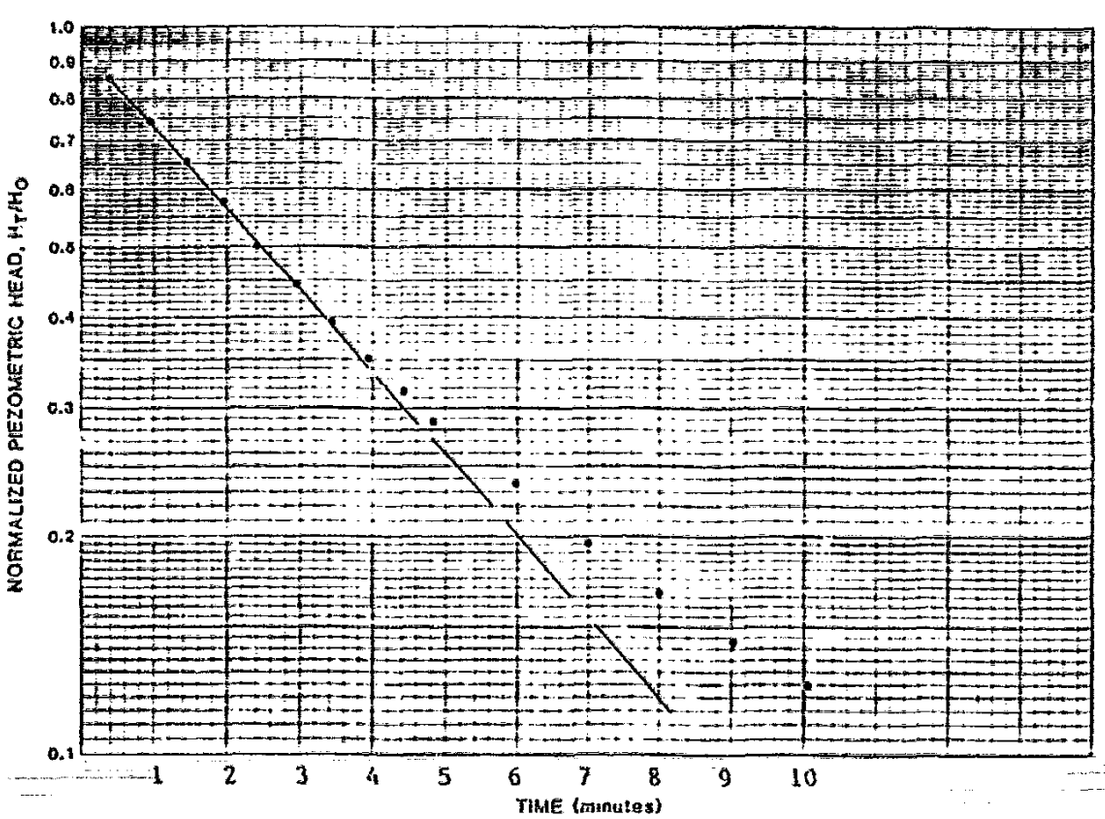
$$K_h = \frac{d^2 \cdot \ln(4L/D)}{8LT}$$ (Ref. Hvorslev)

SKETCH



MEASUREMENTS

ELAPSED TIME (minutes)	WATER DEPTH (feet)
.5	1.15
1	2.04
1.5	2.75
2	3.34
2.5	3.90
3	4.36
3.5	4.77
4	5.1
4.5	5.37
5	5.61
6	6.00
7	6.31
8	6.56
9	6.75
10	6.89



McBride-Ratcliff and Associates, Inc.

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FIELD PERMEABILITY TEST DATA

FIGURE NO.: I-4

PROJECT: South Cavalcade Site

PIEZOMETER NO.: CAV-OW-08 PROJECT NO.:

TEST DATA

TEST DATE: 2-19-87

TIME: 1500

TECHNICIAN: D.T. Coffin

TEST METHOD: Falling - head

PARAMETERS

H_O = 8.54' d = 2"

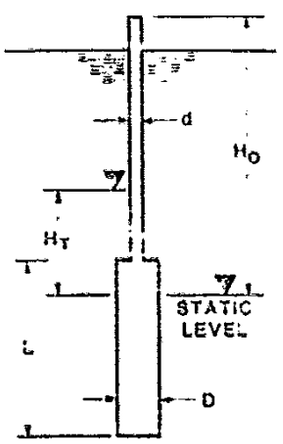
L = 60" T = 37.8 sec.

D = 5"

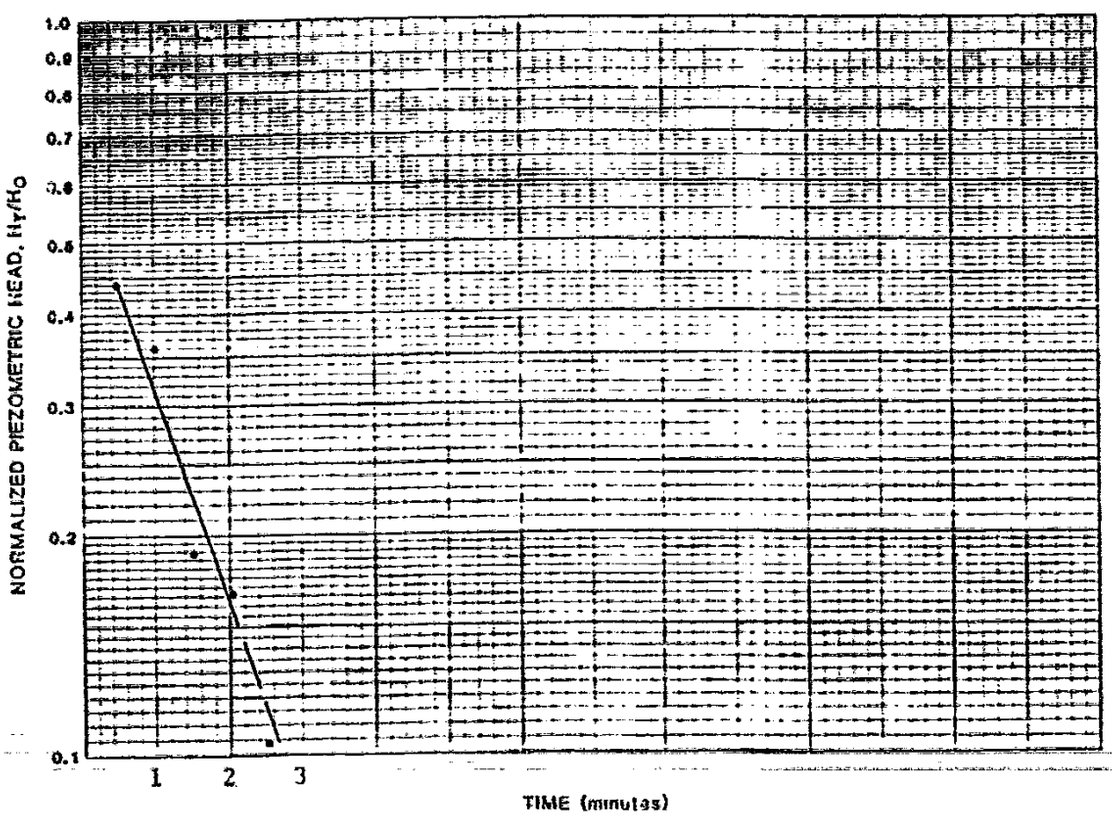
PERMEABILITY EQUATION:

$$K_h = \frac{d^2 \cdot \ln(4L/D)}{8LT}$$ (Ref. Hvorslev)

SKETCH



MEASUREMENTS	
ELAPSED TIME (minutes)	WATER DEPTH (feet)
.5	4.9
1.0	6.4
1.5	7.1
2.0	7.5
2.5	7.7
3.0	7.9
3.5	8.0



McBride-Ratcliff and Associates, Inc.

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zone. Based on visual classification and grain size analyses, sands predominated within the test strata at each well location.

4.0 Conclusions

Hydraulic conductivity field tests were performed at the South Cavalcade site in fully penetrating or mostly penetrating wells. The computed hydraulic conductivities are therefore indicative primarily of the horizontal component of flow. Soils in the Houston area are composed of alluvial and fluvial sediments deposited generally in horizontal layers. As a result, hydraulic conductivity is anisotropic with higher rates of groundwater flow along bedding planes. The component of flow perpendicular to bedding planes is frequently more than an order of magnitude less than horizontal rates of flow (Cooper et. al., 1967).

Hydraulic conductivities of the shallow zone were found to be consistent with observed soil type. An average value of 8.3×10^{-4} cm/sec, was computed for the predominantly sand strata at the South Cavalcade Site. Hydraulic conductivity studies performed at the nearby North Cavalcade site produced averages on the order of 1.5×10^{-3}.

5.0 Limitations

Hydraulic conductivities were assessed at the South Cavalcade site by single well tests. The duration of the injection test is generally short, thus the estimated hydraulic conductivities are representative of only the water-bearing material close to the well. Hydraulic conductivities extraneous to test well locations may vary with changes in soil type and flow system geometry.

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6.0 References

Bouwer, H. and Rice, E.C. "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, "Water Resources Research, Vol. 12, 1976.

Cooper, H.H., Bredehoeft, J.D., and Papadopulos, I.S., "Response of a Finite-Diameter Well to an Instantaneous Charge of Water," Water Resources Research, Vol. 3, No. 1, 1967.

Hvorslev, M.J., "Time Lag and Soil Permeabilty in Ground-Water Observations," Waterways Experiment Station, Bulletin No. 36, Corps of Engineers, Vicksburg, Mississippi, 1951.

U.S. EPA, "Saturated Hydraulic Conductivity, Saturated Leachate Conductivity, and Intrinsic Permeability Methods," Test Methods for Evaluating Solid Waste, Method 9100, SW-846, 1986.

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APPENDIX J - DEEP WELL CONSTRUCTION SPECIFICATIONS

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ATTACHMENT A

GENERAL SPECIFICATIONS

CONSTRUCTION OF DEEP GROUNDWATER MONITORING WELL
SUBTASK 2E
KOPPERS SOUTH CAVALCADE SITE
HOUSTON, TEXAS

A. General

1. Site is located near 2000 Cavalcade Street in Houston, Texas.

2. Site visits can be arranged by contacting Bill Tobin with McBride-Ratcliff and Associates at (713) 460-3766.

3. Estimated start date is April 1987.

4. Desired working hours are 7:00 a.m. to 5:00 p.m., Monday through Friday.

5. General Contractor is Koppers Company, Inc., Pittsburgh, Pennsylvania. Technical contact is Jim Campbell: PGH (412) 227-2689 or Shannon Craig - (412)-733-9499. Contract administrator is George McGinley: PGH (412) 227-2698.

6. Koppers Representatives are McBride-Ratcliff and Associates. Mr. Bill Tobin (713) 460-3766 and Keystone Environmental Resources Ms. Shannon Craig (412)-733-9499. Al Quagliotti, Mgr. (412) 733-9451, and Mike Helbling, Project Hydrogeologist.

7. This site contains documented EPA priority pollutant compounds. Analytical test data will be made available upon written request.

B. Utilities

1. Water (garden hose and fire hydrant) and electricity will be provided at Koppers expense at a central on-site location.

2. The Drilling Contractor will be responsible for transporting water and providing electrical generators when required.

C. Waste Handling

1. Koppers will provide all waste storage containers.

2. The Drilling Contractor will be responsible for collection and placement of waste materials into on-site containers.

3. Koppers will be responsible for transport, storage and disposal of all waste materials.

4. Drilling Contractor will provide all equipment including pumps, lines, and pits necessary for collection and placement of waste into storage containers.

D. Steam Cleaning

1. Koppers will provide a steam cleaner and decontamination facilities at a central on-site location.

2. The Drilling Contractor will be responsible for conducting steam cleaning and decontamination services.

E. Security

1. The Drilling Contractor may temporarily store equipment and materials on-site at his own risk.

2. Koppers assumes no responsibility for theft, damage, or security of Contractors equipment and materials.

F. Safety

1. Drilling Contractor will be required to wear: rubber gloves, steel toe and shank rubber boots, safety glasses or goggles, hard hat, and coveralls during all on-site activities.

2. Koppers will provide personnel decontamination facilities for clothes changing, boot washing, and hand cleaning. Personnel shower facilities will not be provided.

3. Koppers will provide coveralls and rubber gloves.

4. No smoking or eating will be permitted during on-site activities.

5. The use of air-purifying respirators and chemically resistant disposable coveralls may be required and will be provided by Koppers.

6. Working hours may be curtailed or modified if heat stress becomes a problem.

7. Koppers reserves the right to require medical examinations of Contractor personnel or request certification of previous medical examinations for less than 1 year for all on-site personnel, including subcontractor. The cost of medical examinations will be the responsibility of Koppers.

G. Borehole Logging

1. Koppers will provide full-time on-site geologist to log and classify soil samples.

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2. Sample extrusion and sample decontamination will be the responsibility of the Drilling Contractor.

H. Miscellaneous

1. Drilling Contractor downtime asscciated, but not limited to: inclement weather, mechanical failures, material shortages, grout set up time and incomplete equipment decontamination and waste collection will not be cause for reimbursement.

2. All Drilling Contractor operations will be subject to full-time inspection of EPA and their designated representative.

ATTACHMENT B.

TECHNICAL SPECIFICATIONS

CONSTRUCTION OF DEEP GROUNDWATER MONITORING WELL
SUBTASK 2E
KOPPERS SOUTH CAVALCADE SITE
HOUSTON, TEXAS

Introduction

The South Cavalcade site remedial investigation is being conducted by the Koppers Company by Administrative Order from the Region VI EPA under the CERCLA (Superfund) Program. The purpose of the deep groundwater monitoring well installation is to evaluate potential contaminants in a documented water supply sand unit located about 180 ft. below ground surface. Because of the importance of the sand unit and potential consequences of deep groundwater contamination, a high degree of quality control awareness will be maintained throughout the well installation program. It is our intention to reduce the possibility of cross contamination by enforcing strict equipment and materials cleaning, decontamination, and handling procedures.

Scope

The work provided for herein consists of furnishing all labor, materials, and equipment, and performing all operations necessary to drill, construct, and develop one deep groundwater monitoring well.

Quality Control

The Drilling Contractor shall establish and maintain quality control for all monitoring well construction and development activities to assure compliance with the contract specifications and requirements; and maintain records of quality control for all operations including but not limited to the following:

a) Drilling and sampling borehole.
b) Installation and sealing of surface casing.
c) Installation of well screen and riser.
d) Placement of filter pack and grout seals.

e) Development of monitoring well.

f) Decontamination and steam cleaning of drill rig, tools, mud pit, and downhole equipment.

g) Handling of drilling muds, well development water, and soil cuttings.

h) Inventory of materials used and time log of all construction activities.

A copy of these records shall be furnished to Koppers Representative for review at the completion of the job.

General

The location of the deep monitoring well will be specified by Koppers. Access will be provided to the well location and no overhead restrictions are anticipated.

The anticipated installation depth of the monitoring wells is about 180 feet, in an approximate 210 ft. borehole. The actual depth may vary and will be determined in the field by the Koppers Representative.

The well will be constructed using telescoping well installation techniques. A surface casing of approximately 14 inch diameter PVC or steel, with flush threaded joints will be installed and grouted into place using a Portland cement and Bentonite mixture. This surface casing will extend to an approximate depth of 70 feet. An intermediate casing of 10 inch diameter PVC or steel with flush threaded joints will be set at an approximate depth of 140 feet with Portland cement and Bentonite grout. Teflon tap will be used with the flush, threaded joints to insure a good seal. No other sealants will be permitted. The monitoring well will consist of 4 inch diameter stainless steel screen and riser pipe with flush threaded joints. Approximately 30 feet of screen and 180 feet of riser will be required.

Representative soil samples shall be obtained generally on 5 foot centers to the final depth of the borehole. Additional samples may be requested by Koppers Representative at selected borehole depths.

After completion of the monitoring well installation, and approval by Koppers

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Representative, the well will be developed by using pumping techniques.

Setup

The location of the deep monitoring well will be field staked by the Koppers Representative. Prior to drilling and installation, The Drilling Contractor will steam clean all equipment including, drill rods, bits, and mud pits, drill stem, and drill rig. No petroleum lubricants will be permitted. Labortory grade detergents may be used as lubricant substitutes. A minimum 6 mil. plastic underliner shall be placed under the mud pit and extent a sufficient distance throughout the work area to prevent surficial contact with drilling muds and soil cuttings.

Surface Casing Installation

A minimum 18 inch-diameter borehole shall be initially advanced through the upper water-bearing strata to a depth of about 70 feet, as determined by Koppers Representative, using mud rotary drilling procedures to determine the actual depth of the surface casing installation based on the depth of observable soil contamination and the depth to suitable clay soils. The soil boring procedures are outlined in the following section. Drilling mud shall be used throughout the initial depth 70 feet of the borehole. The drilling mud shall consist of pure sodium bentonite, with no polymers or additives, and shall meet API Specification 13A. A sample of the proposed drilling mud shall be submitted to Koppers Representative for approval, prior to use. Weight materials, such as Barite, will not be permitted.

Upon completion of the final borehole all drilling mud and soil cuttings will be completely removed and flushed from the borehole with a grout mixture which will be tremied from the bottom. All drillings muds and soil cuttings will be collected and temporarily store onsite, as directed by Koppers Representative. Also, the drilling rig, mud pit, and all downhole equipment shall be thoroughly steam cleaned.

Once the 18 inch borehole is filled with the Portland Cement III and bentonite mixture a 14 inch-diameter, Schedule 80 PVC or steel, flush jointed surface casing shall be installed to the full depth of the 18 inch borehole. The surface

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casing shall be fitted with stainless centralizers no greater than 20 ft. on center (at 10 ft., 30 ft.,50 ft., 70 ft.). Metal screws or glue will not be permitted to attach the centralizers. The 14 inch surface casing shall be thoroughly steam cleaned prior to installation. The bottom of the surface casing shall be fitted with a threaded cap or a welded PVC plate to prevent the inflow of formation soils and groundwater. The use of potable water or clean drilling mud mixture to achieve negative buoyancy will be permitted during casing installation.

Therefore the annulus between the 18 inch borehole and the 14 inch-PVC or steel surface casing shall be a grout mixture tremied from the bottom of the borehole to the top until a visually consistent grout return is observed. The grout mix shall consist of a maximum cement to bentonite ratio of 10:1. All displaced groundwater and drilling fluids will be collected and temporarily stored onsite, as directed by Koppers Representative. The grouted surface casing shall not be disturbed for a minimum 48 hour period to allow the grout to set.

After installation of the surface casing, all downhole equipment, drilling rig, drill steam, and mud pit shall be thoroughly steam cleaned.

Soil Boring

All drilling will be conducted with mud rotary techniques. The first 70 feet of borehole will be advanced by utilizing an 18 inch wing bit. The second section, to approximately 140 feet, will be advanced using a 13.5 inch bit. The final section of borehole will be advanced with a 9 inch bit to a depth of approximately 210 feet. A schematic of the well construction is shown in figure 1.

Drilling Procedures

The Drilling Contractor shall submit a bid quotations to complete the well borehole. Koppers Company with approval from the EPA will be responsible for selection of the actual drilling procedure to be used on this project.

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Wet Rotary With Recirculation

This procedure includes advancing the borehole using standard wet rotary drilling procedures. Potable water shall be used as the drilling fluid to advance the borehole. The use of drilling mud, if required, shall be approved by the Koppers Representative prior to use.

Sampling

Representative soil samples shall be obtained at 5 foot intervals for the entire depth of borehole, using a 2.5 inch-diameter split spoon or 3 inch-diameter Shelby tube sampler, depending on soil conditions. The samplers shall be throughly decontaminated after each use. The Koppers Representative may delete or add specific samples depending on the formation characteristics. A minimum 12 inch recovery of in-situ soils for all soil samples will be required before additional drilling is approved.

Monitoring Well Materials

The monitoring well screens shall extend throughout the entire internal depth of the sand unit (estimated 30 ft. long) and will consist of 4 inch-diameter, flush jointed, Schedule 40 Type 304 stainless steel. The screens shall be commercially manufactured with uniform 0.010 inch slots. The bottom of the screen section shall be fitted with a threaded flush joint bottom cap. The use of a backwash valve is subject to prior approval by Koppers Representative. The well riser pipe to ground surface shall be 4 inch-diameter, Schedule 40 Type 304 stainless steel, flush jointed pipe. Well materials for drilling should all be 4-in.-diameter, flush jointed, Schedule 40 Type 304, stainless steel. The riser pipe shall be fitted with stainless steel centralizers no greater than 20 ft. on center. The screen section shall be fitted with at least three centralizers placed uniformly at the bottom, middle, and top of the screen. Metal screws or glue will not be permitted to attach the centralizers. All well materials, including centralizers, shall be thoroughly decontaminated and steam cleaned and approved by Koppers Representative prior to installation.

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Monitoring Well Installation

The monitoring well shall extend to a depth of about 210 ft, as determined by Koppers Representative. The borehole shall be flushed with potable water to remove drilling muds and soil cuttings, as directed by Koppers Representative. In addition, all downhole equipment, drilling rig, drill stem, mud pit, and well screen and riser pipe shall be thoroughly steam cleaned. The well screen and riser pipe shall be placed in the borehole in such a manner to ensure that the assembly is not damaged or misaligned. Care shall be used during installation to ensure the well screen and rise pipe is centered in the drilled hole. The use of backwashing procedures to facilitate well placement is subject to prior approval by Koppers Representative.

Filter Pack and Grout

Filter sand shall be placed by tremie around the screened internal and at least 5 feet above the top of the screen. The tip on the tremie pipe may be used to determine the level of the filter pack. A 5 foot bentonite seal shall be placed immediately above the filter pack using premium grade bentonite grout. The remainder of the annulus shall be pressure grouted by tremie, from the bottom to to top, until a consistent grout return is observed. The volclay grout mix shall be used. The grout shall set a minimum of 48 hours prior to well development.

The filter pack shall conform to the following gradation requirements.

WELL FILTER MATERIAL

Standard Sieve Size	Percent Passing
16	98 - 100
20	90 - 100
30	75 - 98
40	27 - 80
50	10 - 25
60	5 - 15
100	0 - 2

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The filter material shall be graded uniformly between the limits specified above. The Drilling Contractor shall demonstrate to Koppers Representative that the filter selected for the wells corresponds to the specified gradation requirements.

Well Development

The development process shall consist of surging the wells by pumping. The development method shall be capable of evacuating the well of any residual drilling fluid or sediment which has migrated into the well.

The well shall be developed until a sediment-free as possible discharge is achieved or the conductivity and pH are stable.

After development, and approval by Koppers Representative, the well will be pumped until at least 4,800 gallons of groundwater is removed. All well water is to be collected and temporarily stored onsite, as directed by the Koppers Representative.

Surface Detail

The 14 and 10 inch-diameter PVC surface casing shall be cut flush with the ground surface and capped with cement. The stainless steel well raiser shall be cut off to provide a 2.5 foot stickup. The well shall be vented and fitted with a male adapter and a threaded stainless steel cap. A steel locking protective casing will be installed and cemented into place around the 4-inch well.

Decontamination and Cleaning Procedures

All tools, downhole equipment, and pit, drill rods, bits, and drill rig will be completely steam cleaned at the following instances:

a) initial equipment setup
b) after completion of any mud changes
c) after installation of surface casing
d) before installation of well screen
e) final demobilization

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Additional equipment steam cleaning may be required by Koppers Representative. All supplemental downhole equipment and materials such as, but not limited to: well pipe, measuring tapes, tremie pipes, submersible pumps, surface casing, etc., will require decontamination and steam cleaning prior to use.

Decontamination will consist of a detergent wash. A methanol rinse may also be required by Koppers Representative. Steam cleaning will immediately follow all decontamination activities. The extent of decontamination and steam cleaning will be determined by Koppers Representative. No equipment or downhole materials will be permitted to enter the borehole unless decontamination and cleaning have been approved by Koppers Representative.

Soil samplers will be decontaminated between each sampling interval prior to use. Decontamination will consist of the following procedures:

a. detergent scrub
b. clean water rinse
c. methanol rinse
d. air dry

Care should be exercised during storage and handling of decontaminated samplers between use. The extent of decontamination will be determined by Koppers Representative. No samplers will be permitted to enter the borehole unless decontamination has been approved by Koppers Representative.

Waste Handling and Disposal

All waste material shall be collected and placed into secure storage containers. No onsite disposal of waste materials will be permitted. Waste materials will include, but not limited to:

a. drilling muds
b. soil cuttings
c. discarded soil samples
d. equipment decontamination waters
e. sampler decontamination waters

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f. all solids and fluids removed from borehole

g. well development water

h. disposable safety items

Surface spillage of waste materials due to improper collection and handling will be the responsibility of the Contractor. All waste material collection and handling activities will be at the direction of Koppers Representative.

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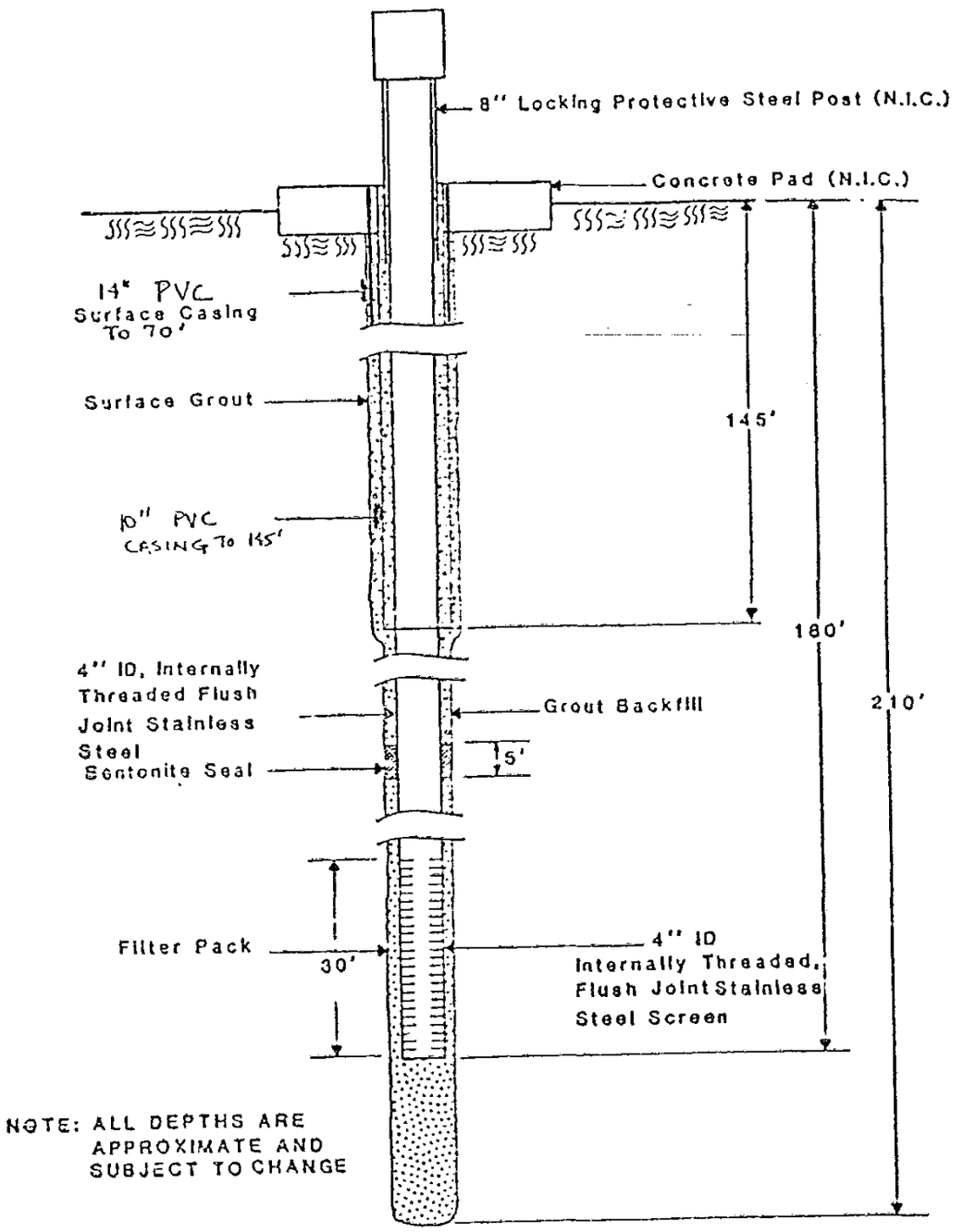

Deep Groundwater Monitoring Well
(NOT TO SCALE)

KOPPERS SOUTH CAVALCADE SITE

HOUSTON, TEXAS

FILE NO. 85-317
FIGURE NO. 1

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APPENDIX K – SELECTED EXISTING SHALLOW WATER WELL REPORTS

007365

007365

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 65-14-7F
Located on map yes
Received: 95
dlc

1) OWNER:
Person having well drilled Olds Press and Forge (Name) Address 3303 Carr St. Houston, TX (Street or RFD) (City) (State)

Landowner Same (Name) Address Same (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Harris, miles in (N.E., S.W., etc.) direction from (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*

SEE REVERSE SIDE North

(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.

Labor League
Block Survey
Abstract No.
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check): New Well X Deepening Reconditioning Plugging

4) PROPOSED USE (Check): Domestic Industrial X Municipal Irrigation Test Well Other

5) TYPE OF WELL (Check): Rotary X Driven Dug Cable Jetted Bored

6) WELL LOG:
Diameter of hole 4 in. Depth drilled 302 ft. Depth of completed well 302 ft. Date drilled 12-20-74

All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	24	Surface Clay
24	48	Clay
48	72	Clay and Sand
72	96	Clay
96	120	Clay and Sand Streaks
120	144	Sand and Gravel
144	168	Sand and Clay
168	192	Sand and Gravel
192	216	Sand and Clay
216	240	Clay and Sand
240	264	Sand and Shell
264	302	Sand

(Use reverse side if necessary)

7) COMPLETION (Check): Straight wall X Gravel packed Other Under reamed Open Hole

8) WATER LEVEL:
Static level 152 ft. below land surface Date 12-20-74
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc. 283 ft.
below land surface.

9) CASING:
Type: Old New Steel X Plastic Other
Cemented from ft. to ft.

Diameter (inches)	Setting From (ft.)	To (ft.)	Gage

10) SCREEN:
Type Stainless steel rod base
Perforated X Slotted

Diameter (inches)	Setting From (ft.)	To (ft.)	Slot Size
#12 guage	292	302	
2½" Blank	278	292	

11) WELL TESTS:
Was a pump test made? yes No X If yes, by whom?
Yield gpm with ft. drawdown after hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? yes No X
Did any strata contain undesirable water? yes No
Type of water? depth of strata

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

Name R. B. Lowry (Type or Print) Water Well Drillers Registration No. 146

4012 Fulton; P.O. Box 8707; Houston, TX 77009 (Street or RFD) (City) (State)

(Signed) [signature] (Water Well Driller) LOWRY WATER WELLS (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

Additional instructions on reverse side.

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Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 65-14-7F
Located on map yes
Received: 95
dlc

1) OWNER:
Person having well drilled Olds Press and Forge (Name) Address 3303 Carr St. Houston, TX (Street or RFD) (City) (State)

Landowner Same (Name) Address Same (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Harris, miles to (N.E., S.W., etc.) direction from (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*

SEE REVERSE SIDE

North

(Use reverse side if necessary)

or

Give legal location with distances and directions from adjacent sections or survey lines.

Labor League
Block Survey
Abstract No.
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check): New Well X Deepening Reconditioning Plugging

4) PROPOSED USE (Check): Domestic Industrial X Municipal Irrigation Test Well Other

5) TYPE OF WELL (Check): Rotary X Driven Dug Cable Jetted Bored

6) WELL LOG
Diameter of hole 4 in. Depth drilled 302 ft. Depth of completed well 302 ft. Date drilled 12-20-74

All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	24	Surface Clay
24	48	Clay
48	72	Clay and Sand
72	96	Clay
96	120	Clay and Sand Streaks
120	144	Sand and Gravel
144	168	Sand and Clay
168	192	Sand and Gravel
192	216	Sand and Clay
216	240	Clay and Sand
240	264	Sand and Shell
264	302	Sand

(Use reverse side if necessary)

7) COMPLETION (Check)
Straight wall X Gravel packed Other
Under reamed Open Hole

8) WATER LEVEL:
Static level 152 ft. below land surface Date 12-20-74
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc. 283 ft.
below land surface.

9) CASING:
Type: Old New Steel X Plastic Other
Cemented from ft. to ft.

Diameter (inches)	Setting From (ft.)	To (ft.)	Gage

10) SCREEN:
Type Stainless steel rod base
Perforated X Slotted

Diameter (inches)	Setting From (ft.)	To (ft.)	Slot Size
#12 guage	292	302	
2½" Blank	278	292	

11) WELL TESTS
Was a pump test made? Yes No X If yes, by whom:
Yield gpm with ft. drawdown after hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? Yes No X
Did any strata contain undesirable water? Yes No
Type of water? depth of strata

I hereby certify that this well was drilled by me or under my supervision and that each and all of the statements herein are true to the best of my knowledge and belief.

Name R. B. Lowry (Type or Print) Water Well Drillers Registration No. 146

Address 4012 Fulton; P.O. Box 8707; Houston, TX 77009 (Street or RFD) (City) (State)

(Signed) R. B. Lowry (Water Well Driller) LOWRY WATER WELLS (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

007367

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WELL NO.	OWNER'S NAME	STATE WELL NO	LATITUDE	LONGITUDE	ELEV	CASING DIAM	DEPTH TO 1ST SCREEN	TOTAL DEPTH	YEAR DRILLED	APPROX. 84 PUMP
1951	NATIONAL VINEGAR COMPANY	6S-14-7 0	2946 3	9520 8	45	4	486	506	1968	17761335
1952	NATIONAL VINEGAR COMPANY	6S-14-7 0	2946 3	9520 8	45	4	486	506	1968	17781335.
1659	COOK PAINT & VARNISH COMPANY	6S-13-9 0	294628	9523 7	55	14	0	502	1965	251000
2716	ADA RESOURCES, INC.	6S-14-7 0	294656	9521 4	80	4	0	0	19 0	0
1967	SOUTHERN PACIFIC TRANS CO	6S-14-8 0	294716	951647	50	10	999	1200	19 0	0.
1968	SOUTHERN PACIFIC TRANS. CO	6S-14-8 2	294716	951847	50	10	999	1200	1954	0.
1788	LAMAR HOTEL	6S-13-6 0	294730	952230	50	8	0	0	1928	0.
2169	HARDING, GEORGE P	6S-13-9 0	294730	952316	60	6	420	476	1962	1963000.
1084	HOUSTON, CITY OF	6S-14-4 6	294743	952010	50	24	999	1993	1944	325869667.
1675	PPG INDUSTRIES, INC.	6S-14-5 0	294746	951757	46	16	850	1125	1963	0.
2910	CROZIER-NELSON CHEM. & CONST	6S-14-4 0	294748	952050	55	0	0	0	19 0	0.
3372	HOUSTON, CITY OF	6S-13-6 8	294750	952424	69	24	561	1458	1936	344021692.
2595	ALLIED FENCE CORPORATION	6S-14-5 0	2948 4	9518 3	45	4	208	228	1960	43849.
2596	ALLIED FENCE CORPORATION	6S-14-5 0	2948 4	9518 3	45	4	210	230	1963	43849.
1086	HOUSTON, CITY OF	6S-14-4 4	2948 5	9520 9	50	24	999	1980	1949	325869667.
2738	CORDELL, JAMES	6S-14-5 0	294812	951730	40	4	350	702	1954	0
1069	HOUSTON, CITY OF	6S-13-624	294814	952423	67	24	620	1730	1965	0.
2334	FREEDMAN BROTHERS PACKING CO	6S-14-4 0	294814	952033	146	6	360	511	1972	1612500.
1068	HOUSTON, CITY OF	6S-13-6 4	294815	952422	68	24	610	1890	1962	344021692
1085	HOUSTON, CITY OF	6S-14-4 5	294815	9520 9	50	24	735	2080	1949	325869667.
2270	GOODWILL INDUSTRIES OF HOUSTON	6S-14-431	294829	952027	52	10	496	579	1955	1020150.
3993	GOODWILL INDUSTRIES OF HOUSTON	6S-14-4 0	294820.	952027	52	5	500	540	19 0	1020150.
1060	HOUSTON, CITY OF	6S-13-6 5	294835	952420	68	25	581	1232	1936	0.
3706	HOUSTON, CITY OF	6S-13-6 0	294835	952420	68	24	702	2000	19 0	344021692.
2198	NATIONAL FLAME & FORGE, INC.	6S-13-6 0	294839	952415	65	6	0	612	1965	743731.

Table K-1

007368

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 65-14-1
Located on map yes
Received: 7-8-77

1) OWNER:
Person having well drilled Southwestern Plating Co. (Name) Address 2918 Gano St. (Street or RFD) (City) (State)

Landowner same (Name) Address same (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Harris, _____ miles in _____ (N.E., S.W., etc.) direction from _____ (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*

see reverse

North

(Use reverse side if necessary)

or

Give legal location with distances and directions from adjacent sections or survey lines.

Labor _____ League _____
Block _____ Survey _____
Abstract No. _____
(NW¼ NE¼ SW¼ SE¼) of Section _____

3) TYPE OF WORK (Check): New Well X; Deepening; Reconditioning; Plugging

4) PROPOSED USE (Check): Domestic; Industrial X; Municipal; Irrigation; Test Well; Other

5) TYPE OF WELL (Check): Rotary X; Driven; Dug; Cable; Jetted; Bored

6) WELL LOG:
Diameter of hole 6 3/4 in. Depth drilled 462 ft. Depth of completed well 462 ft. Date drilled 6-21-77

All measurements made from -0- ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	24	clay
24	48	clay
48	72	sand & clay
72	96	clay
96	120	clay & sand
120	144	clay & sand
144	168	clay & sand
168	192	sand & clay
192	216	sand & clay
216	240	sand & clay
240	264	sand & clay

(Use reverse side if necessary)

9) Casing:
Type: Old; New X; Steel X; Plastic; Other
Cemented from 0 ft. to 462 ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4"	0	439	sch 40

10) SCREEN:
Type rodbase
Perforated X; Slotted

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
2 ½"	447	462	#12

7) COMPLETION (Check):
Straight wall; Gravel packed; Other
Under-reamed XX; Open Hole

8) WATER LEVEL:
Static level 272 ft. below land surface Date 6-21-77
Artesian pressure _____ lbs. per square inch Date _____
Depth to pump bowls, cylinder, jet, etc., 356 ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes; No X If yes, by whom?
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.
Bailer test _____ gpm with _____ ft. drawdown after _____ hrs.
Artesian flow _____ gpm
Temperature of water _____

12) WATER QUALITY:
Was a chemical analysis made? Yes; No X
Did any strata contain undesirable water? Yes; No
Type of water? _____ depth of strata _____

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME R. B. Lowry (Type or Print) Water Well Drillers Registration No. 146

ADDRESS 1327 Aldine-Mail (Street or RFD) Houston (City) TX (State) 77039

(Signed) R B Lowry (Water Well Driller) Lowry Water Wells (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBT-404

007369

007369

2) LOCATION OF WELL:

The sketch showing the well location must be as accurate as possible, showing landmarks, in sufficient detail so that the well may be plotted on a General Highway Map of the county in which the well is located.

Reference points from which distances are measured and directions given should be of a permanent nature (e.g. highway intersections, center of towns, river and creek bridges, railroad crossings). The distance and direction from the nearest town should always be indicated.

When giving a legal description include a sketch showing location of the well within the described area, e.g. survey abstract.

Information furnished in Section 2) of the TWDBE-GW-53 is very important. Unless the well can be accurately located on a map the value of the other data contained in the Report is greatly reduced.

264	288	sand & clay
288	312	clay
312	336	clay
336	360	clay
360	384	clay
384	408	clay sand rock
408	432	clay
432	456	sand
456	462	sand & clay

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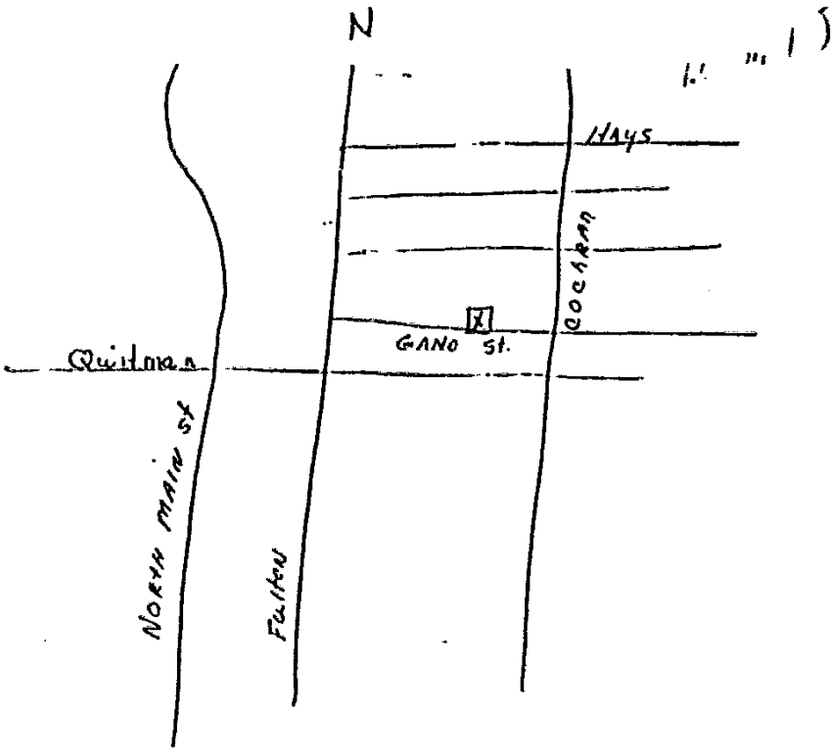
Central Records
Texas Dept. of Water Resources



007370

RECEIVED
MAR - 3 1978
DEPT. OF
WATER RESOURCES

007370

Records of wells in Harris County—Continued

No.	Owner	Driller	Date completed	Depth of well (ft.)	Casing: Diameter (in.)	Casing: Depth (ft.)	Water bearing unit	Altitude of land surface (ft.)	Water Level: Above (+) below land surface datum (ft.)	Water Level: Date of measurement	Method of lift	Use of water	Remarks
65-14-415	W. E. Emerson	Briggs Pump Service	1953	191	4	191	CU	61	105	Sept. 1953	Sub, F 1	P	Screen from 181 to 191 ft. Supplies swimming pool
416	Standard Rendering Co.	J. C. Bland Water Systems	--	520	1	520	CL	51	210	1960	T, F 7½	Ind	
417	do	do	1951	515	4	515	CL	51	210	1960	Sub, F 5	Ind	Screen from 485 to 515 ft.
418	Texas Water Co.	A. F. Fawcett, Jr.	1938	220	6	220	C	69			N	N	Screen from 190 to 210 ft. Formerly supplied Oakwood Subdivision. Well destroyed.
419	Lone Star Cement Co.	Lowry Water Wells	1967	465	6 4	465 465	CL	69	226	Dec. 20, 1967	Sub, F 20	Ind	Screen from 445 to 463 ft. 2
420	Northside Ready Mix Concrete Co.	do	1971	478	8 4	435 478	CL	56	257	May 21, 1971	Sub, F	Ind	Screen from 450 to 478 ft. 2'
423	Linder Lake	McMasters and Pomeroy	1939	656	8 6	624 656	F	61	--		N	N	Screen from 624 to 656 ft. Well destroyed.
424	Texas Water Co.	do	1941	753	8 6	304 753	F, CL	69	91	May 1941	N	N	88 ft. of screen between 496 and 743 ft. Formerly supplied Oakwood Subdivision. Well destroyed.
425	Hunt-Wesson Foods, Inc. Well 2	Layne Texas Co.	1928	834	24 16 8	118 581 834	F, CL	53	62.9 111.9	Jan. 14, 1931 June 2, 1947	N	N	141 ft. of screen between 485 and 824 ft. Reported yield 525 gpm with 50 ft. drawdown when drilled. Well destroyed. 2' 3'
426	Hunt-Wesson Foods, Inc. Well 1	do	1924	740	24 10	108 740	F, CL	53	55.8 167.0	Jan. 14, 1931 Feb. 16, 1959	N	N	125 ft. of screen between 271 and 736 ft. Well destroyed. 2 3'
427	Wood Preserving Corp.	Taylor and Roberts	1912	552	10	552	CL	53	55.2 76.6	Jan. 14, 1931 Sept. 16, 1942	N	N	Well destroyed. 3'
428	City of Houston Lindale Park	McMasters and Pomeroy	1938	856	8 5	636 856	F	61	70	Feb. 11, 1938	N	N	108 ft. of screen between 624 and 845 ft. Reported yield 400 gpm in 1938. Well destroyed.
429	Goodwill Industries Well 1	Layne Texas Co.	1941	530	6 4	-- 530	CL	52	101.7 225.0	Sept. 20, 1943 Feb. 7, 1960	N	N	Screen from 479 to 528 ft. Well destroyed. 3
430	Goodwill Industries Well 2	do	1939	574	8 6	519 574	CL	52	80 125.2	June 6, 1939 June 2, 1947	N	N	Screen from 519 to 572 ft. Reported yield 300 gpm with 30 ft. drawdown when drilled. Well destroyed. 3
431	Goodwill Industries Well 3	Texas Water Wells, Inc.	1955	579	10 6	490 579	CL	52	--	--	T, F 50	Ind	Screen from 496 to 576 ft.
432	Newsom's Truck Lines	Layne Texas Co.	1939	210	4 2½	-- 210	CL	54	64	Dec. 8, 1939	T, F	Ind	Screen from 200 to 210 ft.
433	City Custom Packing Co. Well 1	Unknown	1948	190	4	190	CU	50	-	--	N	N	Reported 15 ft. of screen
434	Missouri Pacific Lines	McMasters and Pomeroy	1929	1,000	10	1,000	F	58	20.7	Sept. 20, 1938	N	N	158 ft. of screen between 611 and 831 ft. Well destroyed. 2
435	City of Houston Lindale Park Well 2	do	1940	853	12 8	250 853	F	61	104	June 17, 1940	N	N	110 ft. of screen between 620 and 843 ft. Reported yield 760 gpm with 73 ft. drawdown when drilled. Well destroyed.
436	City Custom Packing Co. Well 2	Unknown	1955	503	4	503	CL	52	--	--	T, F 3	Ind	

See footnotes at end of table.

007371

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Send original copy by certified mail to the Texas Department of Water Resources P O Box 13087 Austin, Texas 78711

State of Texas
WATER WELL REPORT

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

For TDWR use only
Well No. 65-14-7J
Located on map 165
Received: 7/1

1) OWNER Harris-Galveston Coastal Subsidence District (Name) Address P. O. Box 58847 (Street or RFD) Houston (City) Texas (State) 77058 (Zip)

2) LOCATION OF WELL County Harris 5 miles in N.E. (N.E., S.W., etc.) direction from Houston (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description
Section No. _____ Block No. _____ Township _____
Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____

☒ See attached map

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☐ Public Supply ☐ Irrigation ☒ Test Well ☐ Other _____

5) DRILLING METHOD (Check): ☒ Used Rotary ☐ Air Hammer ☐ Driven ☐ Bored ☐ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other _____

6) WELL LOG

#5

Date drilled 3-10-80

From (ft.)	To (ft.)	Description and color of formation material
		See Attached

(Use reverse side if necessary)

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7-7/8	Surface	299

7) BOREHOLE COMPLETION: ☐ Open Hole ☒ Straight Wall ☐ Underreamed ☐ Gravel Packed ☐ Other _____
If Gravel Packed give interval from _____ ft. to _____ ft.

8) CASING, BLANK PIPE, AND WELL SCREEN DATA

Dia (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfr., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
4½	N	Steel	±2	279	.237
2½	N	Steel	269	284	
2½	N	SST Screen	284	294	
2½	N	Steel	294	299	

CEMENTING DATA
Cemented from 0 ft. to 279 ft.
Method used Pressure
Cemented by O'Day Drilling (Company or Individual)

9) WATER LEVEL
Static level _____ ft. below land surface Date _____
Artesian flow _____ gpm Date _____

10) PACKERS Type Lead Depth 269

11) TYPE PUMP
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

12) WELL TESTS
☐ Type Test ☐ Pump ☐ Bailer ☒ Jetted ☐ Estimated
Yield _____ gpm with _____ ft. drawdown after _____ hrs.

13) WATER QUALITY
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☒ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☒ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME James O'Connor (Type or Print) Water Well Drillers Registration No 999

ADDRESS 5931 Brittmoore (Street or RFD) Houston (City) Texas (State) 77041 (Zip)

(Signed) James O'Connor (Water Well Driller) LAYNE-WESTERN COMPANY, INC. (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TDWR 6392 (Rev 1-12-79)

DEPARTMENT OF WATER RESOURCES COPY

007372

007372

Records of wells in Harris County--Continued

No.	Owner	Driller	Date completed	Depth of well (ft.)	Casing: Diameter (in.)	Casing: Depth (ft.)	Water bearing unit	Altitude of land surface (ft.)	Water level: Above (+) below land surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
65-14-437	W. R. Brown	W. A. Dodson	1962	190	6	190	CU	60	80	Jan. 1963	Sub.E	D	Screen from 180 to 190 ft. 2/
438	Olde Press and Forge Co.	Lowry Water Wells	1966	302	6 2½	278 302	CL	64	145	May 18, 1966	Sub.E 3	Ind	Screen from 282 to 302 ft. Test hole drilled to 303 ft. 2/
501	City of Houston	Texas Water Wells, Inc.	1948	1,035	12 10	-- 1,035	E	48	173	July 27, 1948	N	N	85 ft. of screen between 685 and 1,035 ft. Formerly Texas Water Co. well. Well destroyed
502	do	McMasters and Pomeroy	1944	345	6	342	CL	52	110	Feb. 1944	N	N	Reported 43 ft. of screen. Formerly supplied Homestead Addition. Well destroyed 2/
503	do	do	1946	310	6	310	CL	51	56	1946	N	N	28 ft. of screen between 272 and 310 ft. Formerly supplied Homestead Addition. Well destroyed.
504	do	Texas Water Wells, Inc.	1950	603	10	603	CL	47	--	--	N	N	Supplied Homestead Addition. Well destroyed.
505	General Metals Corp.	A. E. Fawcett, Sr.	1943	217	3	217	CU	30	64	Feb. 1943	N	N	Screen from 207 to 217 ft.
506	Texaco Inc.	Lowry Water Wells	1963	299	4 2½	276 299	CL	45	132	Feb. 1963	Sub.E 3	Ind	Screen from 284 to 299 ft. Supplies service station. 2/
507	Texas Water Co.	McMasters and Pomeroy	1940	544	6	544	CL	48	--	--	N	N	Screen from 494 to 544 ft. Formerly supplied Kashmere Garden Subdivision
508	General Metals Corp.	A. E. Fawcett, Sr.	1938	812	8 6	250 812	E	50	--	--	N	N	Screen from 772 to 812 ft.
509	Industrial Engineering Co.	do	1940	205	3½	205	CU	50	80	Nov. 1940	N	N	Screen from 186 to 198 ft.
510	Pittsburg Plate Glass Co. Well 1	Layne Texas Co.	1940	637	12 6	306 637	CL	50	90	June 21, 1940	N	N	80 ft. of screen between 516 and 626 ft. Reported yield 645 gpm with 61 ft. drawdown when drilled. 2/
511	Houston Gardens	McMasters and Pomeroy	1938	330	6	330	CL	51	39	1938	N	N	Screen from 300 to 330 ft. Reported yield 193 gpm with 41 ft. drawdown when drilled. Well destroyed.
512	Rosedale Gardens	do	1938	330	6	330	CL	52	58	Nov. 23, 1938	N	N	35 ft. of screen between 284 and 321 ft. Reported yield 185 gpm with 41 ft. drawdown when drilled. Well destroyed.
513	Houston Belt and Terminal Railroad	do	1940	826	8	826	E	54	--	--	N	N	Screen from 768 to 826 ft. Well destroyed.
514	Pittsburg Plate Glass Co. Well 2	Layne Texas Co.	1943	1,125	16 10	850 1,125	E	50	286	June 1943	T.E	Ind	168 ft. of screen between 858 and 1,106 ft. Reported yield 1,022 gpm with 37 ft. drawdown when drilled.
515	Peterbuilt Truck Co.	H. J. Schubhart Co.	1964	327	6 4	306 327	CL	50	136	1964	Sub.E	Ind	Screen from 306 to 326 ft. 2/
516	Texas Oilfield Equipment Co.	Lowry Water Wells	1965	329	4 2½	306 323	CL	50	136	Apr. 9, 1965	Sub.E 4	D	Screen from 309 to 329 ft. Test hole drilled to 335 ft. 2/
517	Corbett Fabricating Co.	do	1966	344	4 2½	315 344	CL	50	152	Mar. 4, 1966	Sub.E 3	Ind	Screen from 316 to 336 ft. 2/
521	Merrin Transportation Co.	do	1966	503	4 2½	-- 503	CL	50	350	Mar. 26, 1966	Sub.E	D	Screen from 488 to 498 ft. 2/

007373

Records of wells in Harris County--Continued

No.	Owner	Driller	Date completed	Depth of well (ft.)	Casing: Diameter (in.)	Casing: Depth (ft.)	Water bearing unit	Altitude of land surface (ft.)	Water level: Above (+) below land surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
65-14-307	Tidwell School	A. Chrysty Kuhlmann	1962	384	6 2½	-- 384	CL	46	140	Feb. 1962	Sub.E 3	P	Screen from 358 to 384 ft
308	Mrs. H. J. Williams	Lowry Water Wells	1963	151	4 2½	136 151	CU	46	105	July 1963	Sub.E ½	D	Screen from 136 to 151 ft. 2/
309	Charles Ketty	A and L Pump and Well Service	1963	70	2	65	CU	88	30	Sept 1963	J.E ½	D	Open end. 2/
310	Bailey High School	E. J. Seinehart Co.	1964	475	6	475	CL	57	196	1964	Sub.E 10	P	35 ft of screen between 392 and 469 ft. Reported yield 100 gpm with 11 ft. drawdown when drilled. 2/
401	City of Houston Northeast Well 8	Layne Texas Co.	1949	1,870	24 12	804 1,870	E	64	136.1 352.2	Mar. 24, 1950 Feb. 19, 1971	T.E	P	350 ft. of screen between 1,010 and 1,850 ft. Measured yield 2,850 gpm with 84 ft drawdown when drilled. 1/
402	City of Houston Northeast Well 7	do	1949	1,901	24 12	801 1,901	E	61	141.7 353.7	Dec. 8, 1949 Feb. 12, 1971	T.E	P	417 ft. of screen between 1,001 and 1,880 ft. Measured yield 2,610 gpm with 50 ft. drawdown when drilled. 1/
403	City of Houston Northeast Well 6	do	1949	1,839	24 12	824 1,839	E	85	148.9 349.5	Nov. 13, 1949 Feb. 19, 1971	T.E	P	419 ft. of screen between 1,017 and 1,818 ft. Measured yield 2,690 gpm with 81 ft. drawdown when drilled. 1/
404	City of Houston Northeast Well 5	Texas Water Wells, Inc.	1949	1,980	24 12	825 1,980	E	50	139.3 332.3	Mar. 8, 1950 Feb. 26, 1969	T.E	P	400 ft. of screen between 1,060 and 1,960 ft. Measured yield 2,160 gpm with 38 ft. drawdown Jan. 3, 1951. 1/
405	City of Houston Northeast Well 4	do	1949	2,080	24 12	810 2,080	E	50	166.8 367.0	May 12, 1949 Feb. 16, 1971	T.E	P	405 ft. of screen between 1,030 and 2,060 ft. Measured yield 3,400 gpm with 62 ft. drawdown when drilled. 1/
406	City of Houston Northeast Well 3	Layne Texas Co.	1944	1,993	24 12	558 1,993	E	50	87.6 347.0	June 12, 1944 Feb. 11, 1971	T.E	P	217 ft of screen between 1,143 and 1,970 ft. Measured yield 2,525 gpm with 68 ft. drawdown when drilled. Test hole drilled to 2,510 ft. 1/ 2/
407	Hunt-Wesson Foods, Inc Well 3	do	1946	782	14 7	455 782	E,CL	53	141.3 253.1	Sept. 3, 1946 Feb. 6, 1948	T.E 50	Ind	115 ft. of screen between 484 and 787 ft. 1/
408	Hunt-Wesson Foods, Inc Well 4	do	1948	1,022	14 8	655 1,022	E	52	180	Sept 1948	T.E	Ind	154 ft. of screen between 680 and 1,012 ft. Reported yield 720 gpm with 68 ft. drawdown when drilled.
409	City of Houston Lindale Park Well 4	do	1947	1,152	16 6	546 1,152	E	66	218.8 259.0	June 13, 1956 Feb. 28, 1971	N	N	166 ft. of screen between 732 and 1,140 ft. Reported yield 1,040 gpm with 48 ft. drawdown when drilled. 1/
410	City of Houston	McMasters and Pomeroy	1945	1,100	10 6	678 1,100	E	62	100	May 1945	N	N	126 ft. of screen between 691 and 1,021 ft. Reported yield 500 gpm when drilled. Formerly Texas Water Co. well. Well destroyed.
411	Linder Lake	do	1917	752	8	752	E	64	--	--	N	N	Reported 61 ft. of screen. Formerly supplied swimming pool. Well destroyed.
412	City of Houston Lindale Park Well 3	do	1944	800	8 4 5	400 600 800	E	62	--	--	N	N	Reported 100 ft of screen. Well destroyed.
413	Koppers Company, Inc. Well 1	do	--	666	8 8	622 666	E	64	57.7 271.9	Jan. 9, 1931 Feb. 25, 1970	N	N	Screen from 622 to 666 ft. 1/
414	Koppers Company, Inc. Well 2	do	1948	661	8 8	604 661	E	66	121.0 247.3 253.7	Feb 7, 1948 Feb. 10, 1966 Feb 8, 1967	N	N	Screen from 619 to 661 ft.

007374

APPENDIX L - SURFACE WATER SAMPLE LOGS

007375

SURFACE WATER SAMPLE LOG

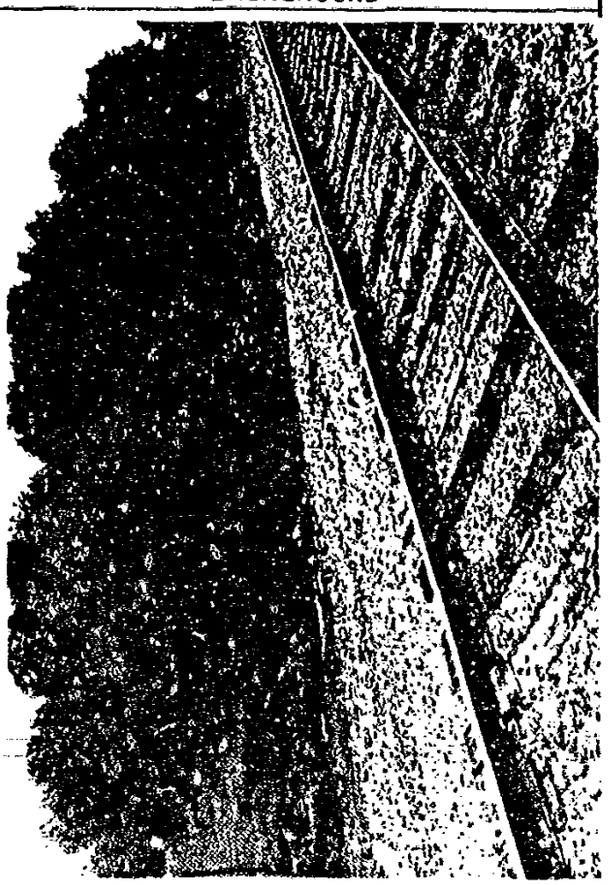
FIGURE NO. I-1

SAMPLE NO.: SCK-SW01-01	PROJECT: S. Cavalcade Remedial Investigation
DATE/TIME: 6-11-86/13:00	CLIENT: Koppers Co., Inc.
SAMPLED BY: PRW	REMARKS: Straw color.
PROJECT NO.: 85-317	
SAMPLE LOCATION	**MEASUREMENTS** LAB [X] FIELD [ ]
LOCATION DESCRIPTION: Drainage ditch @ corner of fenceline between Transcon Trucking along Maury St. near Weiss St.	TEMPERATURE (°C): 19.6
	DISSOLVED OXYGEN (mg/l): 5.39
	CONDUCTIVITY (µmhos/cm): 205, corrected for 25°C
DEPTH: 4"	pH: 7.26
	SALINITY (mg/g) : 0
SURFACE FILM: [ ] YES [X] NO	VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE

BACKGROUND



McBride-Ratcliff and Associates, Inc.

007376

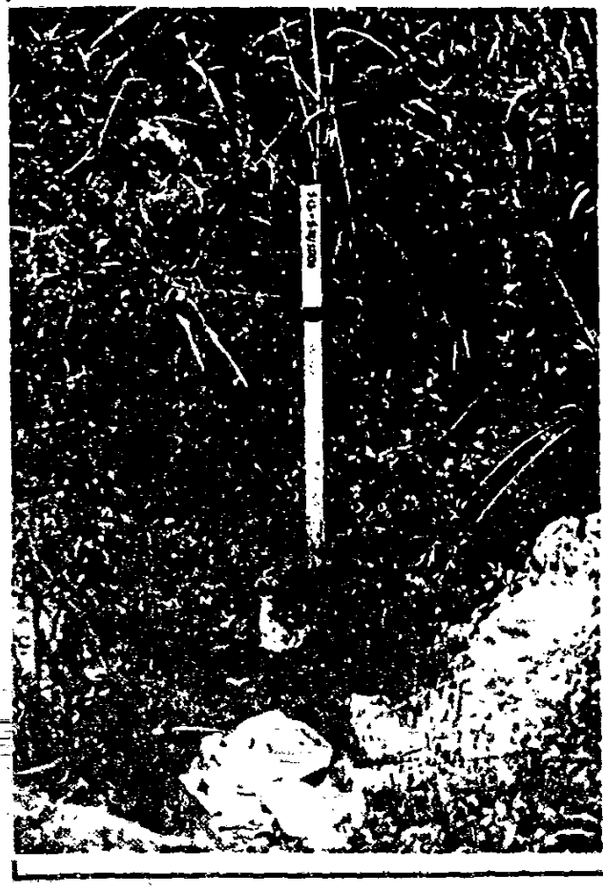
SURFACE WATER SAMPLE LOG

FIGURE NO. L-2

SAMPLE NO.: SCK-SW01-02	PROJECT: S. Cavalcade Remedial Investigation
DATE/TIME: 10-13-86/12:30	CLIENT: Koppers Co., Inc.
SAMPLED BY: PRW/LdlF	REMARKS: Light straw color. . Oily surface film.
PROJECT NO.: 85-317	
SAMPLE LOCATION	**MEASUREMENTS** LAB [X] FIELD [ ]
LOCATION DESCRIPTION: Drainage ditch @ corner of fencelines behind Transcon Trucking along Maury St. near Weiss St.	TEMPERATURE (°C): 20°C
	DISSOLVED OXYGEN (mg/l): 7.45
	CONDUCTIVITY (µmhos/cm): 110, corrected for 25°C
DEPTH: 12"-16"	pH: 7.74
	SALINITY (mg/g) : 0
SURFACE FILM: [X] YES [ ] NO	VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007377

SURFACE WATER SAMPLE LOG

FIGURE NO. L-3

SAMPLE NO.: SCK-SW02-01	PROJECT: S. Cavalcade Remedial Investigation
DATE/TIME: 6-11-86/13:53	CLIENT: Koppers Co., Inc.
SAMPLED BY: PRW/LdlF	REMARKS: Slightly turbid, faint straw color.
PROJECT NO.: 85-317	

SAMPLE LOCATION	MEASUREMENTS LAB ☒ FIELD ☐
LOCATION DESCRIPTION: Drainage ditch between RR tracks & edge of parking lot next to Transcon Trucking 40' south of Cavalcade St.	TEMPERATURE (°C): 19.3
	DISSOLVED OXYGEN (mg/l): 5.23
	CONDUCTIVITY (μmhos/cm): 304, Corrected for 25°C
DEPTH: 5"	pH: 6.93
	SALINITY (mg/g) : 0
SURFACE FILM: ☐ YES ☒ NO	VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE

BACKGROUND

007378

McBride-Ratcliff and Associates, Inc.

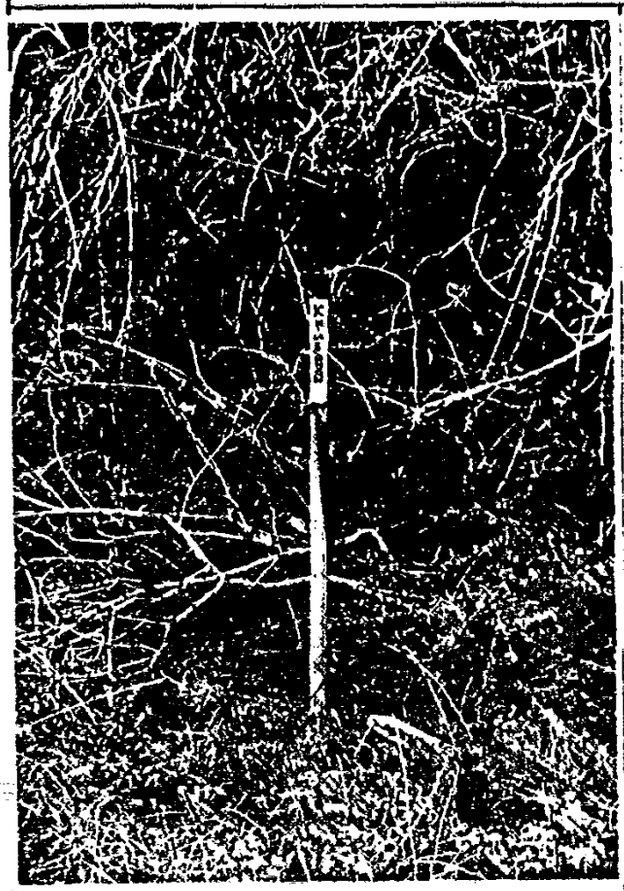
SURFACE WATER SAMPLE LOG

FIGURE NO. L-4

SAMPLE NO.: SCK-SW02-02	PROJECT: S. Cavalcade Remedial Investigation
DATE/TIME: 10-13-86/12:00	CLIENT: Koppers Co., Inc.
SAMPLED BY: PRW/LdlF	REMARKS: Slightly turbid, faint straw color.
PROJECT NO.: 85-317	
SAMPLE LOCATION	**MEASUREMENTS** LAB [X] FIELD [ ]
LOCATION DESCRIPTION: Drainage ditch between RR tracks and edge of parking lot next to Transcon Trucking 40' south of Cavalcade St.	TEMPERATURE (°C): 20°C
	DISSOLVED OXYGEN (mg/l): 5.42
	CONDUCTIVITY (µmhos/cm): 220, corrected for 25°C
DEPTH: 5"	pH: 7.16
	SALINITY (mg/g): 0
SURFACE FILM: [ ] YES [X] NO	VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007379

SURFACE WATER SAMPLE LOG

FIGURE NO. L-5

SAMPLE NO.: SCK-SW03-01

DATE/TIME: 6-11-86/14:37

SAMPLED BY: PRW

PROJECT NO.: 85-317

PROJECT: S. Cavalcade Remedial Investigation

CLIENT: Koppers Co., Inc.

REMARKS:

Turbid, straw color.
Oily surface film.

SAMPLE LOCATION

LOCATION DESCRIPTION: Drainage ditch between Meridian Transport & Mobil 40' north of Collingsworth St.

DEPTH: 8"

SURFACE FILM: ☒ YES ☐ NO

MEASUREMENTS LAB ☒ FIELD ☐

TEMPERATURE (°C): 19.6

DISSOLVED OXYGEN (mg/l): 3.48

CONDUCTIVITY (μmhos/cm): 360, corrected for 25°C

pH: 7.21

SALINITY (mg/g): 0

VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE

BACKGROUND

McBride-Ratcliff and Associates, Inc.

007380

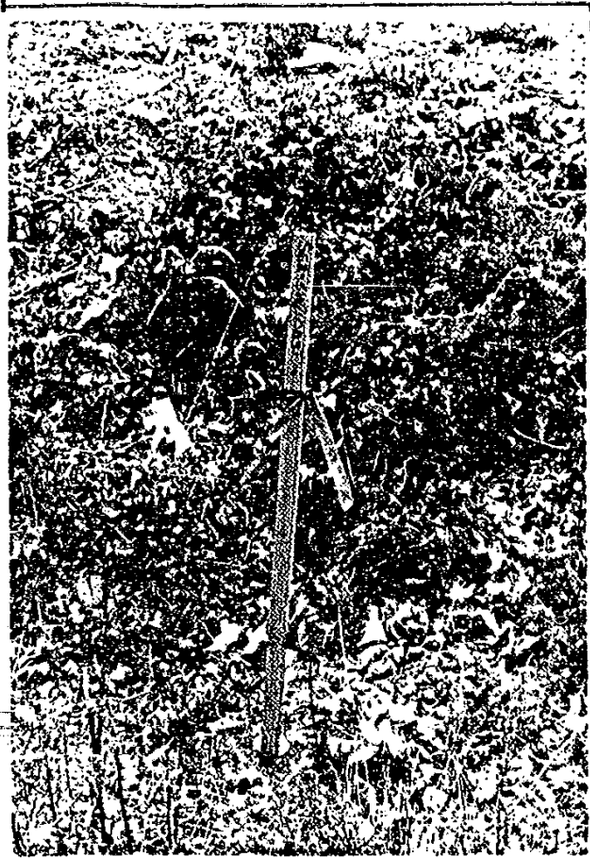
SURFACE WATER SAMPLE LOG

FIGURE NO. L-6

SAMPLE NO.: SCK-SW03-02	PROJECT: S. Cavalcade Remedial Investigation
DATE/TIME: 10-13-86/16:00	CLIENT: Koppers Co., Inc.
SAMPLED BY: PRW/LdlF	REMARKS: Very turbid, very light straw color. Oily surface film.
PROJECT NO.: 85-317	
SAMPLE LOCATION	**MEASUREMENTS** LAB [X] FIELD [ ]
LOCATION DESCRIPTION: Drainage ditch Meridian Transport & Mobil 40' north of Collingsworth St.	TEMPERATURE (°C): 20°C
	DISSOLVED OXYGEN (mg/l): 7.57
	CONDUCTIVITY (μmhos/cm): 220, corrected for 25°C
DEPTH:	pH: 7.69
	SALINITY (mg/g): 0
SURFACE FILM: [X] YES [ ] NO	VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007381

SURFACE WATER SAMPLE LOG

FIGURE NO. L-7

SAMPLE NO.: SCK-SW04-01

DATE/TIME: 6-11-86/15:15

SAMPLED BY: PRW

PROJECT NO.: 85-317

PROJECT: S. Cavalcade Remedial Investigation

CLIENT: Koppers Co., Inc.

REMARKS:

Slight straw color, slightly turbid.

SAMPLE LOCATION

LOCATION DESCRIPTION: Drainage ditch between Palletized Trucking east fenceline & RR tracks 60' north of Collingsworth St.

DEPTH: 4"

SURFACE FILM: ☐ YES ☒ NO

MEASUREMENTS

LAB ☒ FIELD ☐

TEMPERATURE (°C): 19.7

DISSOLVED OXYGEN (mg/l): 6.40

CONDUCTIVITY (µmhos/cm): 304, corrected for 25°C

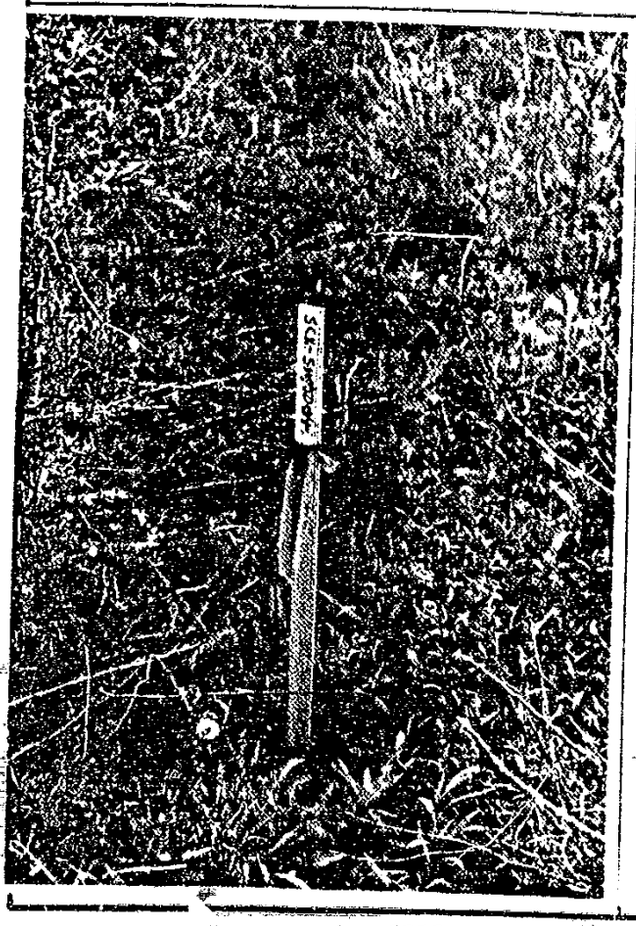
pH: 7.53

SALINITY (mg/g) : 0

VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007382

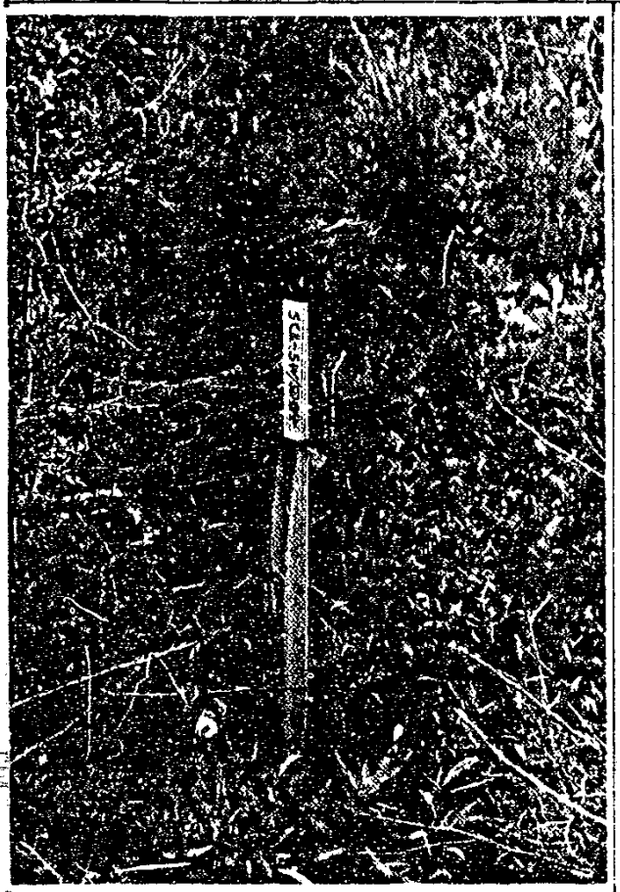
SURFACE WATER SAMPLE LOG

FIGURE NO. L-8

SAMPLE NO.: SCK-SW04-02	PROJECT: S. Cavalcade Remedial Investigation
DATE/TIME: 10-13-86/16:40	CLIENT: Koppers Co., Inc.
SAMPLED BY: PRW/LdlF	REMARKS: Pale straw color.
PROJECT NO.: 85-317	
SAMPLE LOCATION	**MEASUREMENTS** LAB [X] FIELD [ ]
LOCATION DESCRIPTION: Drainage ditch between Palletized Trucking east fenceline & RR track 60' north of Collingsworth St.	TEMPERATURE (°C): 20°C
	DISSOLVED OXYGEN (mg/l): 9.00
	CONDUCTIVITY (µmhos/cm): 385, corrected for 25°C
DEPTH: 4"	pH: 7.66
	SALINITY (mg/g): 0
SURFACE FILM: [ ] YES [X] NO	VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007383

007383

SURFACE WATER SAMPLE LOG

FIGURE NO. L-9

SAMPLE NO.: SCK-SW09-01

DATE/TIME: 10-13-86/15:00

SAMPLED BY: PRW/LdlF

PROJECT NO.: 85-317

PROJECT: S. Cavalcade Remedial Investigation

CLIENT: Koppers Co., Inc.

REMARKS:
Fairly clear, slightly turbid but no straw color.

SAMPLE LOCATION

LOCATION DESCRIPTION:
Drainage swale @ northeast fence-line corner of Mobil next to RR tracks.

DEPTH: 12"

SURFACE FILM: ☐ YES ☒ NO

MEASUREMENTS

LAB ☒ FIELD ☐

TEMPERATURE (°C): 20°C

DISSOLVED OXYGEN (mg/l): 8.99

CONDUCTIVITY (μmhos/cm): 220, corrected for 25°C

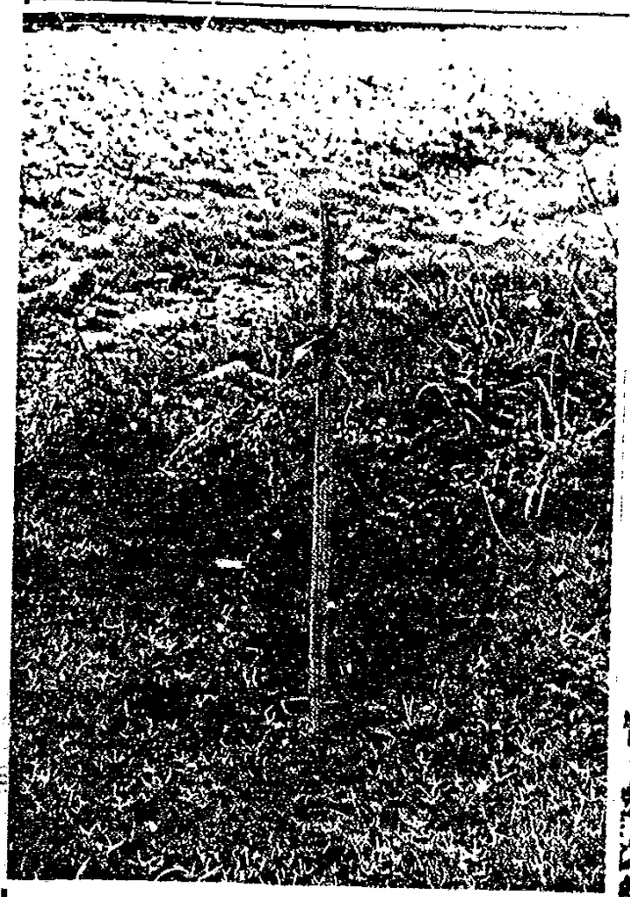
pH: 7.88

SALINITY (mg/g) : 0

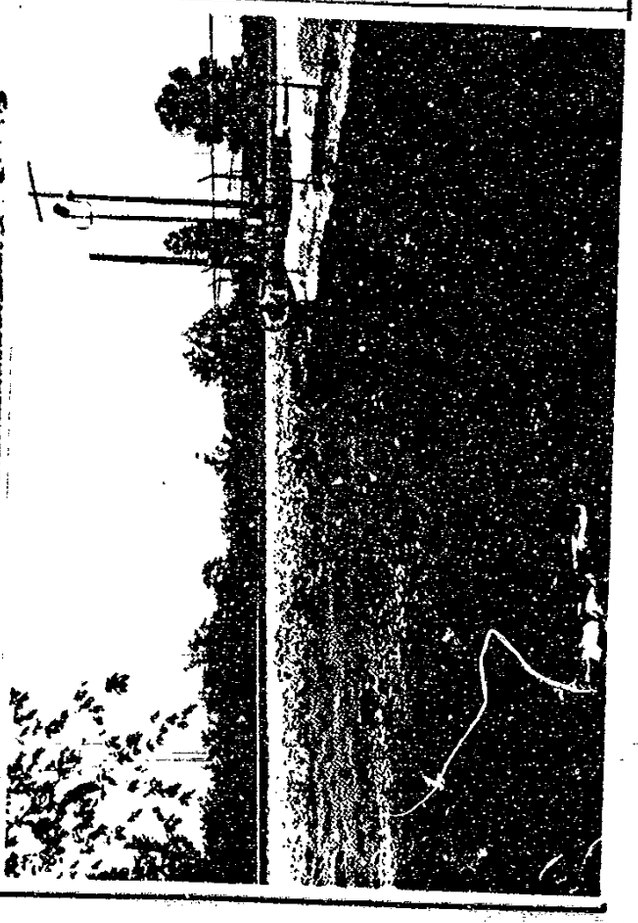
VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND



McBride-Ratcliff and Associates, Inc.

007384

007384

SURFACE WATER SAMPLE LOG

FIGURE NO. L-10

SAMPLE NO.: SCK-SW10-01	PROJECT: S. Cavalcade Remedial Investigation
DATE/TIME: 10-13-86/17:00	CLIENT: Koppers Co., Inc.
SAMPLED BY: PRW/LdiF	REMARKS: Slight straw color.
PROJECT NO.: 85-317	
SAMPLE LOCATION	**MEASUREMENTS** LAB ☒ FIELD ☐
LOCATION DESCRIPTION: Drainage ditch between RR tracks 50' east of SCK-SW04-02.	TEMPERATURE (°C): 20°C
	DISSOLVED OXYGEN (mg/l): 6.65
	CONDUCTIVITY (μmhos/cm): 770, corrected for 25°C
DEPTH: 10"	pH: 7.36
	SALINITY (mg/g): 0
SURFACE FILM: ☐ YES ☒ NO	VELOCITY (ft/sec):

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE

BACKGROUND

007385

McBride-Ratcliff and Associates, Inc.

APPENDIX M – SEDIMENT SAMPLE LOGS

007386

SEDIMENT SAMPLE LOG

FIGURE NO. M-1

SAMPLE NO.: SCK-SD01-01

DATE/TIME: 6-11-86/13:10

SAMPLED BY: PRW

SAMPLE LOCATION: Drainage ditch @ corner of fencelines behind Transcon Trucking along Maury St. near Weiss St.

DEPTH: 0"-6"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

SAMPLE CONDITIONS

SAMPLE DESCRIPTION: Brown & black mixed Clay, Silt, Sand, Gravel & decaying organic matter.

CLEANING PROCEDURE

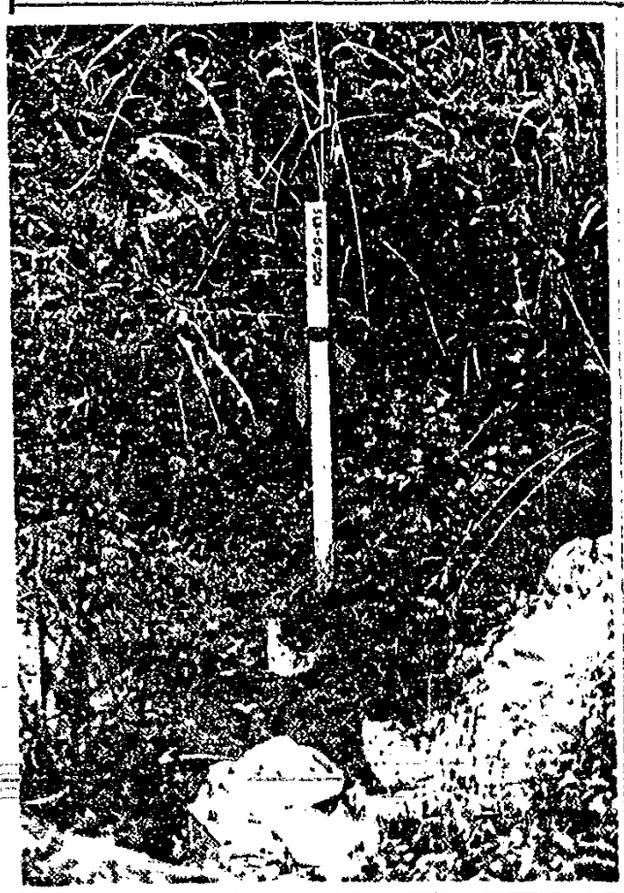
- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

HEADSPACE READING
FIELD ☐ LAB ☐

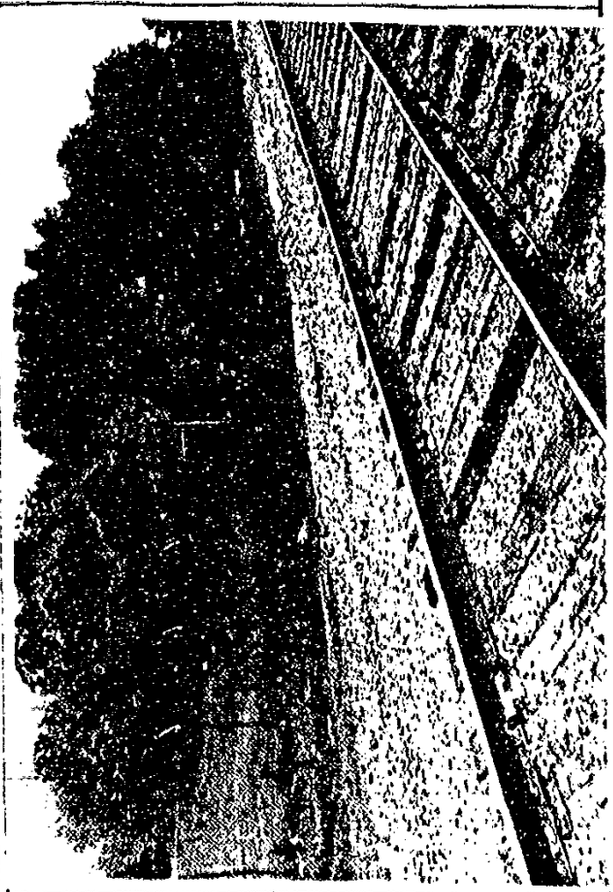
	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND



McBride-Ratcliff and Associates, Inc.

007387

SEDIMENT SAMPLE LOG

FIGURE NO. M-2

SAMPLE NO.: SCK-SD01-02

DATE/TIME: 10-13-86/12:30

SAMPLED BY: PRW/LdlF

SAMPLE LOCATION: Drainage ditch @ corner of fencelines behind Transcon Trucking along Maury St. near Weiss St.

DEPTH: 0"-4"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

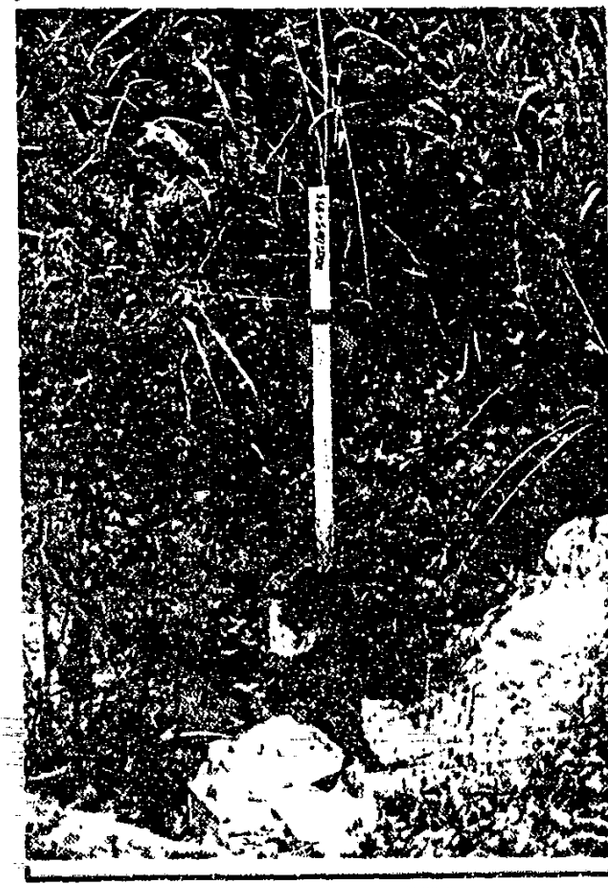
SAMPLE DESCRIPTION: Light gray, yellow, light brownish gray, Sandy Clay. Very little decaying organic matter.

HEADSPACE READING
FIELD ☐ LAB ☐

	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007388

007388

SEDIMENT SAMPLE LOG

FIGURE NO. M-3

SAMPLE NO.: SCK-SD02-01

DATE/TIME: 6-11-86/13:53

SAMPLED BY: PRW

SAMPLE LOCATION: Drainage ditch between RR tracks & edge of parking lot next to Transcon Trucking 40' south of Cavalcade St.
DEPTH: 0"-6"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

SAMPLE CONDITIONS

SAMPLE DESCRIPTION: Brown & black mixed Clay, Silt, Sand, Gravel & decaying organic matter.

CLEANING PROCEDURE

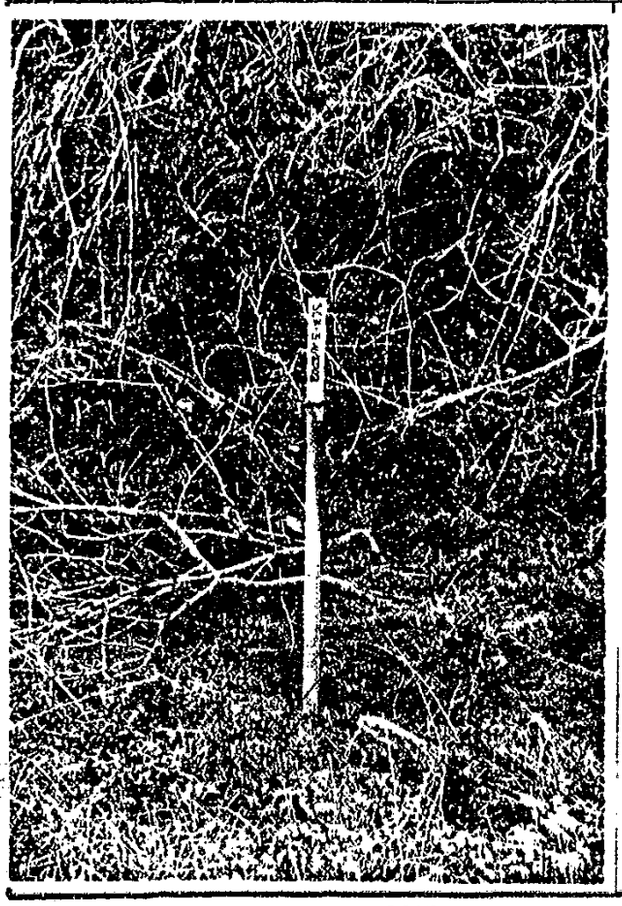
- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

HEADSPACE READING
FIELD ☐ LAB ☐

	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



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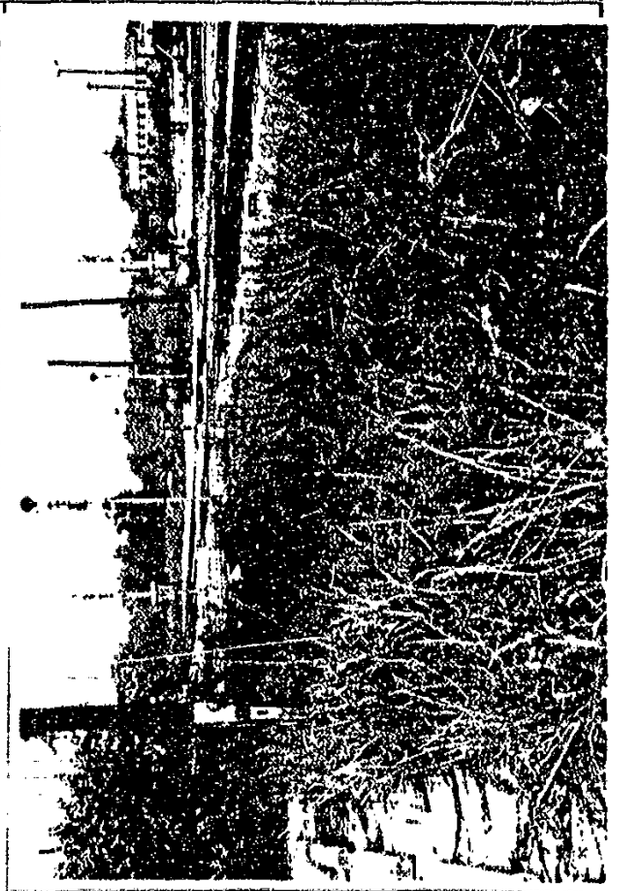


McBride-Ratcliff and Associates, Inc.

007389

SEDIMENT SAMPLE LOG

FIGURE NO. M-4

SAMPLE NO.: SCK-SD02-02

DATE/TIME: 10-13-86/12:00

SAMPLED BY: PRW/LdlF

SAMPLE LOCATION: Drainage ditch between RR tracks & edge of parking lot next to Transcon Trucking 40' south of Cavalcade St.

DEPTH: 0"-4"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

SAMPLE CONDITIONS

SAMPLE DESCRIPTION: Brownish gray & tan Sandy Clay. No visible decaying matter. Shell fragments.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

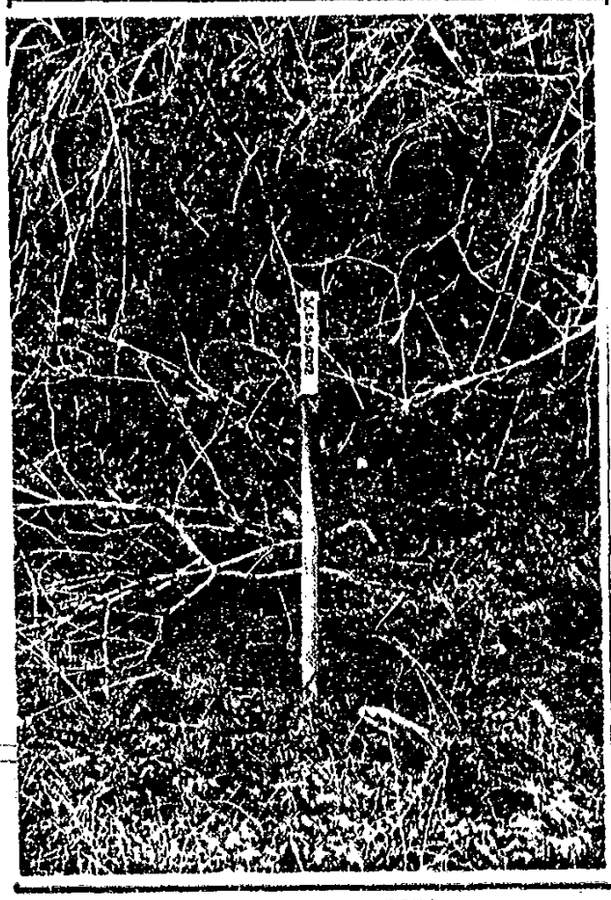
HEADSPACE READING

FIELD ☐ LAB ☐

	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007390

SEDIMENT SAMPLE LOG

FIGURE NO. M-5

SAMPLE NO.: SCK-SD03-01

DATE/TIME: 6-11-86

SAMPLED BY: PRW

SAMPLE LOCATION: Drainage ditch between Meridian Transport & Mobil 40' north of Collingsworth St.

DEPTH: 0"-6"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

SAMPLE DESCRIPTION:

Brown & black mixed Clay, Silt, Sand, Gravel & decaying organic matter.

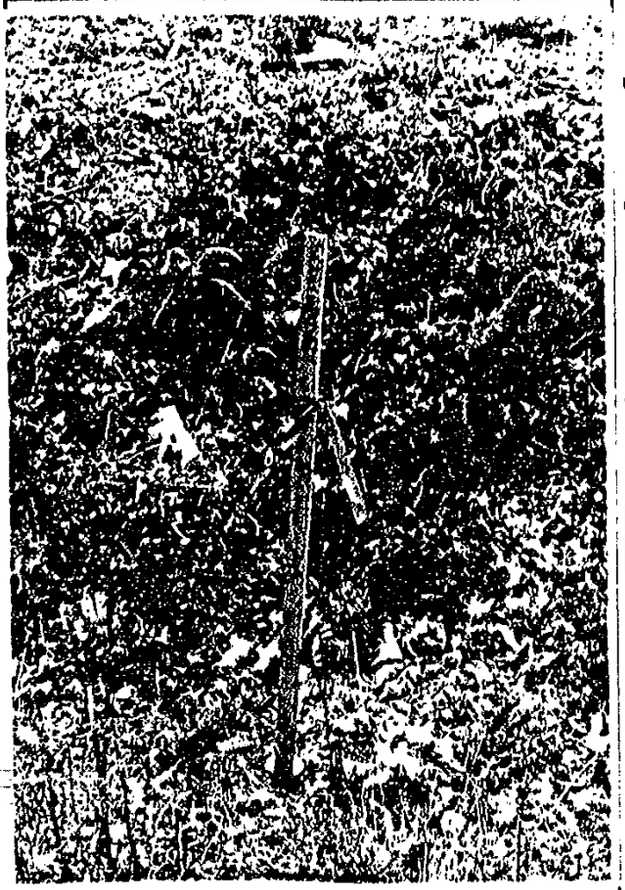
HEADSPACE READING

FIELD ☐ LAB ☐

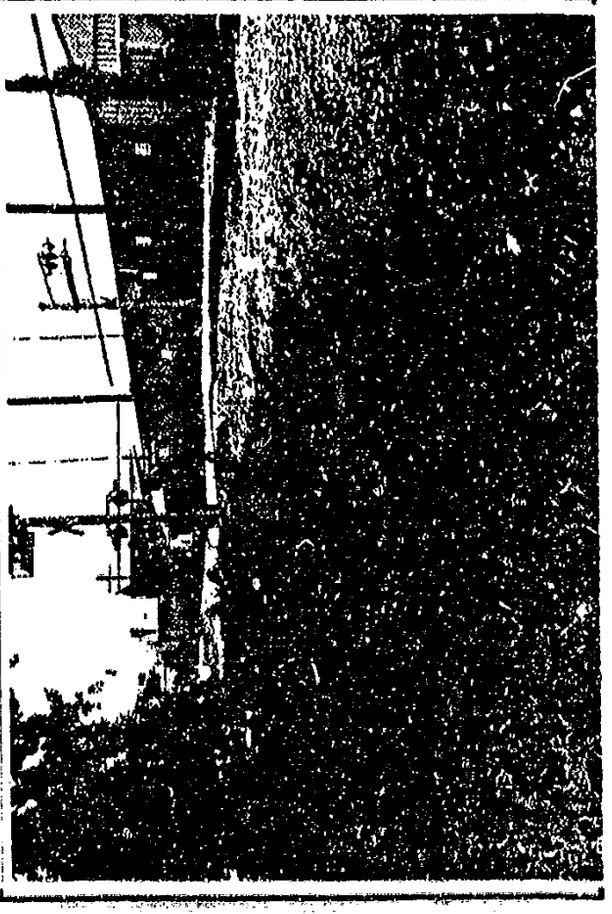
	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND



McBride-Ratcliff and Associates, Inc.

007391

SEDIMENT SAMPLE LOG

FIGURE NO. M-6

SAMPLE NO.: SCK-SD03-02

DATE/TIME: 10-13-86:16:00

SAMPLED BY: PRW/LdlF

SAMPLE LOCATION: Drainage ditch between Meridian Transport & Mobil 40' north of Collingsworth St.

DEPTH: 0"-4"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☐ SOLVENT RINSE
- ☒ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

SAMPLE DESCRIPTION: Black & dark gray Sandy Silt with much decaying organic matter.

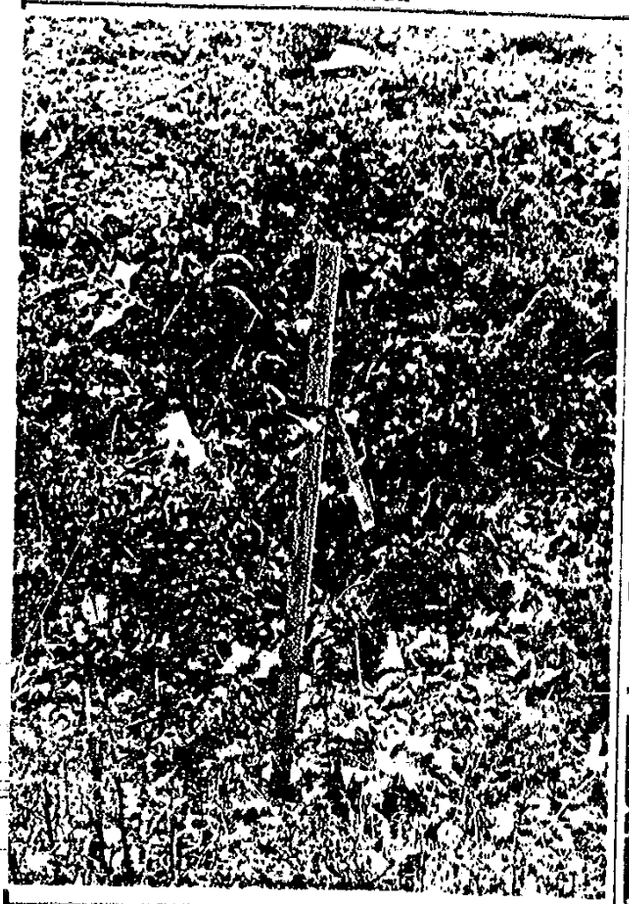
HEADSPACE READING

FIELD ☐ LAB ☐

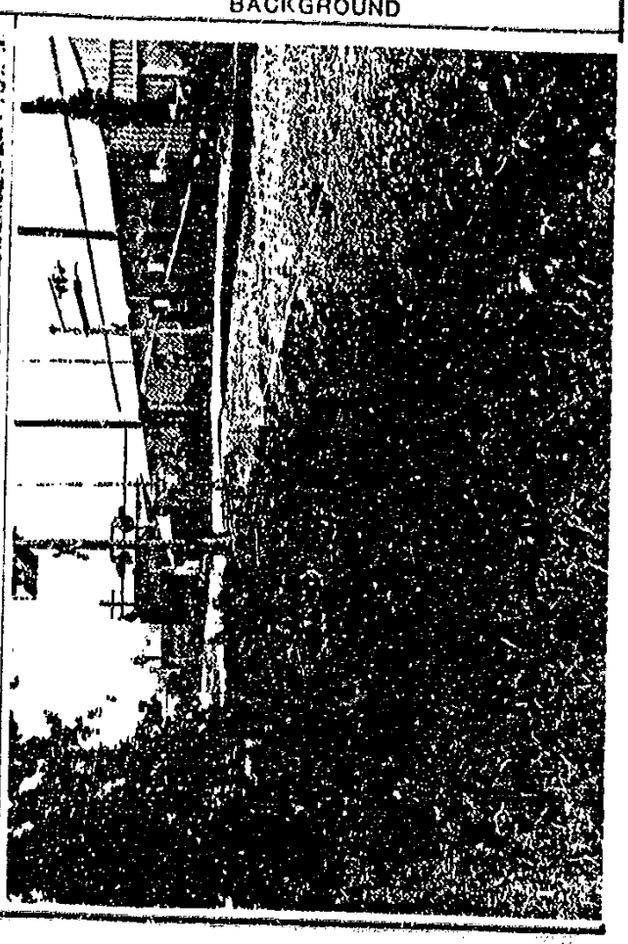
	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND



McBride-Ratcliff and Associates, Inc.

007392

SEDIMENT SAMPLE LOG

FIGURE NO. M-7

SAMPLE NO.: SCK-SD04-01

DATE/TIME: 6-11-86/15:15

SAMPLED BY: PRW

SAMPLE LOCATION: Drainage ditch between Palletized Trucking east fence line & RR tracks 60' north of Collingsworth St.

DEPTH: 0"-6"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

SAMPLE DESCRIPTION:

Brown & black mixed Clay, Silt, Sand, Gravel & decaying organic matter.

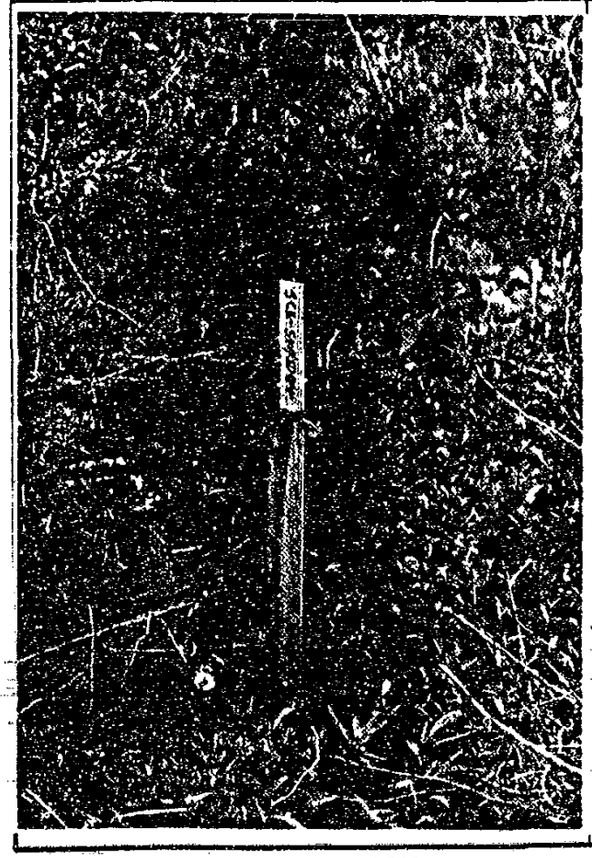
HEADSPACE READING

FIELD ☐ LAB ☐

	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007393

007393

SEDIMENT SAMPLE LOG

FIGURE NO. M-8

SAMPLE NO.: SCK-SD04-02

DATE/TIME: 10-13-86/16:40

SAMPLED BY: PRW/LdlF

SAMPLE LOCATION: Drainage ditch between Palletized Trucking east fenceline & RR tracks 60' north of Collingsworth St.

DEPTH: 0"-4"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

SAMPLE DESCRIPTION:

Gray & brown slightly Clayey Sandy Silt. Natural odor. Not much decaying organic matter. Scattered roots & twigs.

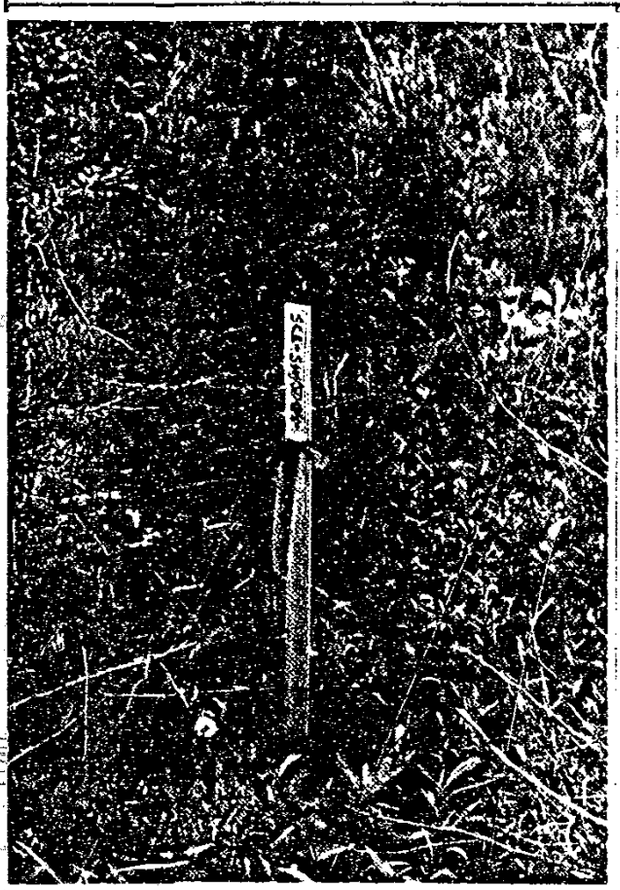
HEADSPACE READING

FIELD ☐ LAB ☐

	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007394

SEDIMENT SAMPLE LOG

FIGURE NO. M-9

SAMPLE NO.: SCK-SD05-01

DATE/TIME: 6-11-86/16:25

SAMPLED BY: PRW

SAMPLE LOCATION: Taken offsite @ drainage ditch along southern edge of Bunton St. in HL&P easement between Elysian St. & Hardy St.
DEPTH: 0"-6"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- [ ] STEAM CLEAN
- [x] SOLVENT RINSE
- [ ] DETERGENT RINSE
- [ ] POTABLE WATER RINSE
- [x] DISTILLED WATER RINSE

SAMPLE CONDITIONS

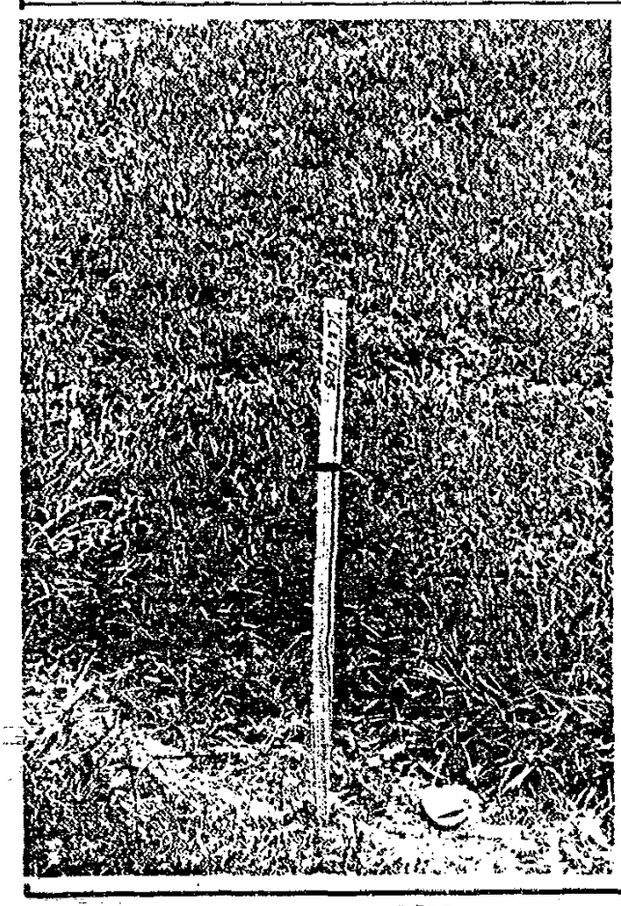
SAMPLE DESCRIPTION:
Brown & black mixed Clay, Silt, Sand, Gravel & decaying organic matter. Round 1 background sample.

HEADSPACE READING
FIELD [ ] LAB [ ]

	YES	NO
NOTICEABLE ODORS	[ ]	[x]
VISUAL DISCOLORATION	[ ]	[x]
OILY RESIDUES	[ ]	[x]

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

007395

SEDIMENT SAMPLE LOG

FIGURE NO. M-10

SAMPLE NO.: SCK-SD05-02A

DATE/TIME: 10-13-86/17:20

SAMPLED BY: PRW/LdlF

SAMPLE LOCATION: Taken offsite @ drainage ditch along northern edge of Bunton St. in HL&P easement between Elysian St. & Hardy St.
DEPTH: 0"-3"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

SAMPLE DESCRIPTION:

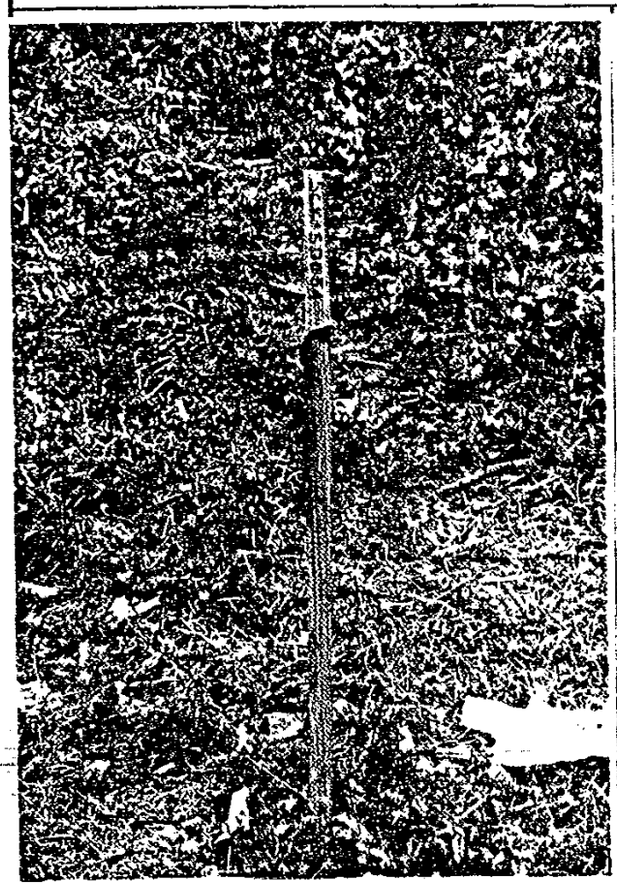
Black Clayey Fine Sand, roots twigs. Round 2 background sample.

HEADSPACE READING
FIELD ☐ LAB ☐

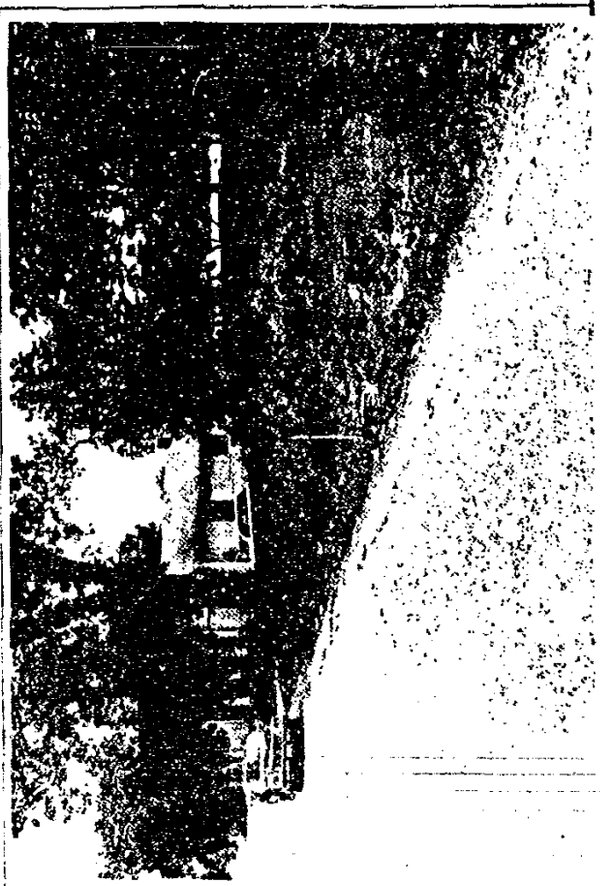
	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND



McBride-Ratcliff and Associates, Inc.

007396

SEDIMENT SAMPLE LOG

FIGURE NO. M-11

SAMPLE NO.: SCK-SD10-01

DATE/TIME: 10-13-86/15:00

SAMPLED BY: PRW/LdlF

SAMPLE LOCATION:
Drainage ditch @ northeast fence-line corner of Mobil next to RR tracks

DEPTH: 0"-4"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

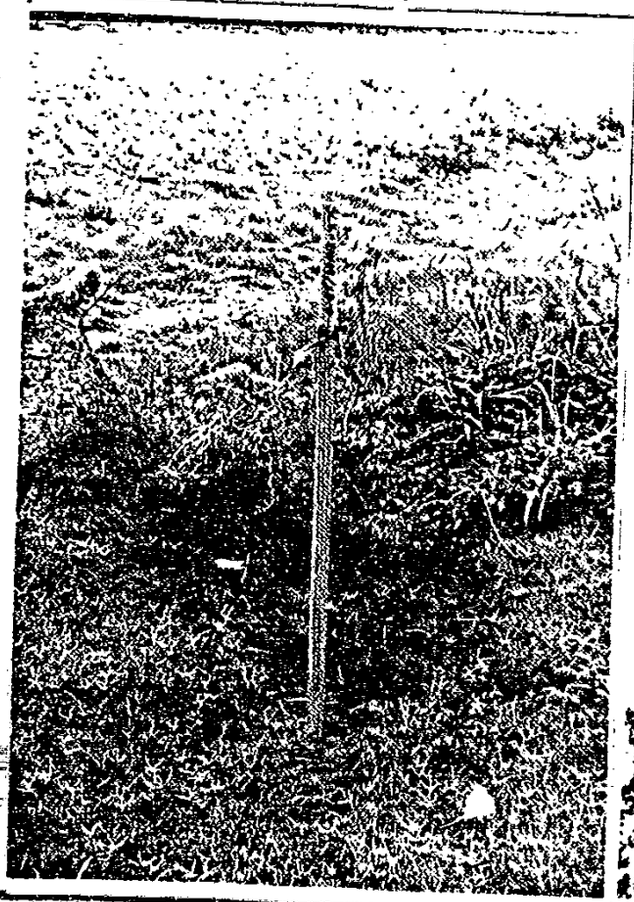
SAMPLE DESCRIPTION:
Grayish brown Sandy Silt. No visible decaying matter.

HEADSPACE READING
FIELD ☐ LAB ☐

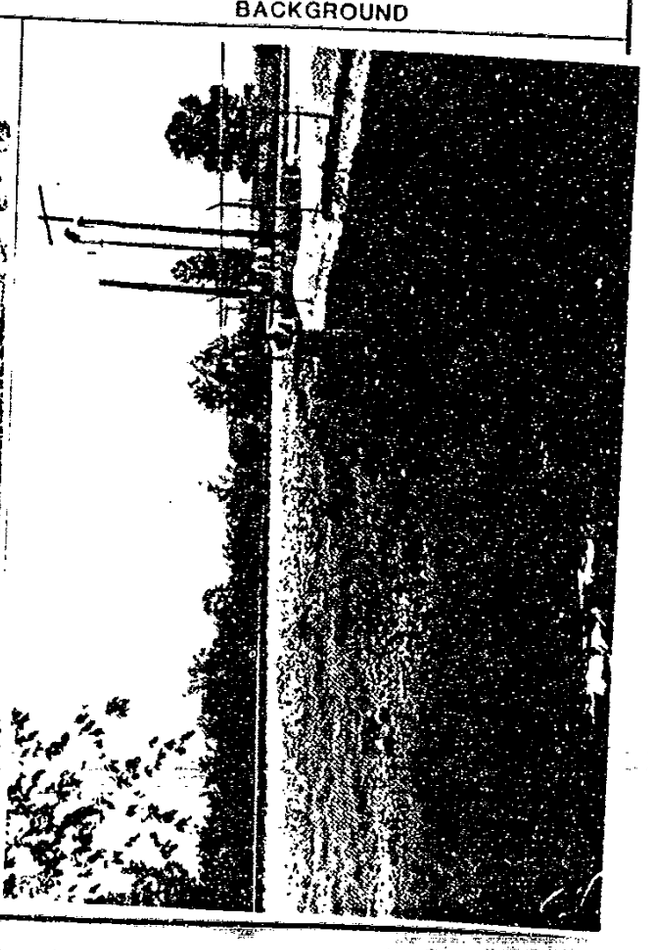
	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND



McBride-Ratcliff and Associates, Inc.

007397

SEDIMENT SAMPLE LOG

FIGURE NO. M-12

SAMPLE NO.: SCK-SD11-01

DATE/TIME: 10-13-86/17:00

SAMPLED BY: PRW/LdlF

SAMPLE LOCATION: Drainage ditch between RR tracks 50' east of SCK-SW04-02.

DEPTH: 0"-4"

PROJECT: S. Cavalcade Remedial Investigation

PROJECT NO.: 85-317

CLIENT: Koppers Co., Inc.

CLEANING PROCEDURE

- ☐ STEAM CLEAN
- ☒ SOLVENT RINSE
- ☐ DETERGENT RINSE
- ☐ POTABLE WATER RINSE
- ☒ DISTILLED WATER RINSE

SAMPLE CONDITIONS

SAMPLE DESCRIPTION:

Dark gray Silty Sand with much decaying organic matter.

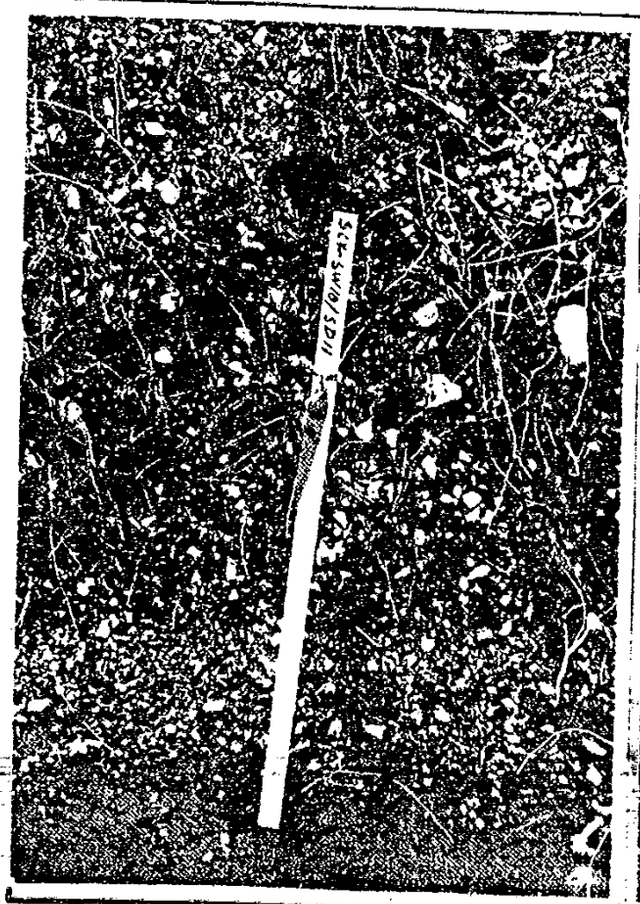
HEADSPACE READING

FIELD ☐ LAB ☐

	YES	NO
NOTICEABLE ODORS	☐	☒
VISUAL DISCOLORATION	☐	☒
OILY RESIDUES	☐	☒

PHOTOGRAPHIC DOCUMENTATION

NEAR RANGE



BACKGROUND

McBride-Ratcliff and Associates, Inc.

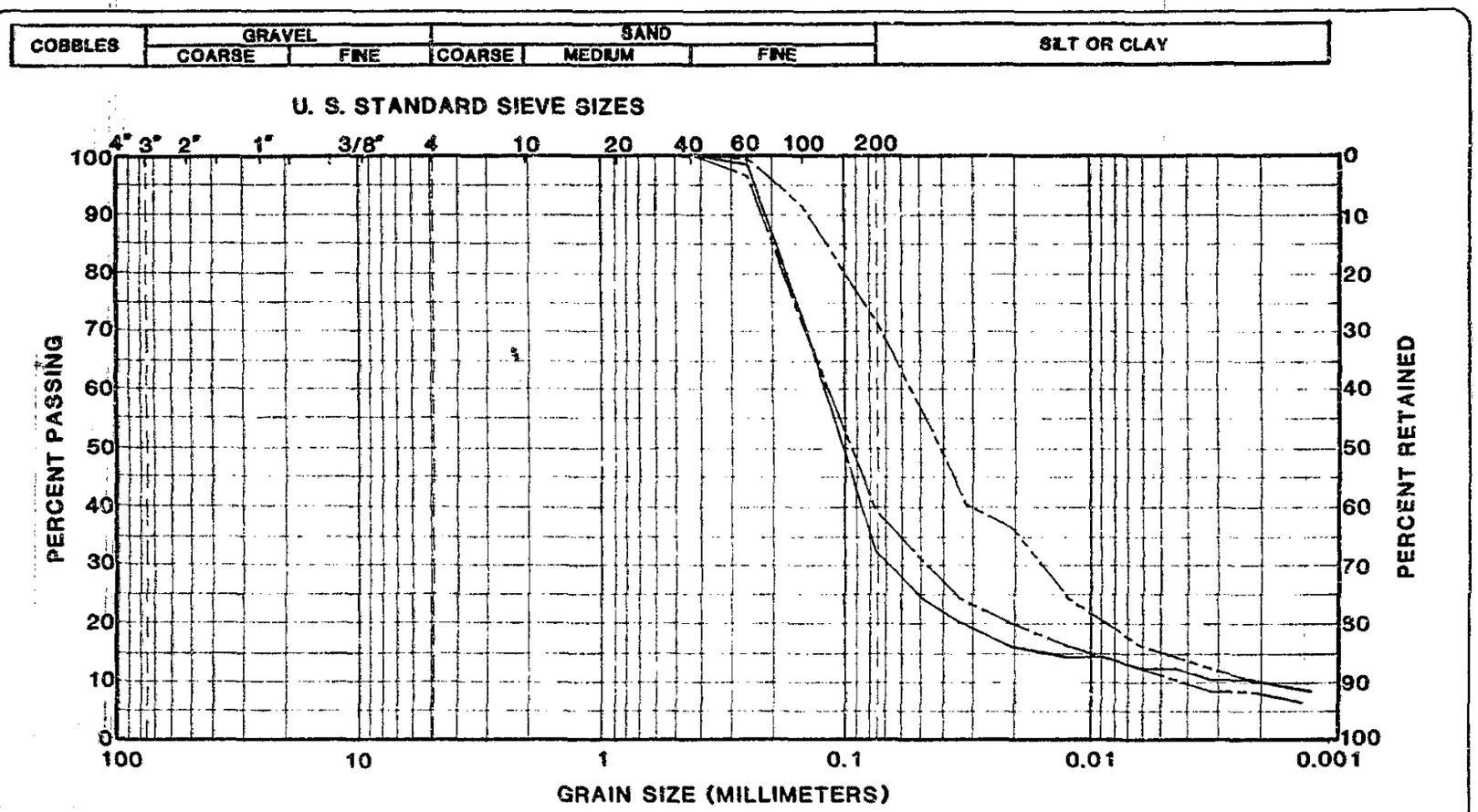
007398

007398

APPENDIX N - SEDIMENT GRAIN SIZE DISTRIBUTION CURVES

007399

007399



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
SD-1	01	Si Sa	———
SD-2	01	Si Sa	——— -
SD-3	01	Sa Si	——— - -

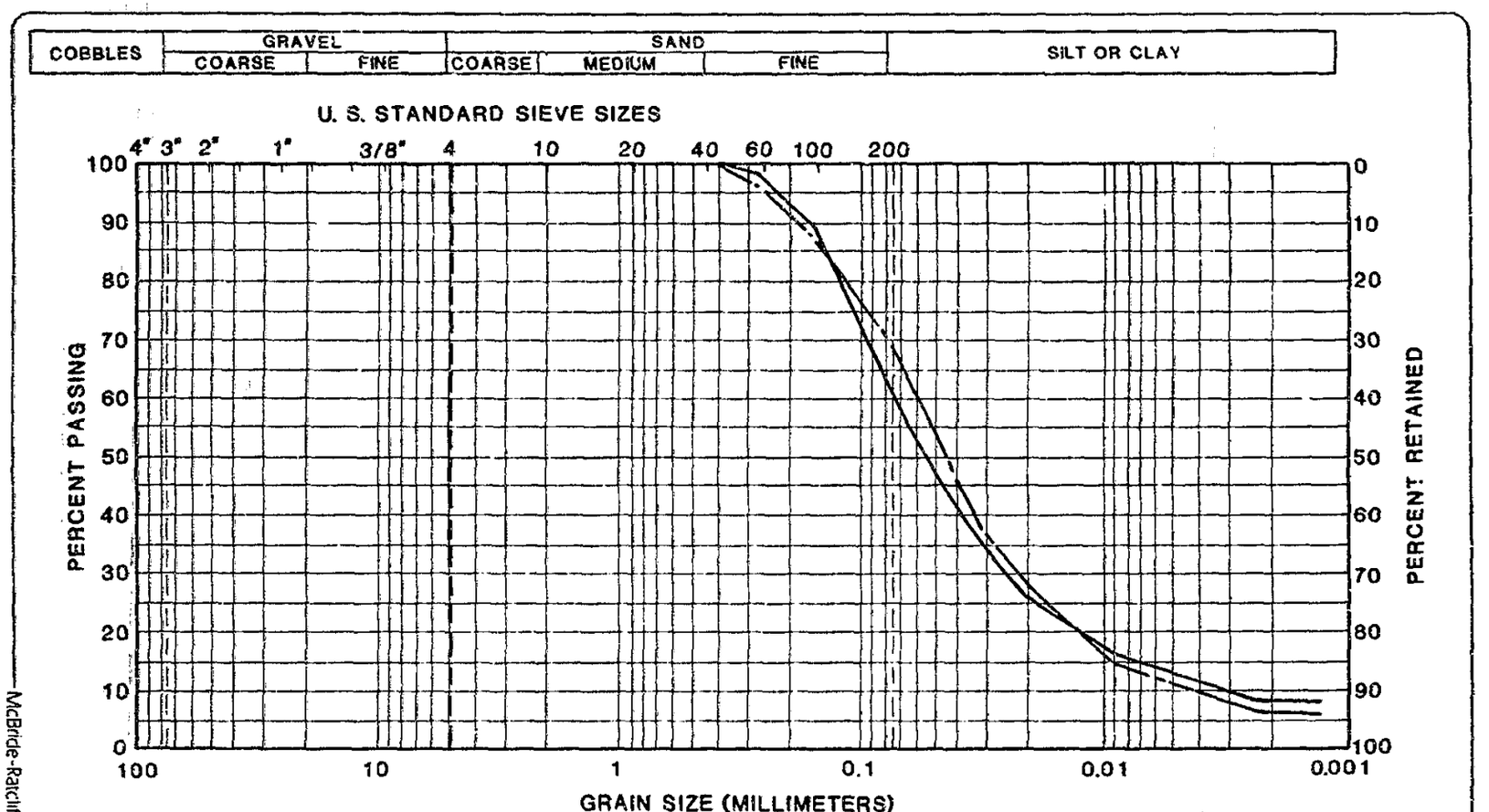
GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: N-1
DATE:

McBride-Ratcliff and Associates, Inc

007400



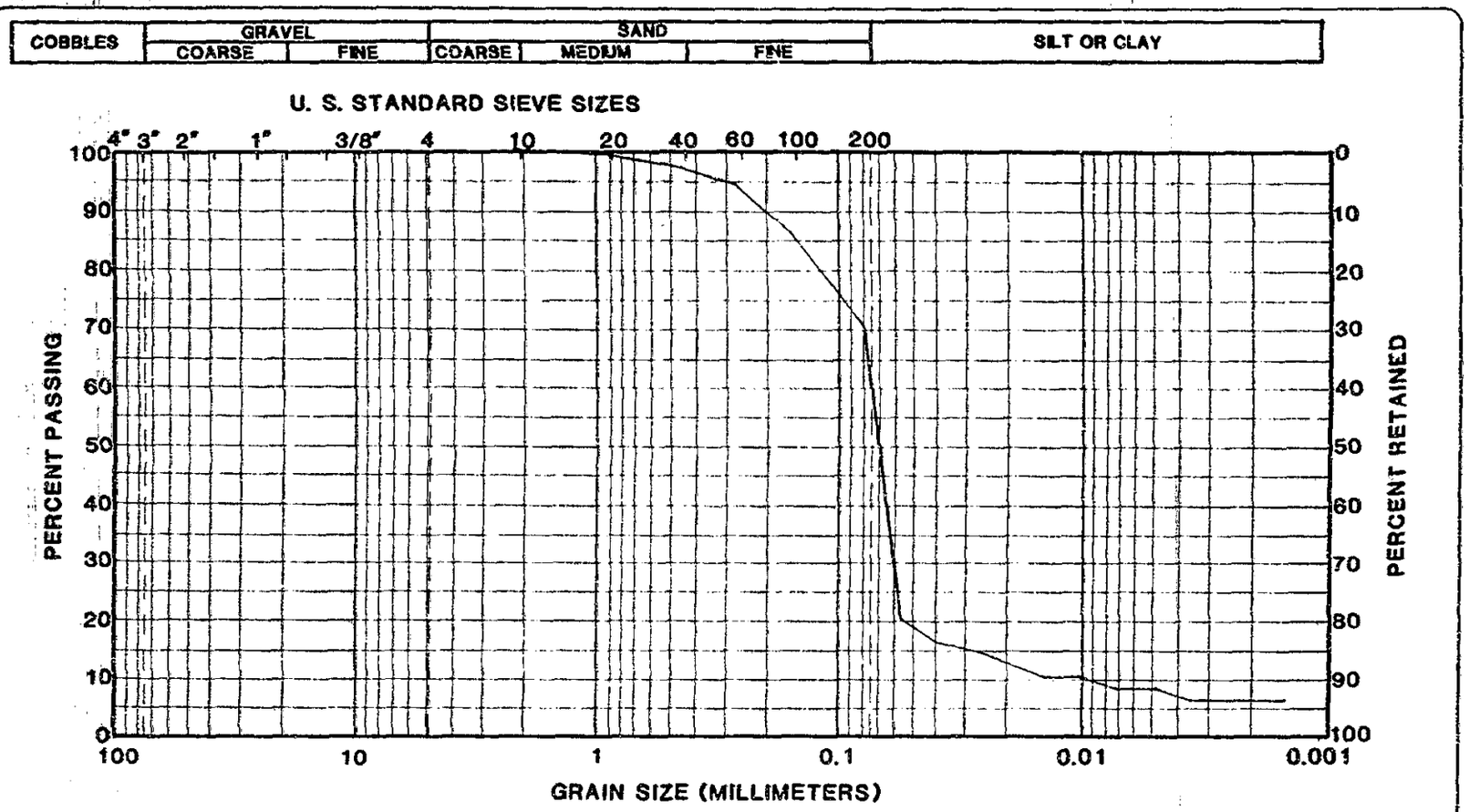
BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
SD-4	01	Sa Si	———
SD-5	01	Sa Si	—·—·—

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO.: 85-317
FIGURE NO.: [illegible]
DATE :

McBride-Ratcliff and Associates, Inc.



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
S001-002			

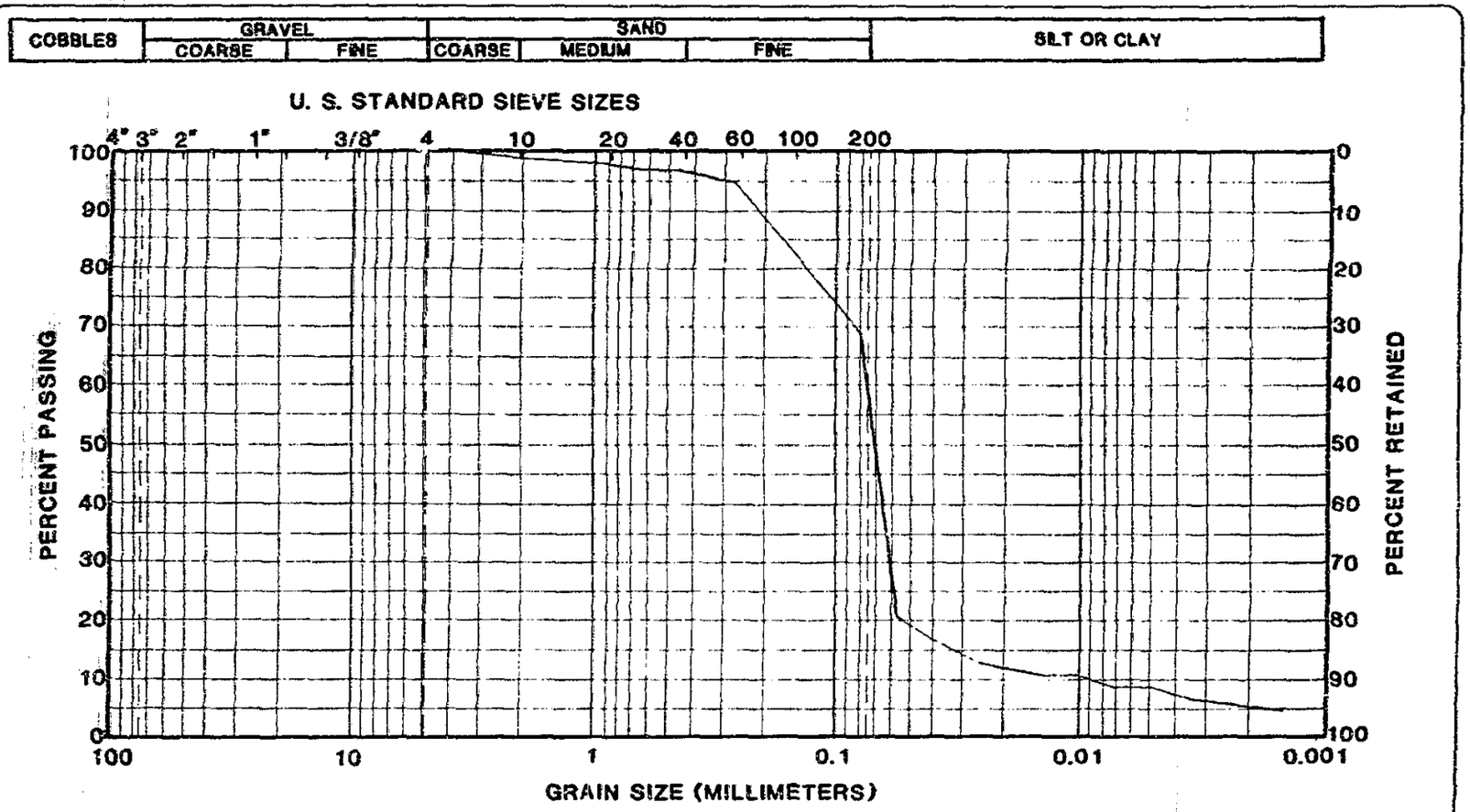
McBride-Ratcliff and Associates, Inc.

FILE NO: 85-317
FIGURE NO: N-3
DATE:

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

007402



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
S002-002		[illegible]	———

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

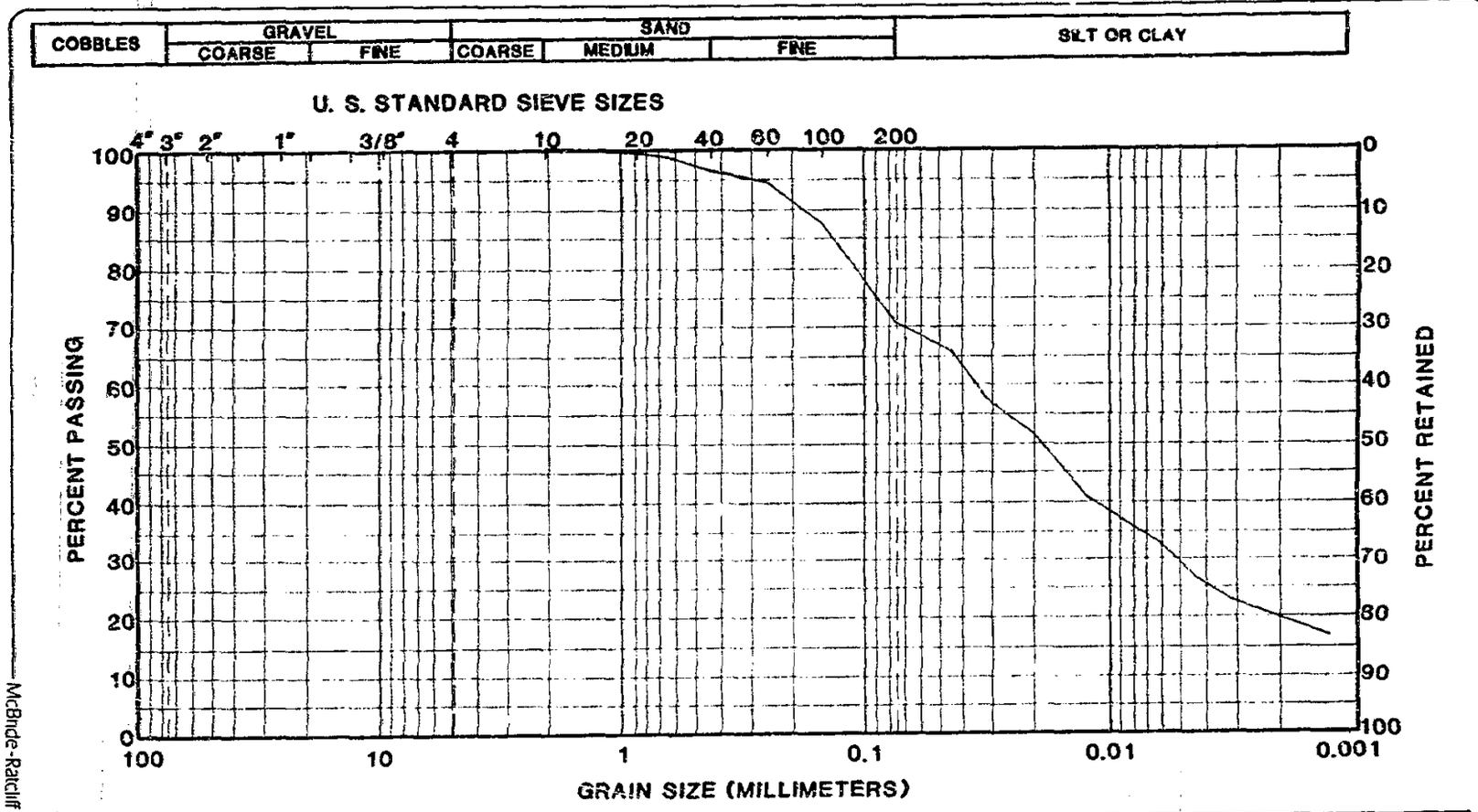
FILE NO: 85-317

FIGURE NO: N-4

DATE:

McBride-Ratcliff and Associates, Inc.

007403



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
SD03-002			

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

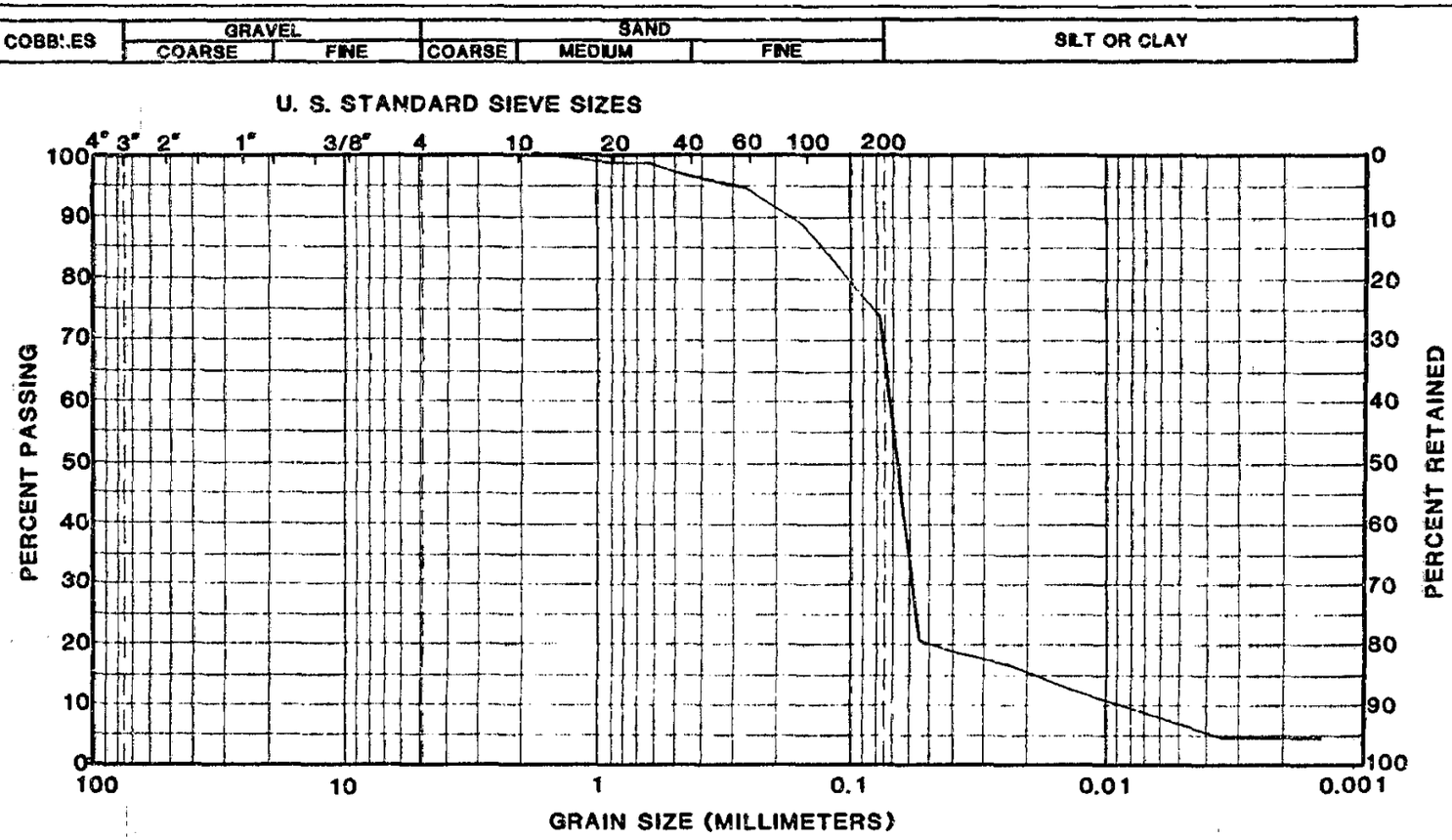
FILE NO: 85-317

FIGURE NO: N-5

DATE:

McBride-Ratcliff and Associates, Inc.

007404



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
SD04-002		[illegible]	———

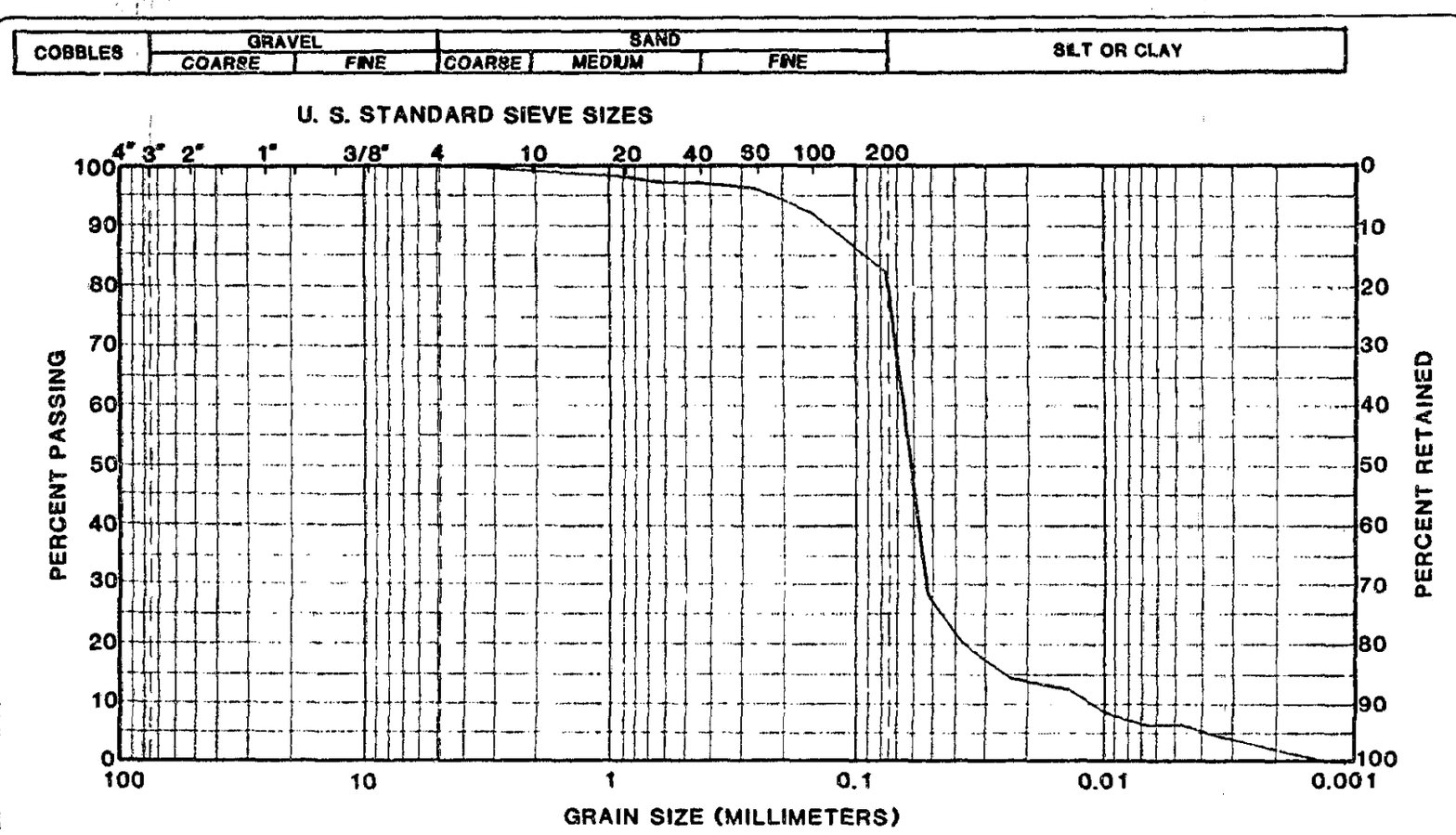
GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: N-6
DATE:

McBride-Ratcliff and Associates, Inc.

007405



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
S005-002-A		Sa Si	———

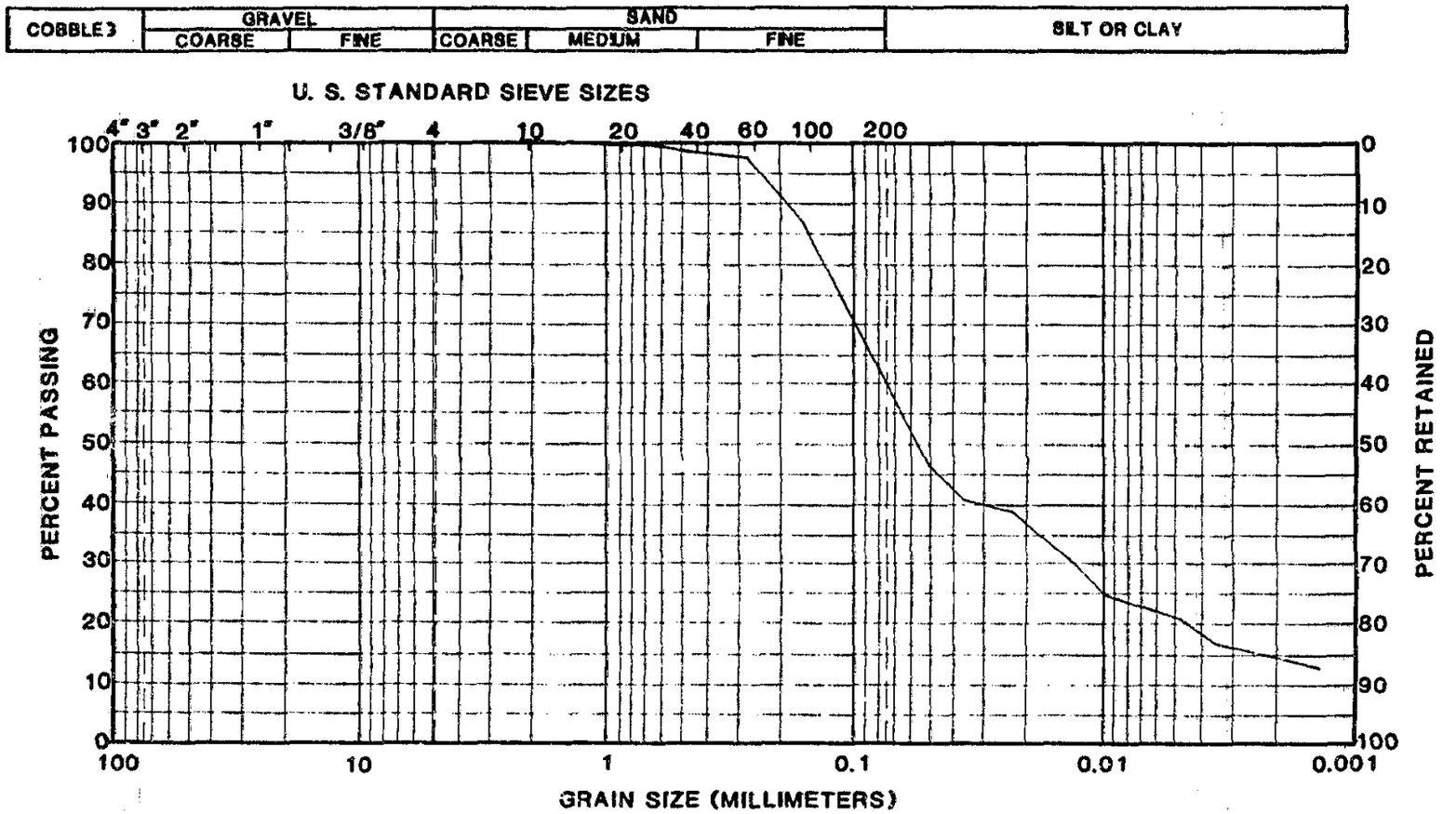
GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: N-7
DATE:

McBride-Ratcliff and Associates, Inc

007406



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
SD10-001		[illegible]	———

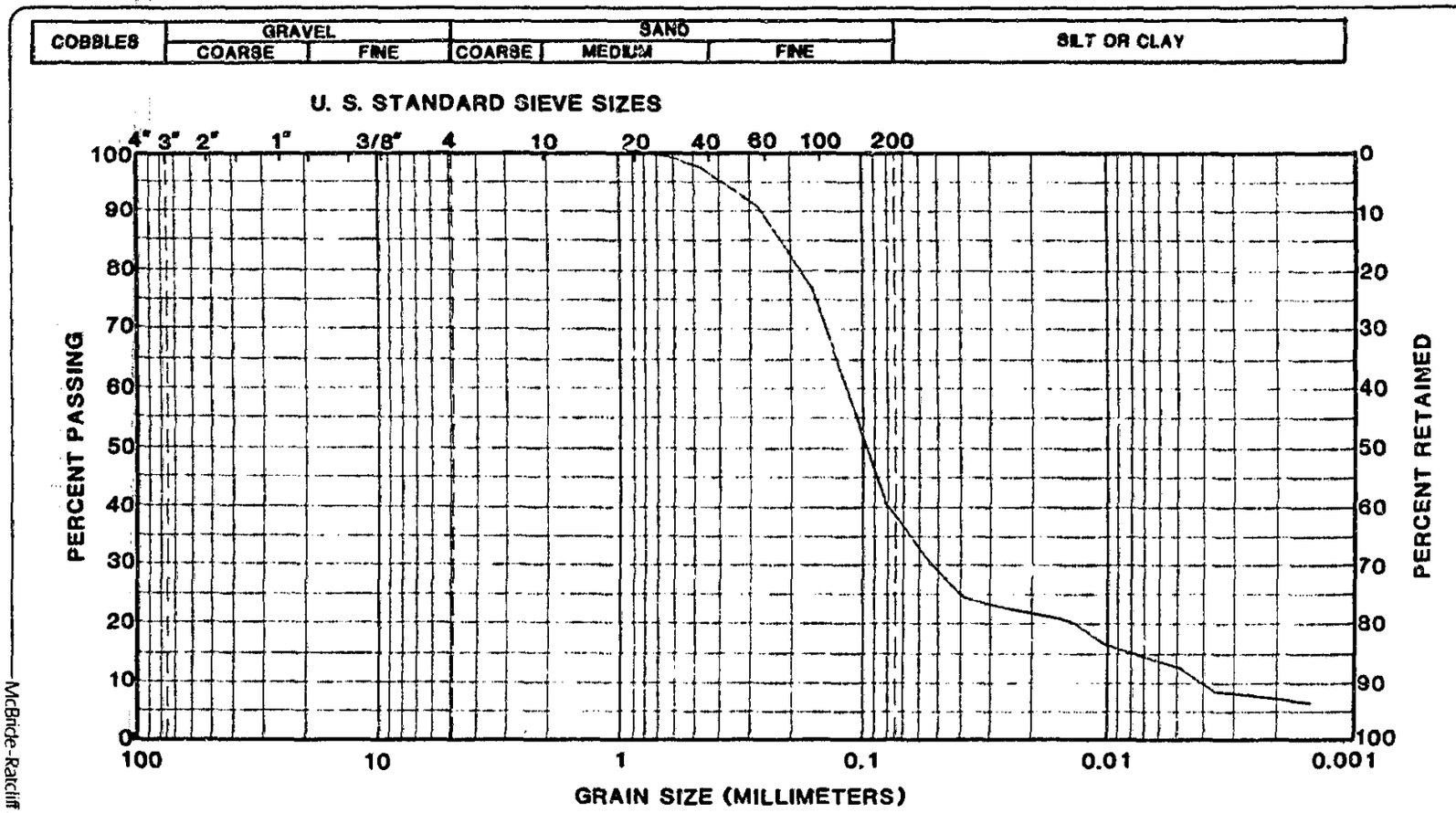
McBride-Ratcliff and Associates, Inc.

FILE NO: 85-317
FIGURE NO: N-8
DATE:

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

007407



BORING NO.	DEPTH(FT)	CLASSIFI-CATION	SYMBOL
SD11-001		Si Sa	———

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)

FILE NO: 85-317
FIGURE NO: N-9
DATE:

McBride-Ratcliff and Associates, Inc.

007408

APPENDIX O - SURFACE WATER AND SEDIMENT ANALYTICAL TEST RESULTS

007409

SOUTH CAVALCADE SITE - SURFACE WATER ANALYTICAL RESULTS

Sample Number	SW01-01	SW01-02	SW02-01	SW02-02	SW03-01	SW03-02	SW04-01	SW04-02
SEMIVOLATILE ORGANICS (ug/l)								
Validation Status :	V	V	V	V	V	V	V	V
PHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2-CHLOROPHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
1,3-DICHLOROBENZENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
BENZYL ALCOHOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
1,2-DICHLOROBENZENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2-METHYLPHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
4-METHYLPHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
N-NITROSODIPROPYLAMINE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
HEXACHLOROETHANE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
NITROBENZENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
ISOPHORONE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2-NITROPHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2,4-DIMETHYLPHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
BENZOIC ACID	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
NAPHTHALENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
4-CHLOROANILINE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
HEXACHLOROBUTADIENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
P-CHLORO-M-CRESOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
2-CHLORONAPHTHALENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2-NITROANILINE	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
DIMETHYL PHTHALATE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
ACENAPHTHYLENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
3-NITROANILINE	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
ACENAPHTHENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2,4-DINITROPHENOL	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
4-NITROPHENOL	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
DIBENZOFURAN	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2,4-DINITROTOLUENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2,6-DINITROTOLUENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
DIETHYL PHTHALATE	20 U	10 U	10 U	10 U	20 J	10 U	10 U	10 U
4-CHLOROPHENYL PHENYL ETHER	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
FLUORENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
4-NITROANILINE	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
N-NITROSODIPHENYLAMINE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
HEXACHLOROBENZENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
PENTACHLOROPHENOL	100 U	50 U	50 U	50 U	100 U	50 U	50 U	50 U
PHENANTHRENE	20 U	10 U	10 U	10 U	20 J	10 U	10 U	10 U
ANTHRACENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
DI-N-BUTYL PHTHALATE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
FLUORANTHENE	20 U	10 U	10 U	10 U	20 U	10 U	10 J	10 U
PYRENE	20 U	10 U	10 U	10 U	20 U	10 U	10 J	10 U
BUTYL BENZYL PHTHALATE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	40 U	20 U	20 U	20 U	40 U	20 U	20 U	20 U
BENZO(A)ANTHRACENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	20 U	23	10 U	10 J	20 U	15	39	97
CHRYSENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
DI-N-OCTYL PHTHALATE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
BENZO(B)FLUORANTHENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U(Q)	10 U
BENZO(K)FLUORANTHENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U(Q)	10 U
BENZO(A)PYRENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
BENZO(GHI)PERYLENE	20 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified.

007410

SOUTH CAVALCADE SITE - SURFACE WATER ANALYTICAL RESULTS

Sample Number	SW09-01	SW10-01
SEMIVOLATILE ORGANICS (ug/l)		
Validation Status :	V	V
PHENOL	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U
2-CHLOROPHENOL	10 U	10 U
1,3-DICHLOROBENZENE	10 U	10 U
1,4-DICHLOROBENZENE	10 U	10 U
BENZYL ALCOHOL	10 U	10 U
1,2-DICHLOROBENZENE	10 U	10 U
2-METHYLPHENOL	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	10 U	10 U
4-METHYLPHENOL	10 U	10 U
N-NITROSODIPROPYLAMINE	10 U	10 U
HEXACHLOROETHANE	10 U	10 U
NITROBENZENE	10 U	10 U
ISOPHORONE	10 U	10 U
2-NITROPHENOL	10 U	10 U
2,4-DIMETHYLPHENOL	10 U	10 U
BENZOIC ACID	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U
2,4-DICHLOROPHENOL	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U
NAPHTHALENE	10 U	10 U
4-CHLOROANILINE	10 U	10 U
HEXACHLOROBUTADIENE	10 U	10 U
P-CHLORO-M-CRESOL	10 U	10 U
2-METHYLNAPHTHALENE	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U
2,4,6-TRICHLOROPHENOL	10 U	10 U
2,4,5-TRICHLOROPHENOL	50 U	50 U
2-CHLORONAPHTHALENE	10 U	10 U
2-NITROANILINE	50 U	50 U
DIMETHYL PHTHALATE	10 U	10 U
ACENAPHTHYLENE	10 U	10 U
3-NITROANILINE	50 U	50 U
ACENAPHTHENE	10 U	10 U
2,4-DINITROPHENOL	50 U	50 U
4-NITROPHENOL	50 U	50 U
DIBENZOFURAN	10 U	10 U
2,4-DINITROTOLUENE	10 U	10 U
2,6-DINITROTOLUENE	10 U	10 U
DIETHYL PHTHALATE	10 U	10 U
4-CHLOROPHENYL PHENYL ETHER	10 U	10 U
FLUORENE	10 U	10 U
4-NITROANILINE	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	50 U	50 U
N-NITROSODIPHENYLAMINE	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	10 U	10 U
HEXACHLOROBENZENE	10 U	10 U
PENTACHLOROPHENOL	50 U	50 U
PHENANTHRENE	10 U	10 U
ANTHRACENE	10 U	10 U
DI-N-BUTYL PHTHALATE	10 U	10 U
FLUORANTHENE	10 U	10 U
PYRENE	10 U	10 U
BUTYL BENZYL PHTHALATE	10 U	10 U
3,3'-DICHLOROBENZIDINE	20 U	20 U
BENZO(A)ANTHRACENE	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 J	10 J
CHRYSENE	10 U	10 U
DI-N-OCTYL PHTHALATE	10 U	10 U
BENZO(B)FLUORANTHENE	10 U	10 U
BENZO(K)FLUORANTHENE	10 U	10 U
BENZO(A)PYRENE	10 U	10 U
INDENO(1,2,3-CD)PYRENE	10 U	10 U
DIBENZO(AH)ANTHRACENE	10 U	10 U
BENZO(GHI)PERYLENE	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified.

007411

SOUTH CAVALCADE SITE - SURFACE WATER ANALYTICAL RESULT.

Sample Number	SW01-01	SW01-02	SW02-01	SW02-02	SW03-01	SW03-02	SW04-01	SW04-02
VOLATILE ORGANICS (ug/l)								
Validation Status :	V	NA	V	Q	V	U	V	NA
CHLOROMETHANE	10 U		10 U	10 U	10 U	10 U	10 U	
BROMOMETHANE	10 U		10 U	10 U	10 U	10 U	10 U	
VINYL CHLORIDE	10 U		10 U	10 U	10 U	10 U	10 U	
CHLOROETHANE	10 U		10 U	10 U	10 U	10 U	10 U	
METHYLENE CHLORIDE	5 J		5 U	5 U	5 J	5 U	14	
ACETONE	10 U		10 U	10 U	10	10 U	10 U	
CARBON DISULFIDE	5 U		5 U	5 U	5 U	5 U	5 U	
1,1-DICHLOROETHENE	5 U		5 U	5 U	5 U	5 U	5 U	
1,1-DICHLOROETHANE	5 U		5 U	5 U	5 U	5 U	5 U	
TRANS-1,2-DICHLOROETHENE	5 U		5 U	5 U	5 U	5 U	5 U	
CHLOROFORM	5 U		5 U	5 U	5 U	5 U	5 U	
1,2-DICHLOROETHANE	5 U		5 U	5 U	5 U	5 U	5 U	
2-BUTANONE	10 U		10 U	10 U	10 U	10 U	10 U	
1,1,1-TRICHLOROETHANE	5 U		5 U	5 U	5 U	5 U	5 U	
CARBON TETRACHLORIDE	5 U		5 U	5 U	5 U	5 U	5 U	
VINYL ACETATE	10 U		10 U	10 U	10 U	10 U	10 U	
BROMODICHLOROMETHANE	5 U		5 U	5 U	5 U	5 U	5 U	
1,2-DICHLOROPROPANE	5 U		5 U	5 U	5 U	5 U	5 U	
TRANS-1,3-DICHLOROPROPENE	5 U		5 U	5 U	5 U	5 U	5 U	
TRICHLOROETHENE	5 U		5 U	5 U	5 U	5 U	5 U	
DIBROMOCHLOROMETHANE	5 U		5 U	5 U	5 U	5 U	5 U	
1,1,2-TRICHLOROETHANE	5 U		5 U	5 U	5 U	5 U	5 U	
BENZENE	5 U		5 U	5 U	5 J	5 U	5 U	
CIS-1,3-DICHLOROPROPENE	5 U		5 U	5 U	5 U	5 U	5 U	
2-CHLOROETHYLVINYL ETHER	10 U		10 U	10 U	10 U	10 U	10 U	
BROMOFORM	5 U		5 U	5 U	5 U	5 U	5 U	
2-HEXANONE	10 U		10 U	10 U	10 U	10 U	10 U	
4-METHYL-2-PENTANONE	10 U		10 U	10 U	10 U	10 U	10 U	
TETRACHLOROETHENE	5 U		5 U	5 U	5 U	5 U	5 U	
1,1,2,2-TETRACHLOROETHANE	5 U		5 U	5 U	5 U	5 U	5 U	
TOLUENE	5 U		5 U	5 U	5 J	5 U	5 U	
CHLOROBENZENE	5 U		5 U	5 U	5 U	5 U	5 U	
ETHYLBENZENE	5 U		5 U	5 U	5 U	5 U	5 U	
STYRENE	5 U		5 U	5 U	5 U	5 U	5 U	
TOTAL XYLENES	5 U		5 U	5 U	5 U	5 U	5 U	
TOTAL PETROLEUM HYDROCARBONS (mg/l)	5.0 U	5.00 U	5.0 U	5.00 U	5.0 U	5.00 U	5.0 U	5.00 U
INORGANICS (ug/l)								
Validation Status :	V	V	V	V	V	V	V	V
SILVER	9 U	10 U	9 U	10 U	11	10 U	9 U	10 U
ARSENIC	33	16	24	56	50	50	45	40
BERYLLIUM	2 U	3 U	2 U	3 U	2 U	3 U	2 U	3 U
CADMIUM	4 U	5 U	4 U	5 U	4 U	5 U	4 U	5 U
CYANIDE	100 U	10 U	100 U	10 U	100 U	10 U	100 U	10 U
CHROMIUM	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U
COPPER	10 U	10 U	10 U	10 U	10 U	10 U	17	14
IRON	3100	680	170	400	540	700	1500	550
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	20 U	29 U	20 U	29 U	20 U	29 U	20 U	36
LEAD	30	6.4	5 U	11	7.3	31	22	14
ANTIMONY	60 U	44 U	60 U	44 U	60 U	44 U	60 U	44 U
SELENIUM	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
THALLIUM	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
ZINC	84	31	38	47	51	140	91	66

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified;

007412

SOUTH CHARLESTON SITE - SURFACE WATER ANALYTICAL RESULTS

Sample Number	SW09-01	SW10-01
VOLATILE ORGANICS (ug/l)		
Validation Status :	NA	NA
CHLOROMETHANE		
BROMOMETHANE		
VINYL CHLORIDE		
CHLOROETHANE		
METHYLENE CHLORIDE		
ACETONE		
CARBON DISULFIDE		
1,1-DICHLOROETHENE		
1,1-DICHLOROETHANE		
TRANS-1,2-DICHLOROETHENE		
CHLOROFORM		
1,2-DICHLOROETHANE		
2-BUTANONE		
1,1,1-TRICHLOROETHANE		
CARBON TETRACHLORIDE		
VINYL ACETATE		
BROMODICHLOROMETHANE		
1,2-DICHLOROPROPANE		
TRANS-1,3-DICHLOROPROPENE		
TRICHLOROETHENE		
DIBROMOCHLOROMETHANE		
1,1,2-TRICHLOROETHANE		
BENZENE		
CIS-1,3-DICHLOROPROPENE		
2-CHLOROETHYLVINYL ETHER		
BROMOFORM		
2-HEXANONE		
4-METHYL-2-PENTANONE		
TETRACHLOROETHENE		
1,1,2,2-TETRACHLOROETHANE		
TOLUENE		
CHLOROBENZENE		
ETHYLBENZENE		
STYRENE		
TOTAL XYLENES		
TOTAL PETROLEUM HYDROCARBONS (mg/l)	7.00	5.00 U
INORGANICS (ug/l)		
Validation Status :	V	V
SILVER	10 U	10 U
ARSENIC	56	10 U
BERYLLIUM	3 U	3 U
CADMIUM	5 U	5 U
CYANIDE	10 U	10 U
CHROMIUM	9 U	9 U
COPPER	10 U	10 U
IRON	1400	300
MERCURY	0.2 U	0.2 U
NICKEL	29 U	36
LEAD	22	5 U
ANTIMONY	44 U	44 U
SELENIUM	5 U	5 U
THALLIUM	10 U	10 U
ZINC	110	32

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified;

007413

SOUTH CAVALLADE SITE - SEDIMENT ANALYTICAL RESULTS

Sample Number	S001-01	S001-02	S002-01	S002-02	S003-01	S003-02	S004-01	S004-02
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	Q	V	Q	V	V	Q	V	Q
PHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
BIS(2-CHLOROETHYL)ETHER	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2-CHLOROPHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
1,3-DICHLOROBENZENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
1,4-DICHLOROBENZENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
BENZYL ALCOHOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
1,2-DICHLOROBENZENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2-METHYLPHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
BIS(2-CHLOROISOPROPYL)ETHER	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
4-METHYLPHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
N-NITROSODIPROPYLAMINE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
HEXACHLOROETHANE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
NITROBENZENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
ISOPHORONE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2-NITROPHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2,4-DIMETHYLPHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
BENZOIC ACID	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
BIS(2-CHLOROETHOXY)METHANE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2,4-DICHLOROPHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
1,2,4-TRICHLOROBENZENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
NAPHTHALENE	1020 U	460 U	2400 U	920 U	17000 U	3700 J	15000 U	24000 J
4-CHLOROANILINE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
HEXACHLOROBUTADIENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
P-CHLORO-M-CRESOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2-METHYLNAPHTHALENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
HEXACHLOROCYCLOPENTADIENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2,4,6-TRICHLOROPHENOL	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2,4,5-TRICHLOROPHENOL	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
2-CHLORONAPHTHALENE	1002 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2-NITROANILINE	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
DIMETHYL PHTHALATE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
ACENAPHTHYLENE	1020 U	460 U	2400 J	920 U	17000 U	3700 J	15000 U	24000 J
3-NITROANILINE	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
ACENAPHTHENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 J
2,4-DINITROPHENOL	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
4-NITROPHENOL	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
DIBENZOFURAN	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2,4-DINITROTOLUENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
2,6-DINITROTOLUENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
DIETHYL PHTHALATE	1020 J	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
4-CHLOROPHENYL PHENYL ETHER	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
FLUORENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 J
4-NITROANILINE	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
4,6-DINITRO-2-METHYLPHENOL	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
N-NITROSODIPHENYLAMINE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
4-BROMOPHENYL PHENYL ETHER	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
HEXACHLOROBENZENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
PENTACHLOROPHENOL	5100 U	2300 U	12000 U	4600 U	85000 U	18500 U	75000 U	120000 U
PHENANTHRENE	1020 U	460 U	2400 J	920 U	17000 U	3700 J	15000 U	24000 J
ANTHRACENE	1020 J	460 U	2400 J	920 U	17000 U	3700 J	15000 U	24000 J
DI-N-BUTYL PHTHALATE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
FLUORANTHENE	1020 J	460 J	2400 J	920 J	17000 J	5400	15000 J	32000
PYRENE	1000	460 J	2400 J	920 J	17000 J	9100	15000 J	44000
BUTYL BENZYL PHTHALATE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
3,3'-DICHLOROBENZIDINE	2040 U	920 U	4800 U	1840 U	34000 U	7400 U	30000 U	48000 U
BENZO(A)ANTHRACENE	1020 J	460 U	2400 U	920 J	17000 U	5600	15000 J	24000 J
BIS(2-ETHYLHEXYL)PHTHALATE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
CHRYSENE	1020 J	460 U	2400 U	920 J	17000 J	10000	15000 J	24000 J
DI-N-OCTYL PHTHALATE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 U
BENZO(B)FLUORANTHENE	1300	460 J	3000	920 J	17000 J(Q)	20000	15000 J	59000
BENZO(K)FLUORANTHENE	1020 U	460 U	2400 U	920 U	17000 U(Q)	3700 U	15000 U	24000 U
BENZO(A)PYRENE	1020 U	460 U	2400 U	920 J	17000 U	9600	15000 U	30000
INDENO(1,2,3-CD)PYRENE	1020 U	460 U	2400 J	920 J	17000 U	11000	15000 J	30000
DIBENZO(AH)ANTHRACENE	1020 U	460 U	2400 U	920 U	17000 U	3700 U	15000 U	24000 J
BENZO(GHI)PERYLENE	1020 U	460 U	2400 J	920 J	17000 U	11000	15000 J	41000

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified.

007414

SOUTH CAVALCADE SITE - SEDIMENT ANALYTICAL RESULTS

Sample Number	S005-01	S005-02A	S010-01	S011-01
SEMIVOLATILE ORGANICS (ug/kg)				
Validation Status :	V	V	V	V
PHENOL	25000 U	2500 U	940 U	2500 U
BIS(2-CHLOROETHYL)ETHER	25000 U	2500 U	940 U	2500 U
2-CHLOROPHENOL	25000 U	2500 U	940 U	2500 U
1,3-DICHLOROBENZENE	25000 U	2500 U	940 U	2500 U
1,4-DICHLOROBENZENE	25000 U	2500 U	940 U	2500 U
BENZYL ALCOHOL	25000 U	2500 U	940 U	2500 U
1,2-DICHLOROBENZENE	25000 U	2500 U	940 U	2500 U
2-METHYLPHENOL	25000 U	2500 U	940 U	2500 U
BIS(2-CHLOROISOPROPYL)ETHER	25000 U	2500 U	940 U	2500 U
4-METHYLPHENOL	25000 U	2500 U	940 U	2500 U
N-NITROSODIPROPYLAMINE	25000 U	2500 U	940 U	2500 U
HEXACHLOROETHANE	25000 U	2500 U	940 U	2500 U
NITROBENZENE	25000 U	2500 U	940 U	2500 U
ISOPHORONE	25000 U	2500 U	940 U	2500 U
2-NITROPHENOL	25000 U	2500 U	940 U	2500 U
2,4-DIMETHYLPHENOL	25000 U	2500 U	940 U	2500 U
BENZOIC ACID	125000 U	12500 U	4700 U	12500 U
BIS(2-CHLOROETHOXY)METHANE	25000 U	2500 U	940 U	2500 U
2,4-DICHLOROPHENOL	25000 U	2500 U	940 U	2500 U
1,2,4-TRICHLOROBENZENE	25000 U	2500 U	940 U	2500 U
NAPHTHALENE	25000 U	2500 U	940 U	2500 U
4-CHLOROANILINE	25000 U	2500 U	940 U	2500 U
HEXACHLOROBUTADIENE	25000 U	2500 U	940 U	2500 U
P-CHLORO-M-CRESOL	25000 U	2500 U	940 U	2500 U
2-METHYLNAPHTHALENE	25000 U	2500 U	940 U	2500 U
HEXACHLOROCYCLOPENTADIENE	25000 U	2500 U	940 U	2500 U
2,4,6-TRICHLOROPHENOL	25000 U	2500 U	940 U	2500 U
2,4,5-TRICHLOROPHENOL	125000 U	12500 U	4700 U	12500 U
2-CHLORONAPHTHALENE	25000 U	2500 U	940 U	2500 U
2-NITROANILINE	125000 U	12500 U	4700 U	12500 U
DIMETHYL PHTHALATE	25000 U	2500 U	940 U	2500 U
ACENAPHTHYLENE	25000 U	2500 U	940 U	2500 J
3-NITROANILINE	125000 U	12500 U	4700 U	12500 U
ACENAPHTHENE	25000 U	2500 U	940 U	2500 U
2,4-DINITROPHENOL	125000 U	12500 U	4700 U	12500 U
4-NITROPHENOL	125000 U	12500 U	4700 U	12500 U
DIBENZOFURAN	25000 U	2500 U	940 U	2500 U
2,4-DINITROTOLUENE	25000 U	2500 U	940 U	2500 U
2,6-DINITROTOLUENE	25000 U	2500 U	940 U	2500 U
DIETHYL PHTHALATE	25000 U	2500 U	940 U	2500 U
4-CHLOROPHENYL PHENYL ETHER	25000 U	2500 U	940 U	2500 U
FLUORENE	25000 U	2500 U	940 U	2500 U
4-NITROANILINE	125000 U	12500 U	4700 U	12500 U
4,6-DINITRO-2-METHYLPHENOL	125000 U	12500 U	4700 U	12500 U
N-NITROSODIPHENYLAMINE	25000 U	2500 U	940 U	2500 U
4-BROMOPHENYL PHENYL ETHER	25000 U	2500 U	940 U	2500 U
HEXACHLOROBENZENE	25000 U	2500 U	940 U	2500 U
PENTACHLOROPHENOL	125000 U	12500 U	4700 U	12500 U
PHENANTHRENE	25000 U	2500 U	940 U	2500 J
ANTHRACENE	25000 U	2500 U	940 U	2500 J
DI-N-BUTYL PHTHALATE	25000 U	2500 U	940 U	2500 U
FLUORANTHENE	25000 U	2500 U	940 J	2500 J
PYRENE	25000 U	2500 U	940 J	2700
BUTYL BENZYL PHTHALATE	25000 U	2500 U	940 U	2500 U
3,3'-DICHLOROBENZIDINE	50000 U	5000 U	1880 U	5000 U
BENZO(A)ANTHRACENE	25000 U	2500 U	940 U	2500 J
BIS(2-ETHYLHEXYL)PHTHALATE	25000 U	2500 U	940 U	120000
CHRYSENE	25000 U	2500 U	940 J	2500 J
DI-N-OCTYL PHTHALATE	25000 U	2500 U	940 U	2500 U
BENZO(B)FLUORANTHENE	25000 U	2500 U	940 J	5000
BENZO(K)FLUORANTHENE	25000 U	2500 U	940 U	2500 U
BENZO(A)PYRENE	25000 U	2500 U	940 J	2500 J
INDENO(1,2,3-CD)PYRENE	25000 U	2500 U	940 J	2500 J
DIBENZO(AH)ANTHRACENE	25000 U	2500 U	940 U	2500 J
BENZO(GHI)PERYLENE	25000 U	2500 U	940 J	2500 J

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified.

007415

SOUTH CAVALCADE SITE - SEDIMENT ANALYTICAL RESULTS

Sample Number	SD01-01	SD01-02	SD02-01	SD02-02	SD03-01	SD03-02	SD04-01	SD04-02
VOLATILE ORGANICS (ug/kg)								
Validation Status :	V	NA	V	V	V	V	V	NA
CHLOROMETHANE	15 U		14 U	14 U	17 U	22 U	15 U	
BROMOMETHANE	15 U		14 U	14 U	17 U	22 U	15 U	
VINYL CHLORIDE	15 U		14 U	14 U	17 U	22 U	15 U	
CHLOROETHANE	15 U		14 U	14 U	17 U	22 U	15 U	
METHYLENE CHLORIDE	30		140	16	46	11 U	7 U	
ACETONE	15 U		25	64	17 U	22 U	10	
CARBON DISULFIDE	7 U		7 U	7 U	8 U	11 U	7 U	
1,1-DICHLOROETHENE	7 U		7 U	7 U	8 U	11 U	7 U	
1,1-DICHLOROETHANE	7 U		7 U	7 U	8 U	11 U	7 U	
TRANS-1,2-DICHLOROETHENE	7 U		7 U	7 U	8 U	11 U	7 U	
CHLOROFORM	7 U		7 U	7 U	8 U	11 U	7 U	
1,2-DICHLOROETHANE	7 U		7 U	7 U	8 U	11 U	7 U	
2-BUTANONE	15 U		14 U	14 U	17 U	22 U	15 U	
1,1,1-TRICHLOROETHANE	7 U		7 U	7 U	8 U	11 U	7 U	
CARBON TETRACHLORIDE	7 U		7 U	7 U	8 U	11 U	7 U	
VINYL ACETATE	15 U		14 U	14 U	17 U	22 U	15 U	
BROMODICHLOROMETHANE	7 U		7 U	7 U	8 U	11 U	7 U	
1,2-DICHLOROPROPANE	7 U		7 U	7 U	8 U	11 U	7 U	
TRANS-1,3-DICHLOROPROPENE	7 U		7 U	7 U	8 U	11 U	7 U	
TRICHLOROETHENE	7 U		7 U	7 U	8 U	11 U	7 U	
DIBROMOCHLOROMETHANE	7 U		7 U	7 U	8 U	11 U	7 U	
1,1,2-TRICHLOROETHANE	7 U		7 U	7 U	8 J	11 U	7 J	
BENZENE	7 U		7 U	7 U	8 U	11 U	7 U	
CIS-1,3-DICHLOROPROPENE	7 U		7 U	7 U	8 U	11 U	7 U	
2-CHLOROETHYLVINYL ETHER	15 U		14 U	14 U	17 U	22 U	15 U	
BROMOFORM	7 U		7 U	7 U	8 U	11 U	7 U	
2-HEXANONE	15 U		14 U	14 U	17 U	22 U	15 U	
4-METHYL-2-PENTANONE	15 U		14 U	14 U	17 U	22 U	15 U	
TETRACHLOROETHENE	7 U		7 U	7 U	8 U	11 U	7 U	
1,1,2,2-TETRACHLOROETHANE	7 U		7 U	7 U	8 U	11 U	7 U	
TOLUENE	7 U		7 U	7 U	8 U	11 U	7 U	
CHLOROBENZENE	7 U		7 U	7 U	8 U	11 U	7 U	
ETHYLBENZENE	7 U		7 U	7 U	8 U	11 U	7 U	
STYRENE	7 U		7 U	7 U	8 U	11 U	7 U	
TOTAL XYLENES	7 U		7 U	7 U	8 U	11 U	7 U	
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
SILVER	4 U	5 U	4 U	5 U	4 U	5 U	4 U	5 U
ARSENIC	8.0	6.8	19	22	34	30	25	6.2
BERYLLIUM	1 U	1.5 U	1 U	1.5 U	1 U	1.5 U	1 U	1.5 U
CADMIUM	2 U	2.5 U	3.0	2.5 U	4 U	2.5 U	2 U	2.5 U
CYANIDE	1 U	5 U	1 U	5 U	1 U	5 U	1 U	5 U
CHROMIUM	4 U	5 U	28	11	72	52	10	14
COPPER	5 U	0.05 U	14	18	73	51	76	73
IRON	4400	NA	5500	NA	8100	NA	8500	NA
MERCURY	0.1 U	0.05 U	0.1 U	0.05 U	0.29	0.05 U	1.23	0.05 U
NICKEL	10 U	14 U	10 U	14 U	10 U	19	10 U	18
LEAD	19	10	64	71	340	230	160	85
ANTIMONY	30 U	22 U	30 U	22 U	30 U	22 U	30 U	22 U
SELENIUM	4 U	2.5 U	4 U	2.5 U	4 U	2.5 U	4 U	2.5 U
THALLIUM	8 U	5 U	7 U	5 U	9	5 U	8 U	5 U
ZINC	70	58	170	97	1200	860	150	170

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified.

007416

SOUTH CAVALCADE SITE - SEDIMENT ANALYTICAL RESULTS

Sample Number	SD05-01	SD05-02A	SD10-01	SD11-01
VOLATILE ORGANICS (ug/kg)				
Validation Status :	V	NA	NA	NA
CHLOROMETHANE	25 U			
BROMOMETHANE	25 U			
VINYL CHLORIDE	25 U			
CHLOROETHANE	25 U			
METHYLENE CHLORIDE	25 U			
ACETONE	120			
CARBON DISULFIDE	12 U			
1,1-DICHLOROETHENE	12 U			
1,1-DICHLOROETHANE	12 U			
TRANS-1,2-DICHLOROETHENE	12 U			
CHLOROFORM	12 U			
1,2-DICHLOROETHANE	12 U			
2-BUTANONE	25 U			
1,1,1-TRICHLOROETHANE	12 U			
CARBON TETRACHLORIDE	12 U			
VINYL ACETATE	25 U			
BROMODICHLOROMETHANE	12 U			
1,2-DICHLOROPROPANE	12 U			
TRANS-1,3-DICHLOROPROPENE	12 U			
TRICHLOROETHENE	12 U			
DIBROMOCHLOROMETHANE	12 U			
1,1,2-TRICHLOROETHANE	12 J			
BENZENE	12 U			
CIS-1,3-DICHLOROPROPENE	12 U			
2-CHLOROETHYLVINYL ETHER	25 U			
BROMOFORM	12 U			
2-HEXANONE	25 U			
4-METHYL-2-PENTANONE	25 U			
TETRACHLOROETHENE	12 U			
1,1,2,2-TETRACHLOROETHANE	12 U			
TOLUENE	12 U			
CHLOROBENZENE	12 U			
ETHYLBENZENE	12 U			
STYRENE	12 U			
TOTAL XYLENES	12 U			
INORGANICS (mg/kg)				
Validation Status :	V	V	V	V
SILVER	4 U	5 U	5 U	5 U
ARSENIC	5 U	5 U	13	26
BERYLLIUM	1 U	1.5 U	1.5 U	1.5 U
CADMIUM	4.5	2.5 U	2.5 U	2.5 U
CYANIDE	1 U	5 U	10 U	5 U
CHROMIUM	18	12	19	14
COPPER	32	40	18	89
IRON	9300	NA	NA	NA
MERCURY	1.25	0.05 U	0.05 U	0.03 U
NICKEL	10 U	15	14 U	18
LEAD	540	250	83	76
ANTIMONY	30 U	22 U	22 U	22 U
SELENIUM	6 U	2.5 U	2.5 U	2.5 U
THALLIUM	12 U	5 U	5 U	5 U
ZINC	630	480	150	200

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified.

007417

APPENDIX P – SOIL BORING ANALYTICAL TEST RESULTS

007418

007418

SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A01-SB03-21	A01-SB03-25	A01-SB04-22	A01-SB06-18	A01-SB06-24	A01-SB07-06	A01-SB09-06	A01-SB09-07
Depth (ft)	46	54	47	47.5	59.5	12	11.5	24
Unit Number	2	3	2	2	3	1	1	2
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	V	V	V	V	V	V	V	V
PHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BIS(2-CHLOROETHYL)ETHER	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
2-CHLOROPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
1,3-DICHLOROBENZENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
1,4-DICHLOROBENZENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BENZYL ALCOHOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
1,2-DICHLOROBENZENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
2-METHYLPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BIS(2-CHLOROISOPROPYL)ETHER	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
4-METHYLPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
N-NITROSODIPROPYLAMINE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
HEXACHLOROETHANE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
NITROBENZENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
ISOPHORONE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
2-NITROPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
2,4-DIMETHYLPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BENZOIC ACID	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BIS(2-CHLOROETHOXY)METHANE	1950 U	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 J
2,4-DICHLOROPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
1,2,4-TRICHLOROBENZENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
NAPHTHALENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
4-CHLOROANILINE	1400	420 J	360 U	110000	410 U	400 U	410 J	3000
HEXACHLOROBUTADIENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
P-CHLORO-M-CRESOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
2-METHYLNAPHTHALENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
HEXACHLOROCYCLOPENTADIENE	840	420 U	360 U	100000	410 U	400 U	410 U	820 U
2,4,6-TRICHLOROPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 J	820 J
2,4,5-TRICHLOROPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
2-CHLORONAPHTHALENE	1950 U	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
2-NITROANILINE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
DIMETHYL PHTHALATE	1950 U	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
ACENAPHTHYLENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
3-NITROANILINE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
ACENAPHTHENE	1950 J	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
2,4-DINITROPHENOL	2100	420 U	360 U	23000 U	410 U	400 U	410 J	820 J
4-NITROPHENOL	1950 U	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
DIBENZOFURAN	1950 U	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
2,4-DINITROTOLUENE	1800	420 U	360 U	94000	410 U	400 U	410 J	1500
2,6-DINITROTOLUENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
DIETHYL PHTHALATE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
4-CHLOROPHENYL PHENYL ETHER	390 U	420 U	360 U	23000 U	410 J	670	410 U	820 U
FLUORENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
4-NITROANILINE	2000	420 U	360 U	23000 U	410 U	400 U	410 J	820 J
4,6-DINITRO-2-METHYLPHENOL	1950 U	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
N-NITROSODIPHENYLAMINE	1950 J	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
4-BROMOPHENYL PHENYL ETHER	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
HEXACHLOROBENZENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
PENTACHLOROPHENOL	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
PHENANTHRENE	1950 U	2100 U	1800 U	115000 U	2050 U	2000 U	2050 U	4100 U
ANTHRACENE	8400	420 J	380	310000	410 J	400 U	410 U	310000
DI-N-BUTYL PHTHALATE	8100	420 J	360 J	49000	410 U	400 U	410 J	22000
FLUORANTHENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	1600
PYRENE	3800	420 J	360 J	140000	410 U	400 U	410 U	110000
BUTYL BENZYL PHTHALATE	3200	420 J	360 J	99000	410 U	400 U	410 U	2500
3,3'-DICHLOROBENZIDINE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BENZO(A)ANTHRACENE	780 U	840 U	720 U	46000 U	820 U	800 U	820 U	1640 U
BIS(2-ETHYLHEXYL)PHTHALATE	720	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
CHRYSENE	390 J	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
DI-N-OCTYL PHTHALATE	770	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BENZO(B)FLUORANTHENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BENZO(K)FLUORANTHENE	600 (Q)	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BENZO(A)PYRENE	390 U(Q)	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
INDENO(1,2,3-CD)PYRENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
DIBENZO(AH)ANTHRACENE	390 J	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
BENZO(GHI)PERYLENE	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
	390 U	420 U	360 U	23000 U	410 U	400 U	410 U	820 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	5.9 U	18.3	5.9 U	5.8 U	15.3	6.0 U	6.1 U	4.7 U
CYANIDE	1.8 U	1.9 U	1.8 U	1.7 U	1.8 U	1.8 U	1.85 U	1.8 U
CHROMIUM	5.3 U	28.2	5 U	9.2	19.8	5.4 U	5.5 U	16.0
COPPER	4.1 U	7.53	4.1 U	4 U	4.3 U	4.2 U	4.3 U	5.55
IRON	1710	36300	1240	2090	28100	1660	43300	6290
LEAD	3 U	12.9	3.2 U	2.9 U	11.61	3.0 U	3.1 U	8.50
ZINC	4.7 U	60.2	4.7 U	4.6 U	48.8	4.8 U	4.9 U	51.2

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A01-SB09-20	A01-SB09-24	A01-SB10-07	A01-SB11-16	A01-SB12-06	A01-SB12-21	A01-SB13-08	A02-SB03-09
Depth (ft)	51.5	59.5	23	40.5	11	52	27	23.5
Unit Number	2	3	2	2	1	3	2	2
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	Q	V	Q	V	V	V	V	V
PHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
BIS(2-CHLOROETHYL)ETHER	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2-CHLOROPHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
1,3-DICHLOROBENZENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
1,4-DICHLOROBENZENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
BENZYL ALCOHOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
1,2-DICHLOROBENZENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2-METHYLPHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
BIS(2-CHLOROISOPROPYL)ETHER	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
4-METHYLPHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
N-NITROSODIPROPYLAMINE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
HEXACHLOROETHANE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
NITROBENZENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
ISOPHORONE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2-NITROPHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2,4-DIMETHYLPHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
BENZOIC ACID	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
BIS(2-CHLOROETHOXY)METHANE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2,4-DICHLOROPHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
1,2,4-TRICHLOROBENZENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
NAPHTHALENE	12000 J	410 J	430 U	390 U	410 U	410 U	400 U	9600
4-CHLOROANILINE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
HEXACHLOROBUTADIENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
P-CHLORO-M-CRESOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2-METHYLNAPHTHALENE	12000 J	410 U	430 U	390 U	410 U	410 U	400 U	26000
HEXACHLOROCYCLOPENTADIENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2,4,6-TRICHLOROPHENOL	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2,4,5-TRICHLOROPHENOL	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
2-CHLORONAPHTHALENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2-NITROANILINE	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
DIMETHYL PHTHALATE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
ACENAPHTHYLENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
3-NITROANILINE	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
ACENAPHTHENE	12000 J	410 U	430 U	390 U	410 U	410 U	400 U	25000
2,4-DINITROPHENOL	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
4-NITROPHENOL	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
DIBENZOFURAN	12000 J	410 U	430 U	390 U	410 U	410 U	400 U	19000
2,4-DINITROTOLUENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
2,6-DINITROTOLUENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
DIETHYL PHTHALATE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
4-CHLOROPHENYL PHENYL ETHER	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
FLUORENE	12000 J	410 U	430 U	390 U	410 U	410 U	400 U	21000
4-NITROANILINE	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
4,6-DINITRO-2-METHYLPHENOL	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
N-NITROSODIPHENYLAMINE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
4-BROMOPHENYL PHENYL ETHER	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
HEXACHLOROBENZENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
PENTACHLOROPHENOL	60000 U	2050 U	2150 U	1950 U	2050 U	2050 U	2000 U	60000 U
PHENANTHRENE	12000 J	410 J	430 U	390 U	410 U	410 U	400 U	83000
ANTHRACENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
DI-N-BUTYL PHTHALATE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
FLUORANTHENE	12000 J	410 J	430 U	390 U	410 U	410 U	400 U	30000
PYRENE	12000 J	410 J	430 U	390 U	410 U	410 U	400 U	40000
BUTYL BENZYL PHTHALATE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
3,3'-DICHLOROBENZIDINE	24000 U	820 U	860 U	780 U	820 U	820 U	800 U	24000 U
BENZO(A)ANTHRACENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 J
BIS(2-ETHYLHEXYL)PHTHALATE	12000 U	410 J	6200	550	410 U	410 U	400 U	12000 U
CHRYSENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 J
DI-N-OCTYL PHTHALATE	12000 U	410 J	430 U	390 U	410 U	410 U	400 U	12000 U
BENZO(B)FLUORANTHENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 J
BENZO(K)FLUORANTHENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
BENZO(A)PYRENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
INDENO(1,2,3-CD)PYRENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
DIBENZO(AH)ANTHRACENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
BENZO(GHI)PERYLENE	12000 U	410 U	430 U	390 U	410 U	410 U	400 U	12000 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	5.6 U	6.1 U	6.5 U	5.6 U	5 U	5	10.9	5.9 U
CYANIDE	1.69 U	1.84 U	1.9 U	1.69 U	1 U	1 U	6 U	1.8 U
CHROMIUM	5.1 U	23.1	21.3	5.1 U	4 U	7	17.4	5.4 U
COPPER	4 U	4.3 U	6.46	4 U	5 U	5	8.38	4.2 U
IRON	2160	27300	5290	2650	2600	4900	20000	8680
LEAD	5.25	9.15	12.3	3.66	4.4	3.6	2.52	8.6
ZINC	6.21	46.9	56.2	4.9 U	4 U	12	40.1	12.5

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007420

SOUTH CHARLEROI SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A02-SB03-21	A03-SB01-11	A03-SB02-09	A03-SB03-18	A03-SB05-06	A03-SB05-22	A03-SB05-24	A03-SB07-13
Depth (ft)	52.5	27.5	26	41	13	56.5	60	48
Unit Number	2	2	2	2	1	2	3	2
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	V	V	V	V	V	V	V	V
PHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
BIS(2-CHLOROETHYL)ETHER	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2-CHLOROPHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
1,3-DICHLOROBENZENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
1,4-DICHLOROBENZENE	12000 U	420 U	12000 U	340 U	400 J	430 U	390 U	420 U
BENZYL ALCOHOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
1,2-DICHLOROBENZENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2-METHYLPHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
BIS(2-CHLOROISOPROPYL)ETHER	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
4-METHYLPHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
N-NITROSODIPROPYLAMINE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
HEXACHLOROETHANE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
NITROBENZENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
ISOPHORONE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2-NITROPHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2,4-DIMETHYLPHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
BENZOIC ACID	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
BIS(2-CHLOROETHOXY)METHANE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2,4-DICHLOROPHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
1,2,4-TRICHLOROBENZENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
NAPHTHALENE	12000 J	2800	21000	340 U	400 U	430 J	390 U	420 U
4-CHLOROANILINE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
HEXACHLOROBUTADIENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
P-CHLORO-M-CRESOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2-METHYLNAPHTHALENE	12000 J	900	12000 J	340 U	400 U	430 U	390 U	420 U
HEXACHLOROCYCLOPENTADIENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2,4,6-TRICHLOROPHENOL	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2,4,5-TRICHLOROPHENOL	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
2-CHLORONAPHTHALENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2-NITROANILINE	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
DIMETHYL PHTHALATE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
ACENAPHTHYLENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
3-NITROANILINE	60000 U	2100 J	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
ACENAPHTHENE	12000 J	820	12000 J	340 U	400 U	430 J	390 U	420 U
2,4-DINITROPHENOL	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
4-NITROPHENOL	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
DIBENZOFURAN	12000 J	1000	12000 J	340 U	400 U	430 J	390 U	420 U
2,4-DINITROTOLUENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
2,6-DINITROTOLUENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
DIETHYL PHTHALATE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
4-CHLOROPHENYL PHENYL ETHER	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
FLUORENE	12000 J	840	12000 J	340 U	400 U	430 J	390 U	420 U
4-NITROANILINE	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
4,6-DINITRO-2-METHYLPHENOL	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
N-NITROSODIPHENYLAMINE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
4-BROMOPHENYL PHENYL ETHER	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
HEXACHLOROBENZENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
PENTACHLOROPHENOL	60000 U	2100 U	60000 U	1700 U	2000 U	2150 U	1950 U	2100 U
PHENANTHRENE	33000	4500	17000	340 U	400 U	650	390 U	420 U
ANTHRACENE	12000 U	4400	12000 J	340 U	400 U	430 U	390 U	420 U
DI-N-BUTYL PHTHALATE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 J	420 U
FLUORANTHENE	12000 J	2300	12000 J	340 U	400 U	430 J	390 U	420 U
PYRENE	12000 J	1800	12000 J	340 U	400 U	430 J	390 U	420 U
BUTYL BENZYL PHTHALATE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
3,3'-DICHLOROBENZIDINE	24000 U	840 U	24000 U	680 U	800 U	860 U	780 U	840 U
BENZO(A)ANTHRACENE	12000 J	1000	12000 U	340 U	400 U	430 J	390 U	420 U
BIS(2-ETHYLHEXYL)PHTHALATE	12000 U	420 J	12000 U	340 J	400 U	430 J	2500	420 U
CHRYSENE	12000 J	1100	12000 U	340 U	400 U	430 J	390 U	420 U
DI-N-OCTYL PHTHALATE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
BENZO(B)FLUORANTHENE	12000 J	440	12000 U	340 U	400 U	430 U	390 U	420 U
BENZO(K)FLUORANTHENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
BENZO(A)PYRENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
INDENO(1,2,3-CD)PYRENE	12000 U	420 J	12000 U	340 U	400 U	430 U	390 U	420 U
DIBENZO(A,H)ANTHRACENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
BENZO(GHI)PERYLENE	12000 U	420 U	12000 U	340 U	400 U	430 U	390 U	420 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	5.8 U	16	10.2	5.6 U	5 U	5 U	14	5 U
CYANIDE	1.7 U	1.8 U	1.8 U	1.7 U	5 U	5 U	5 U	1 U
CHROMIUM	5.2 U	18.2	8.01	5.1 U	4 U	4 U	12	4 U
COPPER	4.1 U	9.11	4.1 U	3.9 U	5 U	5 U	5 U	5 U
IRON	4400	36400	13700	4230	2400	4500	16000	3900
LEAD	2.9 U	22.9	8.3	8.6	2.5	2.6	8.4	2.6
ZINC	9.3	50.4	18.0	4.5 U	4 U	9	28	4 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A03-SB07-23	A04-SB01-06	A04-SB03-27	A04-SB05-21	A05-SB01-19	A06-SB01-13	A06-SB03-13	A06-SB04-07
Depth (ft)	58	10.5	61	54	50.5	45.5	51.5	25
Unit Number	3	1	3	3	2	2	2	2
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	V	V	V	V	V	Q	V	V
PHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
BIS(2-CHLOROETHYL)ETHER	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2-CHLOROPHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
1,3-DICHLOROBENZENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
1,4-DICHLOROBENZENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
BENZYL ALCOHOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
1,2-DICHLOROBENZENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2-METHYLPHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
BIS(2-CHLOROISOPROPYL)ETHER	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
4-METHYLPHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
N-NITROSODIPROPYLAMINE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
HEXACHLOROETHANE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
NITROBENZENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
ISOPHORONE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2-NITROPHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2,4-DIMETHYLPHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
BENZOIC ACID	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
BIS(2-CHLOROETHOXY)METHANE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2,4-DICHLOROPHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
1,2,4-TRICHLOROBENZENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
NAPHTHALENE	410 U	720000	410 U	410 U	400 J	2200	4000	400 J
4-CHLOROANILINE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
HEXACHLOROBUTADIENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
P-CHLORO-M-CRESOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2-METHYLNAPHTHALENE	410 U	180000	410 U	410 U	400 J	780 J	1500 U	400 U
HEXACHLOROCYCLOPENTADIENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2,4,6-TRICHLOROPHENOL	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2,4,5-TRICHLOROPHENOL	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
2-CHLORONAPHTHALENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2-NITROANILINE	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
DIMETHYL PHTHALATE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
ACENAPHTHYLENE	410 U	12000 J	410 U	410 U	400 U	780 U	1500 U	400 U
3-NITROANILINE	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
ACENAPHTHENE	410 U	12000 U	410 U	410 U	400 J	1300	2500	400 J
2,4-DINITROPHENOL	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
4-NITROPHENOL	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
DIBENZOFURAN	410 U	190000	410 U	410 U	400 J	1000	2100	400 J
2,4-DINITROTOLUENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
2,6-DINITROTOLUENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
DIETHYL PHTHALATE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
4-CHLOROPHENYL PHENYL ETHER	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
FLUORENE	410 U	12000 U	410 U	410 U	640	1400	2100	400 J
4-NITROANILINE	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
4,6-DINITRO-2-METHYLPHENOL	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
N-NITROSODIPHENYLAMINE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
4-BROMOPHENYL PHENYL ETHER	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
HEXACHLOROBENZENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
PENTACHLOROPHENOL	2050 U	60000 U	2050 U	2050 U	2000 U	3900 U	7500 U	2000 U
PHENANTHRENE	410 U	980000	410 J	410 U	2700	10000	11000	400 J
ANTHRACENE	410 U	12000 U	410 U	410 U	400 U	1100	1500 U	400 J
DI-N-BUTYL PHTHALATE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
FLUORANTHENE	410 U	370000	410 U	410 U	1300	5600	4300	400 J
PYRENE	410 U	270000	410 U	410 U	1300	3600	4400	400 J
BUTYL BENZYL PHTHALATE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
3,3'-DICHLOROBENZIDINE	820 U	24000 U	820 U	820 U	800 U	1560 U	3000 U	800 U
BENZO(A)ANTHRACENE	410 U	65000	410 U	410 U	400 J	1100	1500 J	400 J
BIS(2-ETHYLHEXYL)PHTHALATE	480	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
CHRYSENE	410 U	56000	410 U	410 U	400 J	1200	1500 J	400 J
DI-N-OCTYL PHTHALATE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
BENZO(B)FLUORANTHENE	410 U	42000	410 U	410 U	400 J	780 U	1500 J	400 U
BENZO(K)FLUORANTHENE	410 U	12000 U	410 U	410 U	400 U	1300	1500 U	400 U
BENZO(A)PYRENE	410 U	12000 U	410 U	410 U	400 J	780 U	1500 J	400 U
INDENO(1,2,3-CD)PYRENE	410 U	12000 J	410 U	410 U	400 J	780 U	1500 J	400 U
DIBENZO(AH)ANTHRACENE	410 U	12000 U	410 U	410 U	400 U	780 U	1500 U	400 U
BENZO(GHI)PERYLENE	410 U	12000 J	410 U	410 U	400 U	780 U	1500 U	400 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	5.8	5.8 U	6 U	20	5.2	5.2	7.2	5 U
CYANIDE	1 U	1.7 U	1.8 U	1.8 U	1.5 U	1.5 U	1.5 U	5 U
CHROMIUM	5	5.2 U	5.5 U	37	10	14	15	4.5 B(D)
COPPER	5 U	4.1 U	4.3 U	4.3 U	4 U	7	9	5 U
IRON	10000	6090	11900	45800	11000	20000	14000	7130
LEAD	4.8	2.9 U	3 U	20	5.4	8.6	8.2	34
ZINC	15	4.6 U	12.2	75	4 U	4 U	4 U	15

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007422

SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A06-SB04-12	A06-SB04-16	A06-SB05-14	A06-SB05-17	A06-SB06-07	A06-SB06-31	A07-SB01-02
Depth (ft)	51	60.5	53.5	59	13.5	67.5	4
Unit Number	2	3	3	3	1	3	1
SEMIVOLATILE ORGANICS (ug/kg)							
Validation Status :	V	V	V	V	V	V	Q
PHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
BIS(2-CHLOROETHYL)ETHER	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2-CHLOROPHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
1,3-DICHLOROBENZENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
1,4-DICHLOROBENZENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
BENZYL ALCOHOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
1,2-DICHLOROBENZENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2-METHYLPHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
BIS(2-CHLOROISOPROPYL)ETHER	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
4-METHYLPHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
N-NITROSODIPROPYLAMINE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
HEXACHLOROETHANE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
NITROBENZENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
ISOPHORONE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2-NITROPHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2,4-DIMETHYLPHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
BENZOIC ACID	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
BIS(2-CHLOROETHOXY)METHANE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2,4-DICHLOROPHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
1,2,4-TRICHLOROBENZENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
NAPHTHALENE	410 J	420 U	390 U	430 U	400 U	440 U	470000
4-CHLOROANILINE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
HEXACHLOROBUTADIENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
P-CHLORO-M-CRESOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2-METHYLNAPHTHALENE	410 U	420 U	390 U	430 U	400 U	440 U	68000
HEXACHLOROCYCLOPENTADIENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2,4,6-TRICHLOROPHENOL	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2,4,5-TRICHLOROPHENOL	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
2-CHLORONAPHTHALENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2-NITROANILINE	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
DIMETHYL PHTHALATE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
ACENAPHTHYLENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 J
3-NITROANILINE	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
ACENAPHTHENE	460	420 J	390 U	430 U	400 U	440 U	75000
2,4-DINITROPHENOL	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
4-NITROPHENOL	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
DIBENZOFURAN	410 J	420 J	390 U	430 U	400 U	440 U	47000
2,4-DINITROTOLUENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
2,6-DINITROTOLUENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
DIETHYL PHTHALATE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
4-CHLOROPHENYL PHENYL ETHER	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
FLUORENE	430	420 J	390 U	430 U	400 U	440 U	72000
4-NITROANILINE	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
4,6-DINITRO-2-METHYLPHENOL	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
N-NITROSODIPHENYLAMINE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
4-BROMOPHENYL PHENYL ETHER	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
HEXACHLOROBENZENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
PENTACHLOROPHENOL	2050 U	2100 U	1950 U	2150 U	2000 U	2200 U	120000 U
PHENANTHRENE	2100	420 J	390 U	430 U	400 U	440 U	300000
ANTHRACENE	410 J	420 J	390 U	430 U	400 U	440 U	47000
DI-N-BUTYL PHTHALATE	410 J	420 U	390 U	430 J	400 U	440 U	24000 U
FLUORANTHENE	1100	420 J	390 U	430 U	400 U	440 U	99000
PYRENE	800	420 J	390 U	430 U	400 U	440 U	98000
BUTYL BENZYL PHTHALATE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
3,3'-DICHLOROBENZIDINE	820 U	840 U	780 U	860 U	800 U	880 U	48000 U
BENZO(A)ANTHRACENE	410 J	420 J	390 U	430 U	400 U	440 U	29000
BIS(2-ETHYLHEXYL)PHTHALATE	410 J	420 U	390 U	820	400 U	440 U	24000 U
CHRYSENE	410 J	420 J	390 U	430 U	400 U	440 U	38000
DI-N-OCTYL PHTHALATE	410 U	420 U	390 U	430 J	400 U	440 U	24000 U
BENZO(B)FLUORANTHENE	410 J	420 U	390 U	430 U	400 U	440 U	24000 U
BENZO(K)FLUORANTHENE	410 U	420 U	390 U	430 U	400 U	440 U	43000
BENZO(A)PYRENE	410 J	420 U	390 U	430 U	400 U	440 U	24000 U
INDENO(1,2,3-CD)PYRENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
DIBENZO(AH)ANTHRACENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
BENZO(GHI)PERYLENE	410 U	420 U	390 U	430 U	400 U	440 U	24000 U
INORGANICS (mg/kg)							
Validation Status :	V	V	V	V	V	V	V
ARSENIC	5 U	9.1	5 U	5 U	6 U(Q)	24.6 (Q)	5 U
CYANIDE	5 U	5 U	5 U	5 U	0.6 U(Q)	0.66 U(Q)	1.5 U
CHROMIUM	7.5 (Q)	25 (Q)	9 (Q)	4.5 U(Q)	1.3	15.3	5
COPPER	5 U	7.5	5 U	5 U	2.6	20	4 U
IRON	6780	18400	7050	4680	934	16700	3800
LEAD	5.1	12	6.2	4.6	4.7	20.7	5 U
ZINC	16	40	21	13	1.7	62.8	4 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007423

SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A08-SB01-25	A08-SB02-06	A08-SB02-17	A08-SB02-27	A08-SB03-27	A09-SB03-06	A09-SB09-24	A10-SB01-02
Depth (ft)	65.5	13	42.5	62	55	13.5	64	3.5
Unit Number	3	1	2	3	3	1	3	1
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	U	V	V	V	V	V	V	V
PHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
BIS(2-CHLOROETHYL)ETHER	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2-CHLOROPHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
1,3-DICHLOROBENZENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
1,4-DICHLOROBENZENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
BENZYL ALCOHOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
1,2-DICHLOROBENZENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2-METHYLPHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
BIS(2-CHLOROISOPROPYL)ETHER	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
4-METHYLPHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
N-NITROSODIPROPYLAMINE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
HEXACHLOROETHANE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
NITROBENZENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
ISOPHORONE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2-NITROPHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2,4-DIMETHYLPHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
BENZOIC ACID	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
BIS(2-CHLOROETHOXY)METHANE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2,4-DICHLOROPHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
1,2,4-TRICHLOROBENZENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
NAPHTHALENE	390 U	420 U	400 U	410 U	400 U	20000	410 J	11600 U
4-CHLOROANILINE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
HEXACHLOROBUTADIENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
P-CHLORO-M-CRESOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2-METHYLNAPHTHALENE	390 U	420 U	400 U	410 U	400 U	11000 J	410 U	11600 U
HEXACHLOROCYCLOPENTADIENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2,4,6-TRICHLOROPHENOL	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2,4,5-TRICHLOROPHENOL	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
2-CHLORONAPHTHALENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2-NITROANILINE	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
DIMETHYL PHTHALATE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
ACENAPHTHYLENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
3-NITROANILINE	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
ACENAPHTHENE	390 U	420 U	400 U	410 J	400 U	16000	410 U	11600 U
2,4-DINITROPHENOL	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
4-NITROPHENOL	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
DIBENZOFURAN	390 U	420 U	400 U	410 J	400 U	11000 J	410 U	11600 U
2,4-DINITROTOLUENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
2,6-DINITROTOLUENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
DIETHYL PHTHALATE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
4-CHLOROPHENYL PHENYL ETHER	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
FLUORENE	390 U	420 U	400 U	580	400 U	11000	410 U	11600 U
4-NITROANILINE	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
4,6-DINITRO-2-METHYLPHENOL	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
N-NITROSODIPHENYLAMINE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
4-BROMOPHENYL PHENYL ETHER	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
HEXACHLOROBENZENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
PENTACHLOROPHENOL	1950 U	2100 U	2000 U	2050 U	2000 U	55000 U	2050 U	58000 U
PHENANTHRENE	390 U	420 U	400 U	3800	400 U	32000	410 J	11600 U
ANTHRACENE	390 U	420 U	400 U	410 J	400 U	11000 U	410 U	11600 U
DI-N-BUTYL PHTHALATE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
FLUORANTHENE	390 U	420 U	400 U	1400	400 U	14000	410 J	11600 U
PYRENE	390 U	420 U	400 U	1100	400 U	11000 J	410 J	11600 U
BUTYL BENZYL PHTHALATE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
3,3'-DICHLOROBENZIDINE	780 U	840 U	800 U	820 U	800 U	22000 U	820 U	23200 U
BENZO(A)ANTHRACENE	390 U	420 U	400 U	410 J	400 U	11000 U	410 U	11600 U
BIS(2-ETHYLHEXYL)PHTHALATE	390 U	420 U	400 U	410 U	1400	11000 U	410 U	11600 U
CHRYSENE	390 U	420 U	400 U	410 J	400 U	11000 U	410 U	11600 U
DI-N-OCTYL PHTHALATE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
BENZO(B)FLUORANTHENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U(Q)
BENZO(K)FLUORANTHENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U(Q)
BENZO(A)PYRENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
INDENO(1,2,3-CD)PYRENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
DIBENZO(AH)ANTHRACENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
BENZO(GHI)PERYLENE	390 U	420 U	400 U	410 U	400 U	11000 U	410 U	11600 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	7.2	5 U	7.6	7.8	5 U	5 U	5	8.8
CYANIDE	1.5 U	1 U	1 U	1 U	1 U	5 U	5 U	1.5 U
CHROMIUM	20	4.5 U	7	12	8	4 U	4 U	9.5
COPPER	5	5 U	5 U	5 U	5 U	5 U	5 U	3.5 U
IRON	20000	1800	11000	8700	10000	1700	4900	4970
LEAD	8.6	2.5 U	7.9	4.5	5.2	3.5	2.5 U	6.3
ZINC	4 U	4.5 U	29	20	17	4 U	4 U	276

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007424

SOUTH CHVHLCHDE SITE - SOIL BORING ANHLYTICAL RESULTS

Sample Number	A10-SB01-21	A10-SB03-08	A10-SB03-27	A10-SB04-08	A10-SB04-31	A11-SB01-30	A12-SB01-08	A12-SB02-07
Depth (ft)	50.5	15	67.5	16	61.5	62.5	15.5	15.5
Unit Number	3	1	3	1	3	3	1	1
SEMI-VOLATILE ORGANICS (ug/kg)								
Validation Status :	V	V	V	V	V	V	V	V
PHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
BIS(2-CHLOROETHYL)ETHER	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2-CHLOROPHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
1,3-DICHLOROBENZENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
1,4-DICHLOROBENZENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
BENZYL ALCOHOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
1,2-DICHLOROBENZENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2-METHYLPHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
BIS(2-CHLOROISOPROPYL)ETHER	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
4-METHYLPHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
N-NITROSODIPROPYLAMINE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
HEXACHLOROETHANE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
NITROBENZENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
ISOPHORONE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2-NITROPHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2,4-DIMETHYLPHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
BENZOIC ACID	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
BIS(2-CHLOROETHOXY)METHANE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2,4-DICHLOROPHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
1,2,4-TRICHLOROBENZENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
NAPHTHALENE	270000	420 U	430 U	420 U	430 U	410 J	1900000	410 U
4-CHLOROANILINE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
HEXACHLOROBUTADIENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
P-CHLORO-M-CRESOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2-METHYLNAPHTHALENE	110000	420 U	430 U	420 U	430 U	410 U	780000	410 U
HEXACHLOROCYCLOPENTADIENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2,4,6-TRICHLOROPHENOL	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2,4,5-TRICHLOROPHENOL	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
2-CHLORONAPHTHALENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2-NITROANILINE	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
DIMETHYL PHTHALATE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
ACENAPHTHYLENE	11500 J	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
3-NITROANILINE	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
ACENAPHTHENE	150000	420 U	430 U	420 U	430 U	410 U	570000	410 U
2,4-DINITROPHENOL	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
4-NITROPHENOL	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
DIBENZOFURAN	100000	420 U	430 U	420 U	430 U	410 J	340000	410 U
2,4-DINITROTOLUENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
2,6-DINITROTOLUENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
DIETHYL PHTHALATE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
4-CHLOROPHENYL PHENYL ETHER	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
FLUORENE	140000	420 U	430 U	420 U	430 U	410 J	440000	410 U
4-NITROANILINE	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
4,6-DINITRO-2-METHYLPHENOL	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
N-NITROSODIPHENYLAMINE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
4-BROMOPHENYL PHENYL ETHER	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
HEXACHLOROBENZENE	11500 U	420 U	430 U	420 U	430 U	410 J	12000 U	410 U
PENTACHLOROPHENOL	57500 U	2100 U	2150 U	2100 U	2150 U	2050 U	60000 U	2050 U
PHENANTHRENE	360000	420 U	430 U	420 U	430 U	410 J	940000	410 U
ANTHRACENE	84000	420 U	430 U	420 U	430 U	410 U	240000	410 U
DI-N-BUTYL PHTHALATE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
FLUORANTHENE	170000	420 U	430 U	420 U	430 U	410 U	420000	410 U
PYRENE	140000	420 U	430 U	420 U	430 U	410 U	280000	410 U
BUTYL BENZYL PHTHALATE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
3,3'-DICHLOROBENZIDINE	23000 U	840 U	860 U	840 U	860 U	820 U	24000 U	820 U
BENZO(A)ANTHRACENE	40000	420 U	430 U	420 U	430 U	410 U	93000	410 U
BIS(2-ETHYLHEXYL)PHTHALATE	11500 U	420 U	430 U	420 J	430 J	410 U	12000 U	410 U
CHRYSENE	31000	420 U	430 U	420 U	430 U	410 U	76000	410 U
DI-N-OCTYL PHTHALATE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
BENZO(B)FLUORANTHENE	17000	420 U	430 U	420 U	430 U	410 U	61000	410 U
BENZO(K)FLUORANTHENE	14000	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
BENZO(A)PYRENE	11500 J	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
INDENO(1,2,3-CD)PYRENE	11500 J	420 U	430 U	420 U	430 U	410 U	12000 J	410 U
DIBENZO(AH)ANTHRACENE	11500 U	420 U	430 U	420 U	430 U	410 U	12000 U	410 U
BENZO(GHI)PERYLENE	11500 J	420 U	430 U	420 U	430 U	410 U	12000 J	410 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	5 U	5 U	10	5 U	5 U	6.7	5 U	5 U
CYANIDE	1.5 U	1.5 U	1.5 U	1 U	1 U	1.8 U	1.5 U	1.5 U
CHROMIUM	11	4.5 U	16	7	9	9.5	4.5 U	7
COPPER	6	5 U	9	5 U	5 U	3.5 U	3.5 U	7
IRON	14700	4700	22000	5100	7500	5930	470	7200
LEAD	6.2	4.6	17	4.1	5	4.15	1.5 U	6.2
ZINC	28	5.5	48	13	16	13.5	11.5	14

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007425

SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A13-SB01-02	A13-SB01-10	A13-SB02-07	A14-SB01-27	A14-SB03-07	A14-SB05-22	A14-SB06-06	A14-SB08-05
Depth (ft)	3.5	23	13.5	64	14	45.5	11.5	11.5
Unit Number	1	2	1	3	1	2	1	1
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	Q	V	V	V	V	V	V	V
PHENOL	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
BIS(2-CHLOROETHYL)ETHER	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2-CHLOROPHENOL	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
1,3-DICHLOROBENZENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
1,4-DICHLOROBENZENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
BENZYL ALCOHOL	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
1,2-DICHLOROBENZENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2-METHYLPHENOL	62000 U	12000 J	25000 U	410 U	12000 U	390 U	400 U	390 U
BIS(2-CHLORGISOPROPYL)ETHER	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
4-METHYLPHENOL	62000 U	12000	25000 U	410 U	12000 U	390 U	400 U	390 U
N-NITROSODIPROPYLAMINE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
HEXACHLOROETHANE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
NITROBENZENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
ISOPHORONE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2-NITROPHENOL	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2,4-DIMETHYLPHENOL	62000 U	12000 J	25000 U	410 U	12000 U	390 U	400 U	390 U
BENZOIC ACID	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
BIS(2-CHLOROETHOXY)METHANE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2,4-DICHLOROPHENOL	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
1,2,4-TRICHLOROBENZENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
NAPHTHALENE	950000	110000	710000	410 J	84000	390 U	400 U	390 U
4-CHLOROANILINE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
HEXACHLOROBUTADIENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
P-CHLORO-M-CRESOL	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2-METHYLNAPHTHALENE	200000	18000	180000	410 J	14000	390 U	400 U	390 U
HEXACHLOROCYCLOPENTADIENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2,4,6-TRICHLOROPHENOL	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2,4,5-TRICHLOROPHENOL	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
2-CHLORONAPHTHALENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2-NITROANILINE	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
DIMETHYL PHTHALATE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
ACENAPHTHYLENE	62000 J	12000 J	25000 U	410 U	12000 U	390 U	400 U	390 U
3-NITROANILINE	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
ACENAPHTHENE	440000	27000	190000	410 J	12000 J	390 U	400 U	390 U
2,4-DINITROPHENOL	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
4-NITROPHENOL	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
DIBENZOFURAN	280000	17000	160000	410 J	13000	390 U	400 U	390 U
2,4-DINITROTOLUENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
2,6-DINITROTOLUENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
DIETHYL PHTHALATE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
4-CHLOROPHENYL PHENYL ETHER	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
FLUORENE	490000	25000	220000	410 J	13000	390 U	400 U	390 U
4-NITROANILINE	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
4,6-DINITRO-2-METHYLPHENOL	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
N-NITROSODIPHENYLAMINE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
4-BROMOPHENYL PHENYL ETHER	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
HEXACHLOROBENZENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
PENTACHLOROPHENOL	310000 U	60000 U	125000 U	2050 U	60000 U	1950 U	2000 U	1950 U
PHENANTHRENE	2100000	63000	560000	570	36000	390 U	400 U	390 U
ANTHRACENE	560000	12000 U	120000	410 U	12000 J	390 U	400 U	390 U
DI-N-BUTYL PHTHALATE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
FLUORANTHENE	1600000	17000	240000	410 J	12000 J	390 U	400 U	390 U
PYRENE	1200000	17000	160000	410 J	12000 J	390 U	400 U	390 U
BUTYL BENZYL PHTHALATE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
3,3'-DICHLOROBENZIDINE	124000 U	24000 U	50000 U	820 U	24000 U	780 U	800 U	780 U
BENZO(A)ANTHRACENE	340000	12000 J	33000	410 U	12000 J	390 U	400 U	390 U
BIS(2-ETHYLHEXYL)PHTHALATE	62000 J	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 J
CHRYSENE	310000	12000 J	36000	410 U	12000 J	390 U	400 U	390 U
DI-N-OCTYL PHTHALATE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
BENZO(B)FLUORANTHENE	290000	12000 U	25000 J	410 U	12000 U	390 U	400 U	390 U
BENZO(K)FLUORANTHENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
BENZO(A)PYRENE	210000	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
INDENO(1,2,3-CD)PYRENE	62000 J	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
DIBENZO(AH)ANTHRACENE	62000 U	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
BENZO(GHI)PERYLENE	77000	12000 U	25000 U	410 U	12000 U	390 U	400 U	390 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	5 U	6.8	5 U	5.5	5 U	5 U	5 U	5 U
CYANIDE	1.9 U	1.8 U	1.9 U	1.8 U	1.5 U	1.5 U	1.5 U	5 U
CHROMIUM	7.5	7	5.5	9	5.5	5.5	5	4 U
COPPER	5	5	3.5 U	3.5 U	5	6	8	5 U
IRON	5550	4530	1040	7290	4480	2200	7900	3100
LEAD	30.4	3.9	1.5 U	4.4	3.25	5.4	6	2.6
ZINC	3480	13.5	250	17.5	12.5	9 U	12	4 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

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SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A14-SB08-21	A16-SB02-06	A16-SB02-21	A17-SB01-10	A17-SB02-31	A26-SB01-08	A26-SB01-22	A26-SB04-26
Depth (ft)	45.5	13	51.5	50	70	17.5	45.5	62.5
Unit Number	2	1	3	2	3	1	3	3
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	Q	V	V	V	V	V	V	V
PHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BIS(2-CHLOROETHYL)ETHER	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2-CHLOROPHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
1,3-DICHLOROBENZENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
1,4-DICHLOROBENZENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BENZYL ALCOHOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
1,2-DICHLOROBENZENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2-METHYLPHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BIS(2-CHLOROISOPROPYL)ETHER	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
4-METHYLPHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
N-NITROSODIPROPYLAMINE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
HEXACHLOROETHANE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
NITROBENZENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
ISOPHORONE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2-NITROPHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2,4-DIMETHYLPHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BENZOIC ACID	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
BIS(2-CHLOROETHOXY)METHANE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2,4-DICHLOROPHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
1,2,4-TRICHLOROBENZENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
NAPHTHALENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
4-CHLOROANILINE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
HEXACHLOROBUTADIENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
P-CHLORO-M-CRESOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2-METHYLNAPHTHALENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
HEXACHLOROCYCLOPENTADIENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2,4,6-TRICHLOROPHENOL	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2,4,5-TRICHLOROPHENOL	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
2-CHLORONAPHTHALENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2-NITROANILINE	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
DIMETHYL PHTHALATE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
ACENAPHTHYLENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
3-NITROANILINE	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
ACENAPHTHENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2,4-DINITROPHENOL	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
4-NITROPHENOL	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
DIBENZOFURAN	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2,4-DINITROTOLUENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
2,6-DINITROTOLUENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
DIETHYL PHTHALATE	410 U	410 J	410 U	400 U	440 U	410 U	390 U	410 U
4-CHLOROPHENYL PHENYL ETHER	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
FLUORENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
4-NITROANILINE	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
4,6-DINITRO-2-METHYLPHENOL	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
N-NITROSODIPHENYLAMINE	410 U	410 U	410 U	400 U	440 U	410 U	390 J	410 U
4-BROMOPHENYL PHENYL ETHER	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
HEXACHLOROBENZENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
PENTACHLOROPHENOL	2050 U	2050 U	2050 U	2000 U	2200 U	2050 U	1950 U	2050 U
PHENANTHRENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
ANTHRACENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
DI-N-BUTYL PHTHALATE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 J
FLUORANTHENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
PYRENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BUTYL BENZYL PHTHALATE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
3,3'-DICHLOROBENZIDINE	820 U	820 U	820 U	800 U	880 U	820 U	780 U	820 U
BENZO(A)ANTHRACENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BIS(2-ETHYLHEXYL)PHTHALATE	840	410 U	410 U	400 U	440 U	410 U	390 U	2300
CHRYSENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
DI-N-OCTYL PHTHALATE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BENZO(B)FLUORANTHENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BENZO(K)FLUORANTHENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BENZO(A)PYRENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
INDENO(1,2,3-CD)PYRENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
DIBENZO(AH)ANTHRACENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
BENZO(GHI)PERYLENE	410 U	410 U	410 U	400 U	440 U	410 U	390 U	410 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	V	V	V
ARSENIC	5 U	5 U	8.6	5 U	12	6.1 U	5.8 U	6.2
CYANIDE	5 U	1 U	1 U	1.5 U	1.5 U	1.83 U	1.73 U	5 U
CHROMIUM	5.5	4.5 U	17	4.5 U	28	10.4	11.6	8.5
COPPER	5 U	5 U	6.5	5.5	10	4.3 U	4 U	5 U
IRON	4500	830	35000	8000	38000	7530	42300	13000
LEAD	4.7	2.5 U	18	7.1	16	3 U	2.9 U	6
ZINC	5	4.5 U	50	10	210	22	39.9	26

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	A26-SB05-19	A26-SB06-19	A26-SB07-23	A26-SB08-15	A27-SB01-02	A27-SB01-13	A27-SB01-25	DW01-28
Depth (ft)	50	46	55.5	39.5	4	34	60	143
Unit Number	2	2	3	2	1	2	3	4
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	V	V	V	V	V	NA	NA	V
PHENOL	400 U	390 U	400 U	430 U	380 U			410 U
BIS(2-CHLOROETHYL)ETHER	400 U	390 U	400 U	430 U	380 U			410 U
2-CHLOROPHENOL	400 U	390 U	400 U	430 U	380 U			410 U
1,3-DICHLOROBENZENE	400 U	390 U	400 U	430 U	380 U			410 U
1,4-DICHLOROBENZENE	400 U	390 U	400 U	430 U	380 U			410 U
BENZYL ALCOHOL	400 U	390 U	400 U	430 U	380 U			410 U
1,2-DICHLOROBENZENE	400 U	390 U	400 U	430 U	380 U			410 U
2-METHYLPHENOL	400 U	390 U	400 U	430 U	380 U			410 U
BIS(2-CHLOROISOPROPYL)ETHER	400 U	390 U	400 U	430 U	380 U			410 U
4-METHYLPHENOL	400 U	390 U	400 U	430 U	380 U			410 U
N-NITROSODIPROPYLAMINE	400 U	390 U	400 U	430 U	380 U			410 U
HEXACHLOROETHANE	400 U	390 U	400 U	430 U	380 U			410 U
NITROBENZENE	400 U	390 U	400 U	430 U	380 U			410 U
ISOPHORONE	400 U	390 U	400 U	430 U	380 U			410 U
2-NITROPHENOL	400 U	390 U	400 U	430 U	380 U			410 U
2,4-DIMETHYLPHENOL	400 U	390 U	400 U	430 U	380 U			410 U
BENZOIC ACID	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
BIS(2-CHLOROETHOXY)METHANE	400 U	390 U	400 U	430 U	380 U			410 U
2,4-DICHLOROPHENOL	400 U	390 U	400 U	430 U	380 U			410 U
1,2,4-TRICHLOROBENZENE	400 U	390 U	400 U	430 U	380 U			410 U
NAPHTHALENE	400 J	390 U	400 U	430 J	380 U			410 U
4-CHLOROANILINE	400 U	390 U	400 U	430 U	380 U			410 U
HEXACHLOROBUTADIENE	400 U	390 U	400 U	430 U	380 U			410 U
P-CHLORO-M-CRESOL	400 U	390 U	400 U	430 U	380 U			410 U
2-METHYLNAPHTHALENE	400 U	390 U	400 U	430 U	380 U			410 U
HEXACHLOROCYCLOPENTADIENE	400 U	390 U	400 U	430 U	380 U			410 U
2,4,6-TRICHLOROPHENOL	400 U	390 U	400 U	430 U	380 U			410 U
2,4,5-TRICHLOROPHENOL	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
2-CHLORONAPHTHALENE	400 U	390 U	400 U	430 U	380 U			410 U
2-NITROANILINE	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
DIMETHYL PHTHALATE	400 U	390 U	400 U	430 U	380 U			410 U
ACENAPHTHYLENE	400 U	390 U	400 U	430 U	380 U			410 U
3-NITROANILINE	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
ACENAPHTHENE	400 J	390 U	400 U	430 U	380 U			410 U
2,4-DINITROPHENOL	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
4-NITROPHENOL	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
DIBENZOFURAN	400 U	390 U	400 U	430 U	380 U			410 U
2,4-DINITROTOLUENE	400 U	390 U	400 U	430 U	380 U			410 U
2,6-DINITROTOLUENE	400 U	390 U	400 U	430 U	380 U			410 U
DIETHYL PHTHALATE	400 U	390 U	400 U	430 U	380 U			410 U
4-CHLOROPHENYL PHENYL ETHER	400 U	390 U	400 U	430 U	380 U			410 U
FLUORENE	400 U	390 U	400 U	430 U	380 U			410 U
4-NITROANILINE	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
4,6-DINITRO-2-METHYLPHENOL	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
N-NITROSODIPHENYLAMINE	400 U	390 U	400 J	430 U	380 U			410 U
4-BROMOPHENYL PHENYL ETHER	400 U	390 U	400 U	430 U	380 U			410 U
HEXACHLOROBENZENE	400 U	390 U	400 U	430 U	380 U			410 U
PENTACHLOROPHENOL	2000 U	1950 U	2000 U	2150 U	1900 U			2050 U
PHENANTHRENE	400 J	390 U	400 U	430 J	380 U			410 U
ANTHRACENE	400 U	390 U	400 U	430 U	380 U			410 U
DI-N-BUTYL PHTHALATE	400 J	390 U	400 U	430 J	380 J			410 U
FLUORANTHENE	400 J	390 U	400 U	430 U	380 U			410 U
PYRENE	400 J	390 U	400 U	430 U	380 J			410 U
BUTYL BENZYL PHTHALATE	400 U	390 U	400 U	430 U	380 U			410 U
3,3'-DICHLOROBENZIDINE	800 U	780 U	800 U	860 U	760 U			820 U
BENZO(A)ANTHRACENE	400 U	390 U	400 U	430 U	380 U			410 U
BIS(2-ETHYLHEXYL)PHTHALATE	1200	390 U	3900	46000	380 J			410 U
CHRYSENE	400 U	390 U	400 U	430 U	380 J			410 U
DI-N-OCTYL PHTHALATE	400 U	390 U	400 U	430 U	380 U			410 U
BENZO(B)FLUORANTHENE	400 U	390 U	400 U	430 U	380 U			410 U
BENZO(K)FLUORANTHENE	400 U	390 U	400 U	430 U	380 J			410 U
BENZO(A)PYRENE	400 U	390 U	400 U	430 U	380 J			410 U
INDENO(1,2,3-CD)PYRENE	400 U	390 U	400 U	430 U	380 U			410 U
DIBENZO(AH)ANTHRACENE	400 U	390 U	400 U	430 U	380 U			410 U
BENZO(GHI)PERYLENE	400 U	390 U	400 U	430 U	380 U			410 U
INORGANICS (mg/kg)								
Validation Status :	V	V	V	V	V	NV	NV	V
ARSENIC	6.8	5 U	5 U	8.3	5.7 U	5.70	23.1	5 U
CYANIDE	5 U	1 U	1 U	1 U	1.7 U	NA	NA	2 U
CHROMIUM	16	4.5 U	9	28	4.5 U	12.1	26.8	9.5
COPPER	5 U	5 U	5 U	14	4 U	5.20	11.0	5 U
IRON	12800	800	6700	22000	3540	8300	44000	5600
LEAD	9.6	4.4	5.5	12	2.8 U	44.5	44.8	5.2
ZINC	26	7.5	20	64	12.5	12.1	60.9	14

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

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SOUTH CAVALCADE SITE - SOIL BORING ANALYTICAL RESULTS

Sample Number	BW02-15	BW02-28	BW02-36	BW02-38	BW02-42
Depth (ft)	71	140	185	191	209
Unit Number	3	4	4	4	4
SEMIVOLATILE ORGANICS (ug/kg)					
Validation Status :	V	V	V	V	V
PHENOL	430 U	400 U	410 U	370 U	400 U
BIS(2-CHLOROETHYL)ETHER	430 U	400 U	410 U	370 U	400 U
2-CHLOROPHENOL	430 U	400 U	410 U	370 U	400 U
1,3-DICHLOROBENZENE	430 U	400 U	410 U	370 U	400 U
1,4-DICHLOROBENZENE	430 U	400 U	410 U	370 U	400 U
BENZYL ALCOHOL	430 U	400 U	410 U	370 U	400 U
1,2-DICHLOROBENZENE	430 U	400 U	410 U	370 U	400 U
2-METHYLPHENOL	430 U	400 U	410 U	370 U	400 U
BIS(2-CHLOROISOPROPYL)ETHER	430 U	400 U	410 U	370 U	400 U
4-METHYLPHENOL	430 U	400 U	410 U	370 U	400 U
N-NITROSODIPROPYLAMINE	430 U	400 U	410 U	370 U	400 U
HEXACHLOROETHANE	430 U	400 U	410 U	370 U	400 U
NITROBENZENE	430 U	400 U	410 U	370 U	400 U
ISOPHORONE	430 U	400 U	410 U	370 U	400 U
2-NITROPHENOL	430 U	400 U	410 U	370 U	400 U
2,4-DIMETHYLPHENOL	430 U	400 U	410 U	370 U	400 U
BENZOIC ACID	2150 U	2000 U	2050 U	1850 U	2000 U
BIS(2-CHLOROETHOXY)METHANE	430 U	400 U	410 U	370 U	400 U
2,4-DICHLOROPHENOL	430 U	400 U	410 U	370 U	400 U
1,2,4-TRICHLOROBENZENE	430 U	400 U	410 U	370 U	400 U
NAPHTHALENE	430 U	400 U	410 U	370 U	400 U
4-CHLOROANILINE	430 U	400 U	410 U	370 U	400 U
HEXACHLOROBUTADIENE	430 U	400 U	410 U	370 U	400 U
P-CHLORO-M-CRESOL	430 U	400 U	410 U	370 U	400 U
2-METHYLNAPHTHALENE	430 U	400 U	410 U	370 U	400 U
HEXACHLOROCYCLOPENTADIENE	430 U	400 U	410 U	370 U	400 U
2,4,6-TRICHLOROPHENOL	430 U	400 U	410 U	370 U	400 U
2,4,5-TRICHLOROPHENOL	2150 U	2000 U	2050 U	1850 U	2000 U
2-CHLORONAPHTHALENE	430 U	400 U	410 U	370 U	400 U
2-NITROANILINE	2150 U	2000 U	2050 U	1850 U	2000 U
DIMETHYL PHTHALATE	430 U	400 U	410 U	370 U	400 U
ACENAPHTHYLENE	430 U	400 U	410 U	370 U	400 U
3-NITROANILINE	2150 U	2000 U	2050 U	1850 U	2000 U
ACENAPHTHENE	430 U	400 U	410 U	370 U	400 U
2,4-DINITROPHENOL	2150 U	2000 U	2050 U	1850 U	2000 U
4-NITROPHENOL	2150 U	2000 U	2050 U	1850 U	2000 U
DIBENZOFURAN	430 U	400 U	410 U	370 U	400 U
2,4-DINITROTOLUENE	430 U	400 U	410 U	370 U	400 U
2,6-DINITROTOLUENE	430 U	400 U	410 U	370 U	400 U
DIETHYL PHTHALATE	430 U	400 U	410 U	370 U	400 U
4-CHLOROPHENYL PHENYL ETHER	430 U	400 U	410 U	370 U	400 U
FLUORENE	430 U	400 U	410 U	370 U	400 U
4-NITROANILINE	2150 U	2000 U	2050 U	1850 U	2000 U
4,6-DINITRO-2-METHYLPHENOL	2150 U	2000 U	2050 U	1850 U	2000 U
N-NITROSODIPHEMYLAMINE	430 U	400 U	410 U	370 U	400 U
4-BROMOPHENYL PHENYL ETHER	430 U	400 U	410 U	370 U	400 U
HEXACHLOROBENZENE	430 U	400 U	410 U	370 U	400 U
PENTACHLOROPHENOL	2150 U	2000 U	2050 U	1850 U	2000 U
PHENANTHRENE	430 U	400 U	410 U	370 U	400 U
ANTHRACENE	430 U	400 U	410 U	370 U	400 U
DI-N-BUTYL PHTHALATE	430 U	400 U	410 U	370 U	400 U
FLUORANTHENE	430 U	400 U	410 U	370 U	400 U
PYRENE	430 U	400 U	410 U	370 U	400 U
BUTYL BENZYL PHTHALATE	140 J	400 U	410 U	370 U	400 U
3,3'-DICHLOROBENZIDINE	860 U	800 U	820 U	740 U	800 U
BENZO(A)ANTHRACENE	430 U	400 U	410 U	370 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE	430 U	400 U	410 U	370 U	400 U
CHRYSENE	430 U	400 U	410 U	370 U	400 U
DI-N-OCTYL PHTHALATE	430 U	400 U	410 U	370 U	400 U
BENZO(B)FLUORANTHENE	430 U	400 U	410 U	370 U	400 U
BENZO(K)FLUORANTHENE	430 U	400 U	410 U	370 U	400 U
BENZO(A)PYRENE	430 U	400 U	410 U	370 U	400 U
INDENO(1,2,3-CD)PYRENE	430 U	400 U	410 U	370 U	400 U
DIBENZO(AH)ANTHRACENE	430 U	400 U	410 U	370 U	400 U
BENZO(GHI)PERYLENE	430 U	400 U	410 U	370 U	400 U
INORGANICS (mg/kg)					
Validation Status :	V	V	V	V	V
ARSENIC	1 U	1 U	6.1 U(Q)	5.6 U(Q)	14 (Q)
CYANIDE	5.6 U	6.1 U	6.2 U	5.6 U	6.3 U
CHROMIUM	10.5	9.10	4.3 U	8.46	4.4 U
COPPER	18.4	9.71	9.2 U	8.5 U	9.4 U
IRON	16700	12900	3960	1060	2220
LEAD	20	19.2	26 (Q)	7.85 (Q)	95.8 (Q)
ZINC	43.4	14.4	7.4 U	20.9	8.19

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed;
(V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007429

APPENDIX Q - GROUNDWATER ANALYTICAL TEST RESULTS

007430

SOUTH CHAVALCHOE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW01-001	MW01-002	MW02-001	MW02-002	MW03-001	MW03-002	MW04-001	MW04-002
Zone	S	S	S	S	S	S	S	S
SEMI VOLATILE ORGANICS (ug/l)								
Validation Status :	Q	Q	Q	Q	V	Q	V	Q
PHENOL	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
BIS(2-CHLOROETHYL)ETHER	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2-CHLOROPHENOL	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
1,3-DICHLOROBENZENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
1,4-DICHLOROBENZENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
BENZYL ALCOHOL	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
1,2-DICHLOROBENZENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2-METHYLPHENOL	110 J	130	31 J	37 J	10 U	10 U	50 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
4-METHYLPHENOL	64 J	95	200 U	100 U	10 U	10 U	50 U	10 U
N-NITROSODIPROPYLAMINE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
HEXACHLOROETHANE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
NITROBENZENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
ISOPHORONE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2-NITROPHENOL	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2,4-DIMETHYLPHENOL	550	620	34 J	36 J	10 U	10 U	50 U	10 U
BENZOIC ACID	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
BIS(2-CHLOROETHOXY)METHANE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2,4-DICHLOROPHENOL	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
1,2,4-TRICHLOROBENZENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
NAPHTHALENE	3100	3400	11000	14000	10 U	10 U	540	280
4-CHLOROANILINE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
HEXACHLOROBUTADIENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
P-CHLORO-M-CRESOL	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2-METHYLNAPHTHALENE	110 J	170	530	560	10 U	10 U	7 J	7 J
HEXACHLOROCYCLOPENTADIENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2,4,6-TRICHLOROPHENOL	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2,4,5-TRICHLOROPHENOL	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
2-CHLORONAPHTHALENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2-NITROANILINE	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
DIMETHYL PHTHALATE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
ACENAPHTHYLENE	400 U	9 J	200 U	100 U	10 U	10 U	50 U	10 U
3-NITROANILINE	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
ACENAPHTHENE	110 J	170	540	460	10 U	10 U	150	73
2,4-DINITROPHENOL	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
4-NITROPHENOL	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
DIBENZOFURAN	65 J	88	370	340	10 U	10 U	77	46
2,4-DINITROTOLUENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
2,6-DINITROTOLUENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
DIETHYL PHTHALATE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
4-CHLOROPHENYL PHENYL ETHER	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
FLUORENE	47 J	64	220	200	10 U	10 U	84	55
4-NITROANILINE	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
4,6-DINITRO-2-METHYLPHENOL	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
N-NITROSODIPHENYLAMINE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
4-BROMOPHENYL PHENYL ETHER	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
HEXACHLOROBENZENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
PENTACHLOROPHENOL	2000 U	250 U	1000 U	500 U	50 U	50 U	250 U	50 U
PHENANTHRENE	28 J	50	320	300	10 U	10 U	21 J	11
ANTHRACENE	400 U	50 U	41 J	39 J	10 U	10 U	8 J	6 J
DI-N-BUTYL PHTHALATE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
FLUORANTHENE	400 U	50 U	45 J	55 J	10 U	10 U	50 U	6 J
PYRENE	400 U	50 U	34 J	46 J	10 U	10 U	50 U	3 J
BUTYL BENZYL PHTHALATE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
3,3'-DICHLOROBENZIDINE	800 U	100 U	400 U	200 U	20 U	20 U	100 U	20 U
BENZO(A)ANTHRACENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	400 U	50 U	200 U	100 U	10 U	17	50 U	10 U
CHRYSENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
DI-N-OCTYL PHTHALATE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
BENZO(B)FLUORANTHENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
BENZO(K)FLUORANTHENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
BENZO(A)PYRENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
INDENO(1,2,3-CD)PYRENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
DIBENZO(AH)ANTHRACENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U
BENZO(GHI)PERYLENE	400 U	50 U	200 U	100 U	10 U	10 U	50 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW05-001	MW06-001	MW06-002	MW07-001	MW07-002	MW08-001	MW08-002	MW09-001
Zone	S	S	S	S	S	S	S	S
SEMI-VOLATILE ORGANICS (ug/l)								
Validation Status :	Q,V	Q	Q	Q	Q	Q,V	V	V
PHENOL	10 U	40000 U	470	10 U	50 U	10 U	20 U	40 U
BIS(2-CHLOROETHYL)ETHER	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2-CHLOROPHENOL	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
1,3-DICHLOROBENZENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
1,4-DICHLOROBENZENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
BENZYL ALCOHOL	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
1,2-DICHLOROBENZENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2-METHYLPHENOL	10 U	40000 U	1400	10 U	50 U	10 U	20 U	40 U
BIS(2-CHLOROISOPROPYL)ETHER	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
4-METHYLPHENOL	10 U	40000 U	280	10 U	50 U	10 U	20 U	40 U
N-NITROSODIPROPYLAMINE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
HEXACHLOROETHANE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
NITROBENZENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
ISOPHORONE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2-NITROPHENOL	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2,4-DIMETHYLPHENOL	10 U	7100 J	100 U	10 U	50 U	10 U	20 U	40 U
BENZOIC ACID	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
BIS(2-CHLOROETHOXY)METHANE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2,4-DICHLOROPHENOL	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
1,2,4-TRICHLOROBENZENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
NAPHTHALENE	10 U	820000	35000	10 U	50 U	24	2 J	40 U
4-CHLOROANILINE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
HEXACHLOROBUTADIENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
P-CHLORO-M-CRESOL	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2-METHYLNAPHTHALENE	10 U	130000	32000	10 U	50 U	7 J	20 U	40 U
HEXACHLOROCYCLOPENTADIENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2,4,6-TRICHLOROPHENOL	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2,4,5-TRICHLOROPHENOL	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
2-CHLORONAPHTHALENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2-NITROANILINE	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
DIMETHYL PHTHALATE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
ACENAPHTHYLENE	10 U	7300 J	610	10 U	50 U	10 U	20 U	40 U
3-NITROANILINE	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
ACENAPHTHENE	10 U	210000	6100	10 U	50 U	22	12 J	40 U
2,4-DINITROPHENOL	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
4-NITROPHENOL	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
DIBENZOFURAN	10 U	140000	4800	10 U	50 U	20	9 J	40 U
2,4-DINITROTOLUENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
2,6-DINITROTOLUENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
DIETHYL PHTHALATE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
4-CHLOROPHENYL PHENYL ETHER	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
FLUORENE	10 U	170000	5300	10 U	50 U	20	4 J	40 U
4-NITROANILINE	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
4,6-DINITRO-2-METHYLPHENOL	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
N-NITROSODIPHENYLAMINE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
4-BROMOPHENYL PHENYL ETHER	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
HEXACHLOROBENZENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
PENTACHLOROPHENOL	50 U	200000 U	500 U	50 U	250 U	50 U	100 U	200 U
PHENANTHRENE	10 U	480000	18000	10 U	50 U	57	25	40 U
ANTHRACENE	10 U	70000	3200	10 U	50 U	7 J	7 J	40 U
DI-N-BUTYL PHTHALATE	21	40000 U	100 U	10 U	50 U	33	7 J	40 U
FLUORANTHENE	10 U	200000	9400	10 U	50 U	19	15 J	40 U
PYRENE	10 U	160000	6500	10 U	50 U	13	15 J	40 U
BUTYL BENZYL PHTHALATE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
3,3'-DICHLOROBENZIDINE	20 U	80000 U	200 U	20 U	100 U	20 U	40 U	80 U
BENZO(A)ANTHRACENE	10 U	31000 J	2600	10 U	50 U	10 U	20 U	40 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	40000 U	100 U	10 U	50 U	10 U	44	40 U
CHRYSENE	10 U	31000 J	1600	10 U	50 U	10 U	20 U	40 U
DI-N-OCTYL PHTHALATE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
BENZO(B)FLUORANTHENE	10 U	9000 J	1200	10 U	50 U	10 U	20 U	40 U
BENZO(K)FLUORANTHENE	10 U	12000 J	100 U	10 U	50 U	10 U	20 U	40 U
BENZO(A)PYRENE	10 U	40000 U	570	10 U	50 U	10 U	20 U	40 U
INDENO(1,2,3-CD)PYRENE	10 U	40000 U	120	10 U	50 U	10 U	20 U	40 U
DIBENZO(AH)ANTHRACENE	10 U	40000 U	100 U	10 U	50 U	10 U	20 U	40 U
BENZO(GHI)PERYLENE	10 U	40000 U	100	10 U	50 U	10 U	20 U	40 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

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SOUTH CHVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW03-002	MW10-001	MW10-002	MW11-001	MW11-002	MW12-001	MW12-002	MW14-001
Zone	S	S	S	S	S	S	S	S
SEMIVOLATILE ORGANICS (ug/l)								
Validation Status :	V	Q	Q	V	Q	Q	V	Q
PHENOL	50 U	200 U	10 U	10 U	20 U	140 J	31	20000 U
BIS(2-CHLOROETHYL)ETHER	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2-CHLOROPHENOL	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
1,3-DICHLOROBENZENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
1,4-DICHLOROBENZENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
BENZYL ALCOHOL	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
1,2-DICHLOROBENZENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2-METHYLPHENOL	50 U	200 U	10 U	10 U	20 U	450	80	3800 J
BIS(2-CHLOROISOPROPYL)ETHER	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
4-METHYLPHENOL	50 U	200 U	10 U	10 U	20 U	720	160	8500 J
N-NITROSODIPROPYLAMINE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
HEXACHLOROETHANE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
NITROBENZENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
ISOPHORONE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2-NITROPHENOL	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2,4-DIMETHYLPHENOL	50 U	200 U	10 U	10 U	20 U	1400	170	5500 J
BENZOIC ACID	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
BIS(2-CHLOROETHOXY)METHANE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2,4-DICHLOROPHENOL	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
1,2,4-TRICHLOROBENZENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
NAPHTHALENE	13 J	3400	690	10 U	20 U	7400	7710	340000
4-CHLOROANILINE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000
HEXACHLOROBUTADIENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
P-CHLORO-M-CRESOL	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000
2-METHYLNAPHTHALENE	50 U	160 J	100	10 U	20 U	570	250	55000
HEXACHLOROCYCLOPENTADIENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2,4,6-TRICHLOROPHENOL	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2,4,5-TRICHLOROPHENOL	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
2-CHLORONAPHTHALENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2-NITROANILINE	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
DIMETHYL PHTHALATE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
ACENAPHTHYLENE	50 U	200 U	6 J	10 U	20 U	11 J	6 J	2200
3-NITROANILINE	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
ACENAPHTHENE	50 U	680	240	10 U	20 U	650	330	82000
2,4-DINITROPHENOL	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
4-NITROPHENOL	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
DIBENZOFURAN	50 U	340	140	10 U	20 U	410	220	56000
2,4-DINITROTOLUENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
2,6-DINITROTOLUENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
DIETHYL PHTHALATE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
4-CHLOROPHENYL PHENYL ETHER	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
FLUORENE	50 U	210	110	10 U	20 U	310	160	67000
4-NITROANILINE	250 U	1000 U	120	50 U	100 U	1000 U	100 U	100000 U
4,6-DINITRO-2-METHYLPHENOL	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
N-NITROSODIPHENYLAMINE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
4-BROMOPHENYL PHENYL ETHER	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
HEXACHLOROBENZENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
PENTACHLOROPHENOL	250 U	1000 U	50 U	50 U	100 U	1000 U	100 U	100000 U
PHENANTHRENE	50 U	410	100	1 J	20 U	680	370	200000
ANTHRACENE	50 U	50 J	27	10 U	20 U	96 J	31	29000
DI-N-BUTYL PHTHALATE	50 U	200 U	10 U	1 J	20 U	200 U	20 U	20000 U
FLUORANTHENE	50 U	56 J	47	10 U	20 U	200	93	83000
PYRENE	50 U	41 J	42	10 U	20 U	166 J	34	66000
BUTYL BENZYL PHTHALATE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
3,3'-DICHLOROBENZIDINE	100 U	400 U	20 U	20 U	40 U	400 U	40 U	40000 U
BENZO(A)ANTHRACENE	50 U	200 U	9 J	10 U	20 U	28 J	15 J	13000 J
BIS(2-ETHYLHEXYL)PHTHALATE	50 U	200 U	10 U	10	20 U	200 U	20 U	20000 U
CHRYSENE	50 U	200 U	8 J	10 U	20 U	26 J	13 J	13000 J
DI-N-OCTYL PHTHALATE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
BENZO(B)FLUORANTHENE	50 U	200 U	10 U	10 U	20 U	200 U	10 J	8300 J
BENZO(K)FLUORANTHENE	50 U	200 U	4 J	10 U	20 U	200 U	20 U	20000 U
BENZO(A)PYRENE	50 U	200 U	10 U	10 U	20 U	200 U	6 J	20000 U
INDENO(1,2,3-CD)PYRENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
DIBENZO(AH)ANTHRACENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U
BENZO(GHI)PERYLENE	50 U	200 U	10 U	10 U	20 U	200 U	20 U	20000 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW14-002	MW16-001	MW16-002	MW23-001	P01-001	P01-002	P02-001	P02-002
Zone	S	S	S	S	S	S	S	S
SEMIVOLATILE ORGANICS (ug/l)								
Validation Status :	Q	V	V	V	V	V	Q	V
PHENOL	1500	20 U	20 U	10 U	10 U	20 U	200 U	10 U
BIS(2-CHLOROETHYL)ETHER	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2-CHLOROPHENOL	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
1,3-DICHLOROBENZENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
1,4-DICHLOROBENZENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
BENZYL ALCOHOL	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
1,2-DICHLOROBENZENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2-METHYLPHENOL	5400	20 U	20 U	10 U	10 U	20 U	200 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
4-METHYLPHENOL	11000	20 U	20 U	10 U	10 U	20 U	200 U	10 U
N-NITROSODIPROPYLAMINE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
HEXACHLOROETHANE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
NITROBENZENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
ISOPHORONE	800 U	20 U	20 U	10 U	1 J	20 U	200 U	10 U
2-NITROPHENOL	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2,4-DIMETHYLPHENOL	7800	20 U	20 U	10 U	10 U	20 U	200 U	10 U
BENZOIC ACID	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
BIS(2-CHLOROETHOXY)METHANE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2,4-DICHLOROPHENOL	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
1,2,4-TRICHLOROBENZENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
NAPHTHALENE	70000	20 U	20 U	10 U	10 U	20 U	6100	5200
4-CHLOROANILINE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
HEXACHLOROBUTADIENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
P-CHLORO-M-CRESOL	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2-METHYLNAPHTHALENE	8900	20 U	20 U	10 U	10 U	20 U	400	10 U
HEXACHLOROCYCLOPENTADIENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2,4,6-TRICHLOROPHENOL	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2,4,5-TRICHLOROPHENOL	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
2-CHLORONAPHTHALENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2-NITROANILINE	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
DIMETHYL PHTHALATE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
ACENAPHTHYLENE	310 J	20 U	20 U	10 U	10 U	20 U	17 J	7 J
3-NITROANILINE	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	10 U
ACENAPHTHENE	8400	20 U	20 U	20 U	10 U	20 U	1200	490
2,4-DINITROPHENOL	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
4-NITROPHENOL	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
DIBENZOFURAN	5700	20 U	20 U	10 U	10 U	20 U	620	10 U
2,4-DINITROTOLUENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
2,6-DINITROTOLUENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
DIETHYL PHTHALATE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
4-CHLOROPHENYL PHENYL ETHER	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
FLUORENE	6100	20 U	20 U	10 U	10 U	20 U	440	160
4-NITROANILINE	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
4,6-DINITRO-2-METHYLPHENOL	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
N-NITROSODIPHENYLAMINE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
4-BROMOPHENYL PHENYL ETHER	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
HEXACHLOROBENZENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
PENTACHLOROPHENOL	4000 U	100 U	100 U	50 U	50 U	100 U	1000 U	50 U
PHENANTHRENE	18000	20 U	20 U	10 U	10 U	20 U	930	340
ANTHRACENE	2300	20 U	20 U	10 U	10 U	20 U	110 J	33
DI-N-BUTYL PHTHALATE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
FLUORANTHENE	6900	20 U	20 U	10 U	10 U	20 U	130 J	31
PYRENE	4300	20 U	20 U	10 U	10 U	20 U	140 J	20
BUTYL BENZYL PHTHALATE	800 U	20 U	43	10 U	10 U	20 U	200 U	10 U
3,3'-DICHLOROBENZIDINE	1600 U	40 U	40 U	20 U	20 U	40 U	400 U	20 U
BENZO(A)ANTHRACENE	1200	20 U	20 U	10 U	10 U	20 U	200 U	3 J
BIS(2-ETHYLHEXYL)PHTHALATE	800 U	20 U	20 U	45	13	20 U	200 U	3 J
CHRYSENE	1100	20 U	20 U	10 U	10 U	20 U	200 U	3 J
DI-N-OCTYL PHTHALATE	800 U	20 U	20 U	75	10 U	20 U	200 U	10 U
BENZO(B)FLUORANTHENE	950	20 U	20 U	10 U	10 U	20 U	200 U	10 U
BENZO(K)FLUORANTHENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
BENZO(A)PYRENE	480 J	20 U	20 U	10 U	10 U	20 U	200 U	10 U
INDENO(1,2,3-CD)PYRENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
DIBENZO(AH)ANTHRACENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U
BENZO(GHI)PERYLENE	800 U	20 U	20 U	10 U	10 U	20 U	200 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

SOUTH CHVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	P03-001	P03-002	P04-001	P04-002	P05-001	P05-002	OW01-001	OW01-002
Zone	S	S	S	S	S	S	S	S
SEMI-VOLATILE ORGANICS (ug/l)								
Validation Status :	Q	Q	V	V	Q	V	V	Q
PHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	35 J	35 J
BIS(2-CHLOROETHYL)ETHER	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2-CHLOROPHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
1,3-DICHLOROBENZENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
1,4-DICHLOROBENZENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
BENZYL ALCOHOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
1,2-DICHLOROBENZENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2-METHYLPHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
BIS(2-CHLOROISOPROPYL)ETHER	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
4-METHYLPHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
N-NITROSODIPROPYLAMINE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
HEXACHLOROETHANE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
NITROBENZENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
ISOPHORONE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2-NITROPHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2,4-DIMETHYLPHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
BENZOIC ACID	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
BIS(2-CHLOROETHOXY)METHANE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2,4-DICHLOROPHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
1,2,4-TRICHLOROBENZENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
NAPHTHALENE	140000	15000	10 U	20 U	2400	20 U	11 J	10 J
4-CHLOROANILINE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
HEXACHLOROBUTADIENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
P-CHLORO-M-CRESOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2-METHYLNAPHTHALENE	19000	500 U	10 U	20 U	220 J	20 U	4 J	100 U
HEXACHLOROCYCLOPENTADIENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2,4,6-TRICHLOROPHENOL	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2,4,5-TRICHLOROPHENOL	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
2-CHLORONAPHTHALENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2-NITROANILINE	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
DIMETHYL PHTHALATE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
ACENAPHTHYLENE	10000 U	500 U	10 U	20 U	400 U	20 U	6 J	6 J
3-NITROANILINE	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
ACENAPHTHENE	26000	1100	10 U	20 U	400	20 U	8 J	100 U
2,4-DINITROPHENOL	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
4-NITROPHENOL	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
DIBENZOFURAN	18000	500 U	10 U	20 U	230 J	20 U	40 U	100 U
2,4-DINITROTOLUENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
2,6-DINITROTOLUENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
DIETHYL PHTHALATE	10000 U	500 U	10 U	20 U	70 J	20 U	40 U	100 U
4-CHLOROPHENYL PHENYL ETHER	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
FLUORENE	19000	730	10 U	20 U	150 J	20 U	12 J	100 U
4-NITROANILINE	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
4,6-DINITRO-2-METHYLPHENOL	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
N-NITROSODIPHENYLAMINE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
4-BROMOPHENYL PHENYL ETHER	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
HEXACHLOROBENZENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
PENTACHLOROPHENOL	50000 U	2500 U	50 U	100 U	2000 U	100 U	200 U	500 U
PHENANTHRENE	58000	2200	10 U	20 U	370 J	20 U	63	26 J
ANTHRACENE	8300 J	310 J	10 U	20 U	34 J	20 U	35 J	18 J
DI-N-BUTYL PHTHALATE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
FLUORANTHENE	26000	850	10 U	20 U	64 J	20 U	52	25 J
PYRENE	19000	630	10 U	20 U	41 J	20 U	40	35 J
BUTYL BENZYL PHTHALATE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
3,3'-DICHLOROBENZIDINE	20000 U	1000 U	20 U	40 U	800 U	40 U	80 U	200 U
BENZO(A)ANTHRACENE	5000 J	180 J	10 U	20 U	400 U	20 U	42	34 J
BIS(2-ETHYLHEXYL)PHTHALATE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
CHRYSENE	4900 J	170 J	10 U	20 U	400 U	20 U	42	40 J
DI-N-OCTYL PHTHALATE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
BENZO(B)FLUORANTHENE	2200 J	150 J	10 U	20 U	400 U	20 U	35 J	62 J
BENZO(K)FLUORANTHENE	2600 J	500 U	10 U	20 U	400 U	20 U	46	100 U
BENZO(A)PYRENE	2600 J	500 U	10 U	20 U	400 U	20 U	38 J	100 U
INDENO(1,2,3-CD)PYRENE	10000 U	500 U	10 U	20 U	400 U	20 U	35 J	27 J
DIBENZO(AH)ANTHRACENE	10000 U	500 U	10 U	20 U	400 U	20 U	40 U	100 U
BENZO(GHI)PERYLENE	10000 U	500 U	10 U	20 U	400 U	20 U	32 J	35 J

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; Q) Qualified; (S) Shallow; (D) Deep.

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	OW02-001	OW02-002	OW06-001	OW06-002	OW07-001	OW07-002	OW08-001	OW08-002
Zone	S	S	D	D	S	S	S	S
SEMIVOLATILE ORGANICS (ug/L)								
Validation Status :	Q	Q	V	Q	V	V	V	V
PHENOL	1000 U	132 J	10 U	20 U	10 U	50 U	10 U	20 U
BIS(2-CHLOROETHYL)ETHER	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2-CHLOROPHENOL	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
1,3-DICHLOROBENZENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
1,4-DICHLOROBENZENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BENZYL ALCOHOL	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
1,2-DICHLOROBENZENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2-METHYLPHENOL	870 J	430 J	10 U	20 U	10 U	50 U	10 U	20 U
BIS(2-CHLOROISOPROPYL)ETHER	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
4-METHYLPHENOL	990 J	390 J	10 U	20 U	10 U	50 U	10 U	20 U
N-NITROSODIPROPYLAMINE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
HEXACHLOROETHANE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
NITROBENZENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
ISOPHORONE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2-NITROPHENOL	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2,4-DIMETHYLPHENOL	4500	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BENZOIC ACID	5000 U	5700	50 U	100 U	50 U	250 U	50 U	100 U
BIS(2-CHLOROETHOXY)METHANE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2,4-DICHLOROPHENOL	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
1,2,4-TRICHLOROBENZENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
NAPHTHALENE	20000	13000	10 U	4 J	10 U	50 U	1 J	20 U
4-CHLOROANILINE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
HEXACHLOROBUTADIENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
P-CHLORO-M-CRESOL	1000 U	500 U	7 J	20 U	10 U	50 U	10 U	20 U
2-METHYLNAPHTHALENE	1200	600	10 U	20 U	10 U	50 U	10 U	20 U
HEXACHLOROCYCLOPENTADIENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2,4,6-TRICHLOROPHENOL	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2,4,5-TRICHLOROPHENOL	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
2-CHLORONAPHTHALENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2-NITROANILINE	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
DIMETHYL PHTHALATE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
ACENAPHTHYLENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
3-NITROANILINE	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
ACENAPHTHENE	770 J	409 J	10 U	20 U	10 U	50 U	10 U	20 U
2,4-DINITROPHENOL	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
4-NITROPHENOL	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
DIBENZOFURAN	450 J	231 J	10 U	20 U	10 U	50 U	10 U	20 U
2,4-DINITROTOLUENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
2,6-DINITROTOLUENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
DIETHYL PHTHALATE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
4-CHLOROPHENYL PHENYL ETHER	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
FLUORENE	350 J	195 J	10 U	20 U	10 U	50 U	10 U	20 U
4-NITROANILINE	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
4,6-DINITRO-2-METHYLPHENOL	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
N-NITROSODIPHENYLAMINE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
4-BROMOPHENYL PHENYL ETHER	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
HEXACHLOROBENZENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
PENTACHLOROPHENOL	5000 U	2500 U	50 U	100 U	50 U	250 U	50 U	100 U
PHENANTHRENE	530 J	189 J	10 U	20 U	10 U	50 U	10 U	20 U
ANTHRACENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
DI-N-BUTYL PHTHALATE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
FLUORANTHENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
PYRENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BUTYL BENZYL PHTHALATE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
3,3'-DICHLOROBENZIDINE	2000 U	1000 U	20 U	40 U	20 U	100 U	20 U	40 U
BENZO(A)ANTHRACENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BIS(2-ETHYLHEXYL)PHTHALATE	1000 U	500 U	10 U	20 U	10 U	50 U	4 J	20 U
CHRYSENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
DI-N-OCTYL PHTHALATE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BENZO(B)FLUORANTHENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BENZO(K)FLUORANTHENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BENZO(A)PYRENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
INDENO(1,2,3-CD)PYRENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
DIBENZO(AH)ANTHRACENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U
BENZO(GHI)PERYLENE	1000 U	500 U	10 U	20 U	10 U	50 U	10 U	20 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

007436

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	GW09-001	GW09-002	GW10-001	GW10-002	GW11-001	GW11-002	GW13-001	GW13-002
Zone	S	S	S	S	S	S	S	S
SEMIVOLATILE ORGANICS (ug/l)								
Validation Status :	V	V	Q	V,Q	Q	Q	Q	Q,V
PHENOL	10 U	10 U	4000 U	37	500000 U	1000 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2-CHLOROPHENOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
1,3-DICHLOROBENZENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
1,4-DICHLOROBENZENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
BENZYL ALCOHOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
1,2-DICHLOROBENZENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2-METHYLPHENOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	10 U	10 U	2000 J	310	500000 U	1000 U	10 U	10 U
4-METHYLPHENOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
N-NITROSODIPROPYLAMINE	10 U	10 U	1400 J	140	500000 U	1000 U	10 U	10 U
HEXACHLOROETHANE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
NITROBENZENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
ISOPHORONE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2-NITROPHENOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2,4-DIMETHYLPHENOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
BENZOIC ACID	10 U	10 U	2700 J	270	500000 U	1000 U	10 U	10 U
BIS(2-CHLOROETHOXY)METHANE	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
2,4-DICHLOROPHENOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
NAPHTHALENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
4-CHLOROANILINE	10 U	10 U	66000	8100	7100000	19000	10 U	10 U
HEXACHLOROBUTADIENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
P-CHLORO-M-CRESOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2-METHYLNAPHTHALENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	6500	400	1300000	9000 J	10 U	10 U
2,4,6-TRICHLOROPHENOL	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
2-CHLORONAPHTHALENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2-NITROANILINE	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
DIMETHYL PHTHALATE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
ACENAPHTHYLENE	10 U	10 U	290 J	15	50000 J	1000 U	10 U	10 U
3-NITROANILINE	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
ACENAPHTHENE	10 U	10 U	6100	230	2600000	1200	10 U	10 U
2,4-DINITROPHENOL	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
4-NITROPHENOL	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
DIBENZOFURAN	10 U	10 U	4700	160	1300000	1000 U	10 U	10 U
2,4-DINITROTOLUENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
2,6-DINITROTOLUENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
DIETHYL PHTHALATE	10 U	4 J	4000 U	10 U	500000 U	1000 U	10 U	10 U
4-CHLOROPHENYL PHENYL ETHER	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
FLUORENE	10 U	10 U	4800	160	1000000	680 J	10 U	10 U
4-NITROANILINE	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
N-NITROSODIPHENYLAMINE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
HEXACHLOROBENZENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
PENTACHLOROPHENOL	50 U	50 U	20000 U	50 U	2500000 U	5000 U	50 U	50 U
PHENANTHRENE	10 U	10 U	12000	220	4900000	1600	10 U	10 U
ANTHRACENE	10 U	10 U	1700 J	23	550000	280 J	10 U	10 U
DI-N-BUTYL PHTHALATE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
FLUORANTHENE	10 U	10 U	4300	38	2600000	800 J	10 U	10 U
PYRENE	10 U	10 U	3100 J	34	1900000	660 J	10 U	10 U
BUTYL BENZYL PHTHALATE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	20 U	20 U	8000 U	20 U	1000000 U	2000 U	20 U	20 U
BENZO(A)ANTHRACENE	10 U	10 U	670 J	7 J	500000	1000 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	2 J	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
CHRYSENE	10 U	10 U	620 J	6 J	420000 J	1000 U	10 U	10 U
DI-N-OCTYL PHTHALATE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
BENZO(B)FLUORANTHENE	10 U	10 U	4000 U	5 J	500000 U	1000 U	10 U	10 U
BENZO(K)FLUORANTHENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
BENZO(A)PYRENE	10 U	10 U	4000 U	3 J	170000 J	1000 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U
BENZO(GHI)PERYLENE	10 U	10 U	4000 U	10 U	500000 U	1000 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

007437

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	OW14-001	OW14-002	OW02-001	OW02-002
Zone	S	S	D	D
SEMIVOLATILE ORGANICS (ug/l)				
Validation Status :	V	V	V	V
PHENOL	1000 U	50 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	1000 U	50 U	10 U	10 U
2-CHLOROPHENOL	1000 U	50 U	10 U	10 U
1,3-DICHLOROBENZENE	1000 U	50 U	10 U	10 U
1,4-DICHLOROBENZENE	1000 U	50 U	10 U	10 U
BENZYL ALCOHOL	1000 U	50 U	10 U	10 U
1,2-DICHLOROBENZENE	1000 U	50 U	10 U	10 U
2-METHYLPHENOL	1000 U	50 U	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	1000 U	50 U	10 U	10 U
4-METHYLPHENOL	1000 U	50 U	10 U	10 U
N-NITROSODIPROPYLAMINE	1000 U	50 U	10 U	10 U
HEXACHLOROETHANE	1000 U	50 U	10 U	10 U
NITROBENZENE	1000 U	50 U	10 U	10 U
ISOPHORONE	1000 U	50 U	10 U	10 U
2-NITROPHENOL	1000 U	50 U	10 U	10 U
2,4-DIMETHYLPHENOL	1000 U	50 U	10 U	10 U
BENZOIC ACID	5000 U	250 U	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	1000 U	50 U	10 U	10 U
2,4-DICHLOROPHENOL	1000 U	50 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	1000 U	50 U	10 U	10 U
NAPHTHALENE	8200	2600	10 U	10 U
4-CHLOROANILINE	1000 U	50 U	10 U	10 U
HEXACHLOROBUTADIENE	1000 U	50 U	10 U	10 U
P-CHLORO-M-CRESOL	1000 U	50 U	10 U	10 U
2-METHYLNAPHTHALENE	350 J	130	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	1000 U	50 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	1000 U	50 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	5000 U	250 U	50 U	50 U
2-CHLORONAPHTHALENE	1000 U	50 U	10 U	10 U
2-NITROANILINE	5000 U	250 U	50 U	50 U
DIMETHYL PHTHALATE	1000 U	50 U	10 U	10 U
ACENAPHTHYLENE	1000 U	22 J	10 U	10 U
3-NITROANILINE	5000 U	250 U	50 U	50 U
ACENAPHTHENE	1000	440	10 U	10 U
2,4-DINITROPHENOL	5000 U	250 U	50 U	50 U
4-NITROPHENOL	5000 U	250 U	50 U	50 U
DIBENZOFURAN	600 J	230	10 U	10 U
2,4-DINITROTOLUENE	1000 U	50 U	10 U	10 U
2,6-DINITROTOLUENE	1000 U	50 U	10 U	10 U
DIETHYL PHTHALATE	1000 U	50 U	10 U	10 U
4-CHLOROPHENYL PHENYL ETHER	1000 U	50 U	10 U	10 U
FLUORENE	610 J	230	10 U	10 U
4-NITROANILINE	5000 U	250 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	5000 U	250 U	50 U	50 U
N-NITROSODIPHENYLAMINE	1000 U	50 U	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	1000 U	50 U	10 U	10 U
HEXACHLOROBENZENE	1000 U	50 U	10 U	10 U
PENTACHLOROPHENOL	5000 U	250 U	50 U	50 U
PHENANTHRENE	650 J	180	10 U	10 U
ANTHRACENE	130 J	30 J	10 U	10 U
DI-N-BUTYL PHTHALATE	1000 U	50 U	10 U	10 U
FLUORANTHENE	360 J	52	10 U	10 U
PYRENE	230 J	49 J	10 U	10 U
BUTYL BENZYL PHTHALATE	1000 U	50 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	2000 U	100 U	20 U	20 U
BENZO(A)ANTHRACENE	1000 U	50 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	1000 U	50 U	10 U	10 U
CHRYSENE	1000 U	50 U	10 U	10 U
DI-N-OCTYL PHTHALATE	1000 U	50 U	10 U	10 U
BENZO(B)FLUORANTHENE	1000 U	50 U	10 U	10 U
BENZO(K)FLUORANTHENE	1000 U	50 U	10 U	10 U
BENZO(A)PYRENE	1000 U	50 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	1000 U	50 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	1000 U	50 U	10 U	10 U
BENZO(GHI)PERYLENE	1000 U	50 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid; (I) Invalid; (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

007438

SOUTH LANDFILL SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW01-001	MW01-002	MW02-001	MW02-002	MW03-001	MW03-002	MW04-001
Zone	S	S	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	V	Q	V	Q	V	Q	V
CHLOROMETHANE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
BROMOMETHANE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
VINYL CHLORIDE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
CHLOROETHANE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
METHYLENE CHLORIDE	5 U	5 U	400	5 U	5 U	5 U	100
ACETONE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
CARBON DISULFIDE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
1,1-DICHLOROETHENE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
1,1-DICHLOROETHANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
CHLOROFORM	5 U	5 U	100 U	5 U	5 U	5 U	100 U
1,2-DICHLOROETHANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
2-BUTANONE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
1,1,1-TRICHLOROETHANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
CARBON TETRACHLORIDE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
VINYL ACETATE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
BROMODICHLOROMETHANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
1,2-DICHLOROPROPANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
TRICHLOROETHENE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
DIBROMOCHLOROMETHANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
1,1,2-TRICHLOROETHANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
BENZENE	2 J	15	90	77	5 U	5 U	50 J
CIS-1,3-DICHLOROPROPENE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U	200 U	10 U	10 U	10 U	200 U
BROMOFORM	5 U	5 U	100 U	5 U	5 U	5 U	100 U
2-HEXANONE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
4-METHYL-2-PENTANONE	10 U	10 U	200 U	10 U	10 U	10 U	200 U
TETRACHLOROETHENE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
TOLUENE	3 J	34	120	75	5 U	5 U	100 U
CHLOROBENZENE	5 U	5 U	100 U	5 U	5 U	5 U	100 U
ETHYLBENZENE	2 J	21	160	65	5 U	5 U	100 U
STYRENE	5 U	4 J	100 U	6	5 U	5 U	100 U
TOTAL XYLENES	3 J	38	400	110	5 U	5 U	100 U
PESTICIDES/PCB (ug/l)	V	V	V	V	V	V	V
ALPHA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
BETA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DELTA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALDRIN	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U	0.15	0.05 U	0.05 U	0.05 U
DIELDRIN	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN ALDEHYDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
CHLORDANE	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1016	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
INORGANICS (ug/l)	Q	V	V	V	Q	V	V
SILVER	10 U	8 U	10 U(Q)	8 U	10 U	8 U	10 U
ARSENIC	61.7	105	20.2	82.5	10 U	12.4	25.3
BERYLLIUM	3 U	14	3 U	11	3 U	3 U	4
CADMIUM	5 U	4 U	5 U(Q)	4 U	5 U	4 U	5 U
CYANIDE	100 U	NA	100 U	NA	100 U	NA	100 U
CHROMIUM	38	160	9 U	108	9 U	37	15
COPPER	41	107	10 U	64	10 U	14 U	10 U
IRON	100000	181000 (Q)	4840	134000 (Q)	1420	18500 (Q)	7510
MERCURY	0.2 U	0.2 U(Q)	0.2 U	0.2 U(Q)	0.2 U	0.2 U(Q)	0.2 U
NICKEL	125	194	42	163	56	52	29 U
NITRATE	NA	NA	NA	100	NA	100	NA
LEAD	80.0	160	19	100	5 U	17	36
ANTIMONY	44 U	49 U(Q)	44 U(Q)	49 U(Q)	44 U	49 U(Q)	44 U
SELENIUM	5 U	5 U	5 U(Q)	5 U	5 U	5 U	5 U
THALLIUM	10 U	10 U	10 U	10 U	10 U	10 U	10 U
ZINC	196	367	37	241	20	42	61

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid
(NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW04-002	MW05-001	MW06-001	MW06-002	MW07-001	MW07-002	MW08-001
Zone	S	S	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	NA	V	V	NA	V	NA	V
CHLOROMETHANE		10 U	200 U		10000 U		10 U
BROMOMETHANE		10 U	200 U		10000 U		10 U
VINYL CHLORIDE		10 U	200 U		10000 U		10 U
CHLOROETHANE		10 U	200 U		10000 U		10 U
METHYLENE CHLORIDE		4 J	470		5000 U		5 U
ACETONE		10 U	200 U		5600 J		10 U
CARBON DISULFIDE		5 U	100 U		5000 U		5 U
1,1-DICHLOROETHENE		10 U	100 U		5000 U		10 U
1,1-DICHLOROETHANE		5 U	100 U		5000 U		5 U
TRANS-1,2-DICHLOROETHENE		5 U	100 U		5000 U		5 U
CHLOROFORM		5 U	100 U		5000 U		5 U
1,2-DICHLOROETHANE		5 U	100 U		5000 U		5 U
2-BUTANONE		10 U	200 U		10000 U		10 U
1,1,1-TRICHLOROETHANE		5 U	100 U		5000 U		5 U
CARBON TETRACHLORIDE		5 U	100 U		5000 U		5 U
VINYL ACETATE		10 U	200 U		10000 U		10 U
BROMODICHLOROMETHANE		5 U	100 U		5000 U		5 U
1,2-DICHLOROPROPANE		5 U	100 U		5000 U		5 U
TRANS-1,3-DICHLOROPROPENE		5 U	100 U		5000 U		5 U
TRICHLOROETHENE		5 U	100 U		5000 U		5 U
DIBROMOCHLOROMETHANE		5 U	100 U		5000 U		5 U
1,1,2-TRICHLOROETHANE		5 U	100 U		5000 U		5 U
BENZENE		5 U	930		5000 U		5 U
CIS-1,3-DICHLOROPROPENE		5 U	100 U		5000 U		5 U
2-CHLOROETHYLVINYL ETHER		10 U	200 U		10000 U		10 U
BROMOFORM		5 U	100 U		5000 U		5 U
2-HEXANONE		10 U	200 U		10000 U		10 U
4-METHYL-2-PENTANONE		10 U	200 U		10000 U		10 U
TETRACHLOROETHENE		5 U	100 U		5000 U		5 U
1,1,2,2-TETRACHLOROETHANE		5 U	100 U		5000 U		5 U
TOLUENE		5 U	900		5000 U		5 U
CHLOROBENZENE		5 U	100 U		5000 U		5 U
ETHYLBENZENE		5 U	170		5000 U		5 U
STYRENE		5 U	100 U		5000 U		5 U
TOTAL XYLENES		5 U	680		5000 U		5 U
PESTICIDES/PCB (ug/l)	V	Q	V	V	V	V	Q
ALPHA-BHC	0.05 U	0.005 U	2.50 U	0.25 U	0.05 U	0.05 U	0.005 U
BETA-BHC	0.05 U	0.005 U	2.50 U	0.25 U	0.05 U	0.05 U	0.005 U
DELTA-BHC	0.05 U	0.005 U	2.50 U	0.25 U	0.05 U	0.05 U	0.005 U
GAMMA-BHC (LINDANE)	0.05 U	0.005 U	2.50 J	0.25 U	0.05 U	0.05 U	0.005 U
HEPTACHLOR	0.05 U	0.005 UB	2.50 U	0.25 U	0.05 U	0.05 U	0.005 U
ALDRIN	0.05 U	0.005 U	2.50 U	0.25 U	0.05 U	0.05 U	0.005 U
HEPTACHLOR EPOXIDE	0.05 U	0.005 U	2.50 U	0.25 U	0.05 U	0.05 U	0.005 U
ENDOSULFAN I	0.05 U	0.005 U	2.50 U	0.25 U	0.05 U	0.05 U	0.005 U
DIELDRIN	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
4,4'-DDE	0.10 U	0.010 U	5.00 U	8.1	0.10 U	0.10 U	0.010 U
ENDRIN	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
ENDOSULFAN II	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
4,4'-DDD	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
ENDRIN ALDEHYDE	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
ENDOSULFAN SULFATE	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
4,4'-DDT	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
METHOXYCHLOR	0.50 U	0.050 U	25.00 U	2.50 U	0.50 U	0.50 U	0.050 U
ENDRIN KETONE	0.10 U	0.010 U	5.00 U	0.50 U	0.10 U	0.10 U	0.010 U
CHLORDANE	0.50 U	0.050 U	25.00 U	2.50 U	0.50 U	0.50 U	0.050 U
TOXAPHENE	1.0 U	0.100 U	50.0 U	5.0 U	1.0 U	1.0 U	0.100 U
AROCLOR-1016	0.50 U	0.050 U	25.00 U	2.50 U	0.50 U	0.50 U	0.050 U
AROCLOR-1221	0.50 U	0.050 U	25.00 U	2.50 U	0.50 U	0.50 U	0.050 U
AROCLOR-1232	0.50 U	0.050 U	25.00 U	2.50 U	0.50 U	0.50 U	0.050 U
AROCLOR-1242	0.50 U	0.050 U	25.00 U	2.50 U	0.50 U	0.50 U	0.050 U
AROCLOR-1248	0.50 U	0.050 U	25.00 U	2.50 U	0.50 U	0.50 U	0.050 U
AROCLOR-1254	1.0 U	0.100 U	50.0 U	5.0 U	1.0 U	1.0 U	0.100 U
AROCLOR-1260	1.0 U	0.100 U	50.0 U	5.0 U	1.0 U	1.0 U	0.100 U
INORGANICS (ug/l)	V	V	V	V	V	V	V
SILVER	NA	8 U	50 U(Q)	8 U	10 U(Q)	NA	8 U
ARSENIC	40.0	10 U(Q)	33.4	80	24	55	34.6 (Q)
BERYLLIUM	NA	4 U	15 U	3 U	3 U	NA	4
CADMIUM	NA	5 U	25 U(Q)	4 U	6 (Q)	NA	5 U
CYANIDE	NA	10 U	100 U	NA	100 U	NA	10 U
CHROMIUM	30	111	450	16	9 U	30	185
COPPER	NA	12	75	1340	17	NA	38
IRON	NA	38000	35600	13600 (Q)	5260	NA	78000
MERCURY	NA	0.2 U	0.2 U	0.2 U(Q)	0.2 U	NA	0.2 U
NICKEL	72	127 U	360	318	22 U	85	231
NITRATE	NA	500	NA	100 U	NA	NA	200
LEAD	12	25.8 (Q)	119	5 U	34	27	35.9 (Q)
ANTIMONY	NA	50 U	220 U(Q)	48 U(Q)	44 U(Q)	NA	50 U
SELENIUM	NA	5 U(Q)	25 U(Q)	5 U	5 U(Q)	NA	5 U(Q)
THALLIUM	NA	10 U(Q)	10 U	10 U	10 U	NA	10 U(Q)
ZINC	67	74	685	1180	49	109	180

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep; (B) Detected in Blank.

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW08-002	MW09-001	MW09-002	MW10-001	MW10-002	MW11-001	MW11-002
Zone	S	S	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	NA	V	NA	V	Q	V	Q
CHLOROMETHANE		10 U		50 U	10 U	10 U	10 U
BROMOMETHANE		10 U		50 U	10 U	10 U	10 U
VINYL CHLORIDE		10 U		50 U	10 U	10 U	10 U
CHLOROETHANE		10 U		50 U	10 U	10 U	10 U
METHYLENE CHLORIDE		5 U		25 U	5 U	5 U	5 U
ACETONE		9 J		50 U	10 U	50	10 U
CARBON DISULFIDE		5 U		25 U	5 U	5 U	5 U
1,1-DICHLOROETHENE		5 U		25 U	5 U	5 U	5 U
1,1-DICHLOROETHANE		5 U		25 U	5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE		5 U		25 U	5 U	5 U	5 U
CHLOROFORM		5 U		25 U	5 U	5 U	5 U
1,2-DICHLOROETHANE		5 U		25 U	5 U	5 U	5 U
2-BUTANONE		10 U		50 U	10 U	10 U	10 U
1,1,1-TRICHLOROETHANE		5 U		25 U	5 U	5 U	5 U
CARBON TETRACHLORIDE		5 U		25 U	5 U	5 U	5 U
VINYL ACETATE		10 U		50 U	10 U	10 U	10 U
BROMODICHLOROMETHANE		5 U		25 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE		5 U		25 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE		5 U		25 U	5 U	5 U	5 U
TRICHLOROETHENE		5 U		25 U	5 U	5 U	5 U
DIBROMOCHLOROMETHANE		5 U		25 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE		5 U		25 U	5 U	5 U	5 U
BENZENE		5 U		8 J	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE		5 U		25 U	5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER		10 U		50 U	10 U	10 U	10 U
BROMOFORM		5 U		25 U	5 U	5 U	5 U
2-HEXANONE		10 U		50 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE		10 U		50 U	10 U	10 U	10 U
TETRACHLOROETHENE		5 U		25 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE		5 U		25 U	5 U	5 U	5 U
TOLUENE		5 U		25 U	5 U	5 U	5 U
CHLOROBENZENE		5 U		25 U	5 U	5 U	5 U
ETHYLBENZENE		5 U		25 U	8	5 U	3 J
STYRENE		5 U		25 U	5 U	5 U	5 U
TOTAL XYLENES		5 U		11 J	5 U	5 U	5 U
PESTICIDES/PCB (ug/l)	NA	V	NA	V	V	V	V
ALPHA-BHC		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
BETA-BHC		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
DELTA-BHC		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-BHC (LINDANE)		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
ALDRIN		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN I		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN ALDEHYDE		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE		0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
CHLORDANE		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1016		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1260		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U
INORGANICS (ug/l)	V	V	V	V	V	Q	V
SILVER	9 U	10 U(Q)	NA	10 U	8 U	10 U	8 U
ARSENIC	10 U	10 U	14	25	48	10 U	12
BERYLLIUM	2 U	3 U	NA	3 U	5	3 U	3 U
CADMIUM	5 U	5 U(Q)	NA	5 U	4 U	5 U	4 U
CYANIDE	NA	100 U	NA	100 U	NA	100 U	NA
CHROMIUM	27	9 U	99	9 U	62	102	29
COPPER	21	11	NA	10 U	21	31	14 U
IRON	NA	3300	NA	2320	44700 (Q)	91900	21900 (Q)
MERCURY	0.2 U	0.2 U	NA	0.2 U	0.2 U(Q)	0.2 U	0.2 U(Q)
NICKEL	35	29 U	53	29 U	70	131	24 U
NITRATE	NA	NA	NA	NA	100 U	NA	NA
LEAD	34	23	233	5 U	30	39	13
ANTIMONY	54 U	44 U(Q)	NA	44 U	48 U(Q)	44 U	48 U(Q)
SELENIUM	5 U	5 U(Q)	NA	5 U	5 U	5 U	5 U
THALLIUM	10 U	10 U	NA	10 U	10 U	10 U	10 U
ZINC	59	67	549	23	75	345	96

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid
(NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

007441

SOUTH CHVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	MW12-001	MW12-002	MW14-001	MW14-002	MW16-001	MW16-002	MW23-001
Zone	S	S	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	V	NA	V	NA	V	V	V
CHLOROETHANE	1000 U		1000 U		10 U	10 U	10 U
BROMOMETHANE	1000 U		1000 U		10 U	10 U	10 U
VINYL CHLORIDE	1000 U		1000 U		10 U	10 U	10 U
CHLOROETHANE	1000 U		1000 U		10 U	10 U	10 U
METHYLENE CHLORIDE	500 U		500 U		5 U	5 U	5 U
ACETONE	1000 U		430 J		170	150	10 U
CARBON DISULFIDE	500 U		500 U		5 U	5 U	5 U
1,1-DICHLOROETHENE	500 U		500 U		5 U	5 U	10 U
1,1-DICHLOROETHANE	500 U		500 U		5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	500 U		500 U		5 U	5 U	5 U
CHLOROFORM	500 U		500 U		5 U	3 J	5 U
1,2-DICHLOROETHANE	500 U		500 U		5 U	5 U	5 U
2-BUTANONE	1000 U		1000 U		10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	500 U		500 U		5 U	5 U	5 U
CARBON TETRACHLORIDE	500 U		500 U		5 U	5 U	5 U
VINYL ACETATE	1000 U		1000 U		10 U	10 U	10 U
BROMODICHLOROMETHANE	500 U		500 U		5 U	5 U	5 U
1,2-DICHLOROPROPANE	500 U		500 U		5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	500 U		500 U		5 U	5 U	5 U
TRICHLOROETHENE	500 U		500 U		5 U	5 U	5 U
DIBROMOCHLOROMETHANE	500 U		500 U		5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	500 U		500 U		5 U	5 U	5 U
BENZENE	500 U		830		5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	500 U		500 U		5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	1000 U		1000 U		10 U	10 U	10 U
BROMOFORM	500 U		500 U		5 U	5 U	5 U
2-HEXANONE	1000 U		1000 U		10 U	10 U	10 U
4-METHYL-2-PENTANONE	1000 U		1000 U		10 U	10 U	10 U
TETRACHLOROETHENE	500 U		500 U		5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	500 U		500 U		5 U	5 U	5 U
TOLUENE	500 U		640		5 U	5 U	5 U
CHLOROBENZENE	500 U		500 U		5 U	5 U	5 U
ETHYLBENZENE	500 U		500 U		5 U	5 U	5 U
STYRENE	500 U		500 U		5 U	5 U	5 U
TOTAL XYLENES	500 U		500 U		5 U	5 U	5 U
PESTICIDES/PCB (ug/l)	V	NA	V	V	V	V	V
ALPHA-BHC	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
BETA-BHC	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
DELTA-BHC	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
GAMMA-BHC (LINDANE)	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
ALDRIN	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN I	0.05 U		2.50 U	0.25 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.10 U		5.00 U	1.7	0.10 U	0.10 U	0.10 U
ENDRIN	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
ENDRIN ALDEHYDE	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR	0.50 U		25.00 U	2.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	0.10 U		5.00 U	0.50 U	0.10 U	0.10 U	0.10 U
CHLORDANE	0.50 U		25.00 U	2.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	1.0 U		50.0 U	5.0 U	1.0 U	1.0 U	1.00 U
AROCLOR-1016	0.50 U		25.00 U	2.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	0.50 U		25.00 U	2.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	0.50 U		25.00 U	2.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	0.50 U		25.00 U	2.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	0.50 U		25.00 U	2.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	1.0 U		50.0 U	5.0 U	1.0 U	1.0 U	1.00 U
AROCLOR-1260	1.0 U		50.0 U	5.0 U	1.0 U	1.0 U	1.00 U
INORGANICS (ug/l)	V	V	V	V	V	V	V
SILVER	10 U(Q)	NA	10 U(Q)	NA	10 U(Q)	9 U	9 U
ARSENIC	29.0	27	50	26	10 U	10 U	5 U
BERYLLIUM	3 U	NA	3 U	NA	3 U	3 U	2 U
CADMIUM	5 U(Q)	NA	5 U(Q)	NA	5 U(Q)	4 U	5 U
CYANIDE	100 U	NA	100 U	NA	100 U	NA	10 U
CHROMIUM	11	73	26	9 U	20	12	8 U
COPPER	11	NA	33	NA	10 U	14 U	16 U
IRON	9620	NA	22100	NA	428	314 (I)	2720
MERCURY	0.2 U	NA	0.2 U	NA	0.2 U	0.2 U	0.2 U
NICKEL	29 U	76	47	29	29 U	24 U	34 U
NITRATE	NA	NA	NA	NA	NA	200	400
LEAD	102	72	67	5 U	7	5 U	4 U
ANTIMONY	44 U(Q)	NA	44 U(Q)	NA	44 U(Q)	48 U	54 U
SELENIUM	5 U(Q)	NA	5 U(Q)	NA	5 U(Q)	5 U	4 U
THALLIUM	10 U	NA	10 U	NA	10 U	10 U	5 U(Q)
ZINC	60	141	75	17 U	24	17 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	P01-001	P01-002	P02-001	P02-002	P03-001	P03-002	P04-001
Zone	S	S	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	V	NA	V	NA	V	NA	V
CHLOROMETHANE	10 U		200 U		1000 U		10 U
BROMOMETHANE	10 U		200 U		1000 U		10 U
VINYL CHLORIDE	10 U		200 U		1000 U		10 U
CHLOROETHANE	10 U		200 U		1000 U		10 U
METHYLENE CHLORIDE	5 U		100 U		500 U		5 U
ACETONE	10 U		200 U		1000 J		10 U
CARBON DISULFIDE	5 U		100 U		500 U		5 U
1,1-DICHLOROETHENE	5 U		100 U		500 U		5 U
1,1-DICHLOROETHANE	5 U		100 U		500 U		5 U
TRANS-1,2-DICHLOROETHENE	5 U		100 U		500 U		5 U
CHLOROFORM	5 U		100 U		500 U		5 U
1,2-DICHLOROETHANE	5 U		100 U		500 U		5 U
2-BUTANONE	10 U		200 U		1000 U		10 U
1,1,1-TRICHLOROETHANE	5 U		100 U		500 U		5 U
CARBON TETRACHLORIDE	5 U		100 U		500 U		5 U
VINYL ACETATE	10 U		200 U		1000 U		10 U
BROMODICHLOROMETHANE	5 U		100 U		500 U		5 U
1,2-DICHLOROPROPANE	5 U		100 U		500 U		5 U
TRANS-1,3-DICHLOROPROPENE	5 U		100 U		500 U		5 U
TRICHLOROETHENE	5 U		100 U		500 U		5 U
DIBROMOCHLOROMETHANE	5 U		100 U		500 U		5 U
1,1,2-TRICHLOROETHANE	5 U		100 U		500 U		5 U
BENZENE	5 U		70 J		800		5 U
CIS-1,3-DICHLOROPROPENE	5 U		100 U		500 U		5 U
2-CHLOROETHYLVINYL ETHER	10 U		200 U		1000 U		10 U
BROMOFORM	5 U		100 U		500 U		5 U
2-HEXANONE	10 U		200 U		1000 U		10 U
4-METHYL-2-PENTANONE	10 U		200 U		1000 U		10 U
TETRACHLOROETHENE	5 U		100 U		500 U		5 U
1,1,2,2-TETRACHLOROETHANE	5 U		100 U		500 U		5 U
TOLUENE	5 U		33 J		740		5 U
CHLOROBENZENE	5 U		100 U		500 U		5 U
ETHYLBENZENE	5 U		85 J		500 U		5 U
STYRENE	5 U		100 U		500 U		5 U
TOTAL XYLENES	5 U		85 J		500 J		5 U
PESTICIDES/PCB (ug/l)	V	NA	V	NA	V	NA	V
ALPHA-BHC	0.05 U		0.05 U		0.05 U		0.05 U
BETA-BHC	0.05 U		0.05 U		0.05 U		0.05 U
DELTA-BHC	0.05 U		0.05 U		0.05 U		0.05 U
GAMMA-BHC (LINDANE)	0.05 U		0.05 U		0.05 U		0.05 U
HEPTACHLOR	0.05 U		0.05 U		0.05 U		0.05 U
ALDRIN	0.05 U		0.05 U		0.05 U		0.05 U
HEPTACHLOR EPOXIDE	0.05 U		0.05 U		0.05 U		0.05 U
ENDOSULFAN I	0.05 U		0.05 U		0.05 U		0.05 U
DIELDRIN	0.10 U		0.10 U		0.10 U		0.10 U
4,4'-DDE	0.10 U		0.10 U		0.10 U		0.10 U
ENDRIN	0.10 U		0.10 U		0.10 U		0.10 U
ENDOSULFAN II	0.10 U		0.10 U		0.10 U		0.10 U
4,4'-DDD	0.10 U		0.10 U		0.10 U		0.10 U
ENDRIN ALDEHYDE	0.10 U		0.10 U		0.10 U		0.10 U
ENDOSULFAN SULFATE	0.10 U		0.10 U		0.10 U		0.10 U
4,4'-DDT	0.10 U		0.10 U		0.10 U		0.10 U
METHOXYCHLOR	0.50 U		0.50 U		0.50 U		0.50 U
ENDRIN KETONE	0.10 U		0.10 U		0.10 U		0.10 U
CHLORDANE	0.50 U		0.50 U		0.50 U		0.50 U
TOXAPHENE	1.0 U		1.0 U		1.0 U		1.0 U
AROCLOR-1016	0.50 U		0.50 U		0.50 U		0.50 U
AROCLOR-1221	0.50 U		0.50 U		0.50 U		0.50 U
AROCLOR-1232	0.50 U		0.50 U		0.50 U		0.50 U
AROCLOR-1242	0.50 U		0.50 U		0.50 U		0.50 U
AROCLOR-1248	0.50 U		0.50 U		0.50 U		0.50 U
AROCLOR-1254	1.0 U		1.0 U		1.0 U		1.0 U
AROCLOR-1260	1.0 U		1.0 U		1.0 U		1.0 U
INORGANICS (ug/l)	Q	V	Q	V	V	V	Q
SILVER	10 U	NA	10 U	NA	10 U	NA	10 U
ARSENIC	10 U	10 U	30	26	29	10 U	14
BERYLLIUM	3 U	NA	3 U	NA	3 U	NA	3 U
CADMIUM	5 U	NA	5 U	NA	5 U	NA	5 U
CYANIDE	100 U	NA	100 U	NA	100 U	NA	100 U
CHROMIUM	13	9 U	9 U	9 U	21	24	9 U
COPPER	10 U	NA	10 U	NA	11	NA	10 U
IRON	4440	NA	7380	NA	20100	NA	6850
MERCURY	0.2 U	NA	0.2 U	NA	0.2 U	NA	0.2 U
NICKEL	30	24 U	64	24 U	29 U	44	57
NITRATE	NA	NA	100 U	NA	100 U	NA	NA
LEAD	15	5 U	5 U	5 U	18	8	5 U
ANTIMONY	44 U	NA	44 U	NA	44 U	NA	44 U
SELENIUM	5 U	NA	5 U	NA	5 U	NA	5 U
THALLIUM	10 U	NA	10 U	NA	10 U	NA	10 U
ZINC	14	17 U	33	17 U	63	41	53

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

007443

SOUTH CHARLCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	P04-002	P05-001	P05-002	DW01-001	DW01-002	DW02-001	DW02-002
Zone	S	S	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	NA	V	NA	V	NA	V	V
CHLOROMETHANE		100 U		10 U		1000 U	10 U
BROMOMETHANE		100 U		10 U		1000 U	10 U
VINYL CHLORIDE		100 U		10 U		1000 U	10 U
CHLOROETHANE		100 U		10 U		1000 U	10 U
METHYLENE CHLORIDE		50 U		5 U		500 U	5 U
ACETONE		78 J		130		1000 U	7 J
CARBON DISULFIDE		50 U		5 U		500 U	5 U
1,1-DICHLOROETHENE		50 U		5 U		500 U	5 U
1,1-DICHLOROETHANE		50 U		5 U		500 U	5 U
TRANS-1,2-DICHLOROETHENE		50 U		5 U		500 U	5 U
CHLOROFORM		50 U		5 U		500 U	5 U
1,2-DICHLOROETHANE		50 U		5 U		500 U	5 U
2-BUTANONE		100 U		18		1000 U	10 U
1,1,1-TRICHLOROETHANE		50 U		5 U		500 U	5 U
CARBON TETRACHLORIDE		50 U		5 U		500 U	5 U
VINYL ACETATE		100 U		10 U		1000 U	10 U
BROMODICHLOROMETHANE		50 U		5 U		500 U	5 U
1,2-DICHLOROPROPANE		50 U		5 U		500 U	5 U
TRANS-1,3-DICHLOROPROPENE		50 U		5 U		500 U	5 U
TRICHLOROETHENE		50 U		5 U		500 U	5 U
DIBROMOCHLOROMETHANE		50 U		5 U		500 U	5 U
1,1,2-TRICHLOROETHANE		50 U		5 U		500 U	5 U
BENZENE		50 U		5 U		500 U	4 J
CIS-1,3-DICHLOROPROPENE		50 U		5 U		500 U	5 U
2-CHLOROETHYLVINYL ETHER		100 U		10 U		1000 U	10 U
BROMOFORM		50 U		5 U		500 U	5 U
2-HEXANONE		100 U		10 U		1000 U	10 U
4-METHYL-2-PENTANONE		100 U		10 U		1000 U	10 U
TETRACHLOROETHENE		50 U		5 U		500 U	5 U
1,1,2,2-TETRACHLOROETHANE		50 U		5 U		500 U	5 U
TOLUENE		50 U		5 U		500 U	16
CHLOROBENZENE		50 U		5 U		500 U	5 U
ETHYLBENZENE		50 U		5 U		500 U	7
STYRENE		50 U		5 U		500 U	5 U
TOTAL XYLENES		50 U		5 U		500 U	13
PESTICIDES/PCB (ug/l)	NA	V	NA	V	V	V	NA
ALPHA-BHC		0.05 U		0.50 U	0.25 U	0.05 U	
BETA-BHC		0.05 U		110	0.57	0.05 U	
DELTA-BHC		0.05 U		0.50 U	0.25 U	0.05 U	
GAMMA-BHC (LINDANE)		0.05 U		0.50 U	0.25 U	0.05 U	
HEPTACHLOR		0.05 U		0.50 U	0.25 U	0.05 U	
ALDRIN		0.05 U		0.50 U	0.25 U	0.05 U	
HEPTACHLOR EPOXIDE		0.05 U		0.50 U	0.25 U	0.05 U	
ENDOSULFAN I		0.05 U		0.50 U	0.25 U	0.05 U	
DIELDRIN		0.10 U		1.00 U	0.50 U	0.10 U	
4,4'-DDE		0.10 U		1.00 U	0.50 U	0.10 U	
ENDRIN		0.10 U		1.00 U	0.50 U	0.10 U	
ENDOSULFAN II		0.10 U		1.00 U	0.50 U	0.10 U	
4,4'-DDD		0.10 U		1.00 U	0.50 U	0.10 U	
ENDRIN ALDEHYDE		0.10 U		1.00 U	0.50 U	0.10 U	
ENDOSULFAN SULFATE		0.10 U		1.00 U	0.50 U	0.10 U	
4,4'-DDT		0.10 U		1.00 U	0.50 U	0.10 U	
METHOXYCHLOR		0.50 U		5.00 U	2.50 U	0.50 U	
ENDRIN KETONE		0.10 U		1.00 U	0.50 U	0.10 U	
CHLORDANE		0.50 U		5.00 U	2.50 U	0.50 U	
TOXAPHENE		1.0 U		10.0 U	5.0 U	1.0 U	
AROCLOR-1016		0.50 U		5.00 U	2.50 U	0.50 U	
AROCLOR-1221		0.50 U		5.00 U	2.50 U	0.50 U	
AROCLOR-1232		0.50 U		5.00 U	2.50 U	0.50 U	
AROCLOR-1242		0.50 U		5.00 U	2.50 U	0.50 U	
AROCLOR-1248		0.50 U		5.00 U	2.50 U	0.50 U	
AROCLOR-1254		1.0 U		10.0 U	5.0 U	1.0 U	
AROCLOR-1260		1.0 U		10.0 U	5.0 U	1.0 U	
INORGANICS (ug/l)	V	V	V	V	V	V	V
SILVER	NA	10 U(Q)	NA	10 U(Q)	NA	10 U	NA
ARSENIC	10 U	10 U	10 U	166	156	69	63
BERYLLIUM	NA	3 U	NA	3 U	NA	3 U	NA
CADMIUM	NA	5 U(Q)	NA	5 U(Q)	NA	3 U	NA
CYANIDE	NA	100 U	NA	100 U	NA	100 U	NA
CHROMIUM	24	25	9 U	9 U	14	9 U	9 U
COPPER	NA	17	NA	10 U	NA	10 U	NA
IRON	NA	14400	NA	6230	NA	4580	NA
MERCURY	NA	0.2 U	NA	0.2 U	NA	0.2 U	NA
NICKEL	51	29 U	24 U	40	24 U	23 U	37
NITRATE	NA	NA	NA	NA	NA	NA	NA
LEAD	7	21	5 U	28	25	5 U	11
ANTIMONY	NA	44 U(Q)	NA	44 U(Q)	NA	44 U	NA
SELENIUM	NA	5 U(Q)	NA	5 U(Q)	NA	5 U	NA
THALLIUM	NA	10 U	NA	10 U	NA	10 U	NA
ZINC	57	87	19	73	54	29	17 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid
(NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

007444

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	0W06-001	0W06-002	0W07-001	0W07-002	0W08-001	0W08-002	0W03-001
Zone	D	D	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	V	Q	V	NA	V	NA	V
CHLOROMETHANE	10 U	10 U	10 U		10 U		10 U
BROMOMETHANE	10 U	10 U	10 U		10 U		10 U
VINYL CHLORIDE	10 U	10 U	10 U		10 U		10 U
CHLOROETHANE	10 U	10 U	10 U		10 U		10 U
METHYLENE CHLORIDE	5 U	3 J	5 U		5 U		5 U
ACETONE	51 B	10 U	10 U		10 U		10 U
CARBON DISULFIDE	5 U	5 U	5 U		5 U		5 U
1,1-DICHLOROETHENE	5 U	5 U	5 U		5 U		5 U
1,1-DICHLOROETHANE	5 U	5 U	5 U		5 U		5 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U	5 U		5 U		5 U
CHLOROFORM	5 U	5 U	5 U		5 U		5 U
1,2-DICHLOROETHANE	5 U	5 U	5 U		5 U		5 U
2-BUTANONE	10 U	10 U	10 U		10 U		10 U
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U		5 U		5 U
CARBON TETRACHLORIDE	5 U	5 U	5 U		5 U		5 U
VINYL ACETATE	10 U	10 U	10 U		10 U		10 U
BROMODICHLOROMETHANE	5 U	5 U	5 U		5 U		5 U
1,2-DICHLOROPROPANE	5 U	5 U	5 U		5 U		5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	5 U		5 U		5 U
TRICHLOROETHENE	5 U	5 U	5 U		5 U		5 U
DIBROMOCHLOROMETHANE	5 U	5 U	5 U		5 U		5 U
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U		5 U		5 U
BENZENE	5 J	5 U	5 U		5 U		5 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U	5 U		5 U		5 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U	10 U		10 U		10 U
BROMOFORM	5 U	5 U	5 U		5 U		5 U
2-HEXANONE	10 U	10 U	10 U		10 U		10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U		10 U		10 U
TETRACHLOROETHENE	5 U	5 U	5 U		5 U		5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	5 U		5 U		5 U
TOLUENE	5 U	5 U	5 U		5 U		5 U
CHLOROBENZENE	5 U	5 U	5 U		5 U		5 U
ETHYLBENZENE	5 U	5 U	5 U		5 U		5 U
STYRENE	5 U	3 J	5 U		5 U		5 U
TOTAL XYLENES	5 U	5 U	5 U		5 U		5 U
PESTICIDES/PCB (ug/l)	V	Q	V	NA	V	NA	V
ALPHA-BHC	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
BETA-BHC	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
DELTA-BHC	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
HEPTACHLOR	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
ALDRIN	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U		0.05 U		0.05 U
DIELDRIN	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
4,4'-DDE	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
ENDRIN	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
ENDOSULFAN II	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
4,4'-DDD	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
ENDRIN ALDEHYDE	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
ENDOSULFAN SULFATE	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
4,4'-DDT	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
METHOXYCHLOR	0.50 U	0.50 U	0.50 U		0.50 U		0.50 U
ENDRIN KETONE	0.10 U	0.10 U	0.10 U		0.10 U		0.10 U
CHLORDANE	0.50 U	0.50 U	0.50 U		0.50 U		0.50 U
TOXAPHENE	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U
AROCLOR-1016	0.50 U	0.50 U	0.50 U		0.50 U		0.50 U
AROCLOR-1221	0.50 U	0.50 U	0.50 U		0.50 U		0.50 U
AROCLOR-1232	0.50 U	0.50 U	0.50 U		0.50 U		0.50 U
AROCLOR-1242	0.50 U	0.50 U	0.50 U		0.50 U		0.50 U
AROCLOR-1248	0.50 U	0.50 U	0.50 U		0.50 U		0.50 U
AROCLOR-1254	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U
AROCLOR-1260	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U
INORGANICS (ug/l)	Q	V	Q	V	V	V	V
SILVER	10 U	8 U	10 U	NA	10 U	NA	10 U
ARSENIC	10 U	10 U	95	59	22	55	13.0
BERYLLIUM	3 U	3 U	20	NA	3 U	NA	5
CADMIUM	5 U	4 U	10	NA	9	NA	5 U
CYANIDE	100 U	NA	100 U	NA	100 U	NA	100 U
CHROMIUM	9 U	9 U	155	217	19	72	31
COPPER	10 U	14 U	85	NA	13	NA	21
IRON	35700	1430 (Q)	165000	NA	5340	NA	30400
MERCURY	0.2 U	0.2 U(Q)	0.2 U	NA	0.2 U	NA	0.2 U
NICKEL	60	42	107	241	29 U	102	29 U
NITRATE	NA	NA	NA	NA	NA	NA	NA
LEAD	23	5 U	159	148	28	52	40
ANTIMONY	44 U	48 U(Q)	44 U	NA	44 U	NA	44 U
SELENIUM	5 U	5 U	5 U	NA	5 U	NA	5 U
THALLIUM	10 U	10 U	10 U	NA	10 U	NA	10 U
ZINC	156	17 U	279	352	48	146	99

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid
(NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep; (B) Detected in Blank.

007445

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	OW09-002	OW10-001	OW10-002	OW11-001	OW11-002	OW13-001	OW13-002
Zone	S	S	S	S	S	S	S
VOLATILE ORGANICS (ug/l)	NA	V	V	V	V	V	NA
CHLOROMETHANE		200 U	100 U	1000 U	100 U	10 U	
BROMOMETHANE		200 U	100 U	1000 U	100 U	10 U	
VINYL CHLORIDE		200 U	100 U	1000 U	100 U	10 U	
CHLOROETHANE		200 U	100 U	1000 U	100 U	10 U	
METHYLENE CHLORIDE		140	52	500 U	60	5 U	
ACETONE		200 U	100 U	1000 J	100 U	10 U	
CARBON DISULFIDE		100 U	50 U	500 U	50 U	5 U	
1,1-DICHLOROETHENE		100 U	50 U	500 U	50 U	5 U	
1,1-DICHLOROETHANE		100 U	50 U	500 U	50 U	5 U	
TRANS-1,2-DICHLOROETHENE		100 U	50 U	500 U	50 U	5 U	
CHLOROFORM		100 U	50 U	500 U	50 U	5 U	
1,2-DICHLOROETHANE		100 U	50 U	500 U	50 U	5 U	
2-BUTANONE		200 U	100 U	1000 U	100 U	10 U	
1,1,1-TRICHLOROETHANE		100 U	50 U	500 U	50 U	5 U	
CARBON TETRACHLORIDE		100 U	50 U	500 U	50 U	5 U	
VINYL ACETATE		200 U	100 U	1000 U	100 U	10 U	
BROMODICHLOROMETHANE		100 U	50 U	500 U	50 U	5 U	
1,2-DICHLOROPROPANE		100 U	50 U	500 U	50 U	5 U	
TRANS-1,3-DICHLOROPROPENE		100 U	50 U	500 U	50 U	5 U	
TRICHLOROETHENE		100 U	50 U	500 U	50 U	5 U	
DIBROMOCHLOROMETHANE		100 U	50 U	500 U	50 U	5 U	
1,1,2-TRICHLOROETHANE		100 U	50 U	500 U	50 U	5 U	
BENZENE		290	380	500 J	300	5 U	
CIS-1,3-DICHLOROPROPENE		100 U	50 U	500 U	50 U	5 U	
2-CHLOROETHYLVINYL ETHER		200 U	100 U	1000 U	100 U	10 U	
BROMOFORM		100 U	50 U	500 U	50 U	5 U	
2-HEXANONE		200 U	100 U	1000 U	100 U	10 U	
4-METHYL-2-PENTANONE		200 U	100 U	1000 U	100 U	10 U	
TETRACHLOROETHENE		100 U	50 U	500 U	50 U	5 U	
1,1,2,2-TETRACHLOROETHANE		100 U	50 U	500 U	50 U	5 U	
TOLUENE		620	1000	590	1000	5 U	
CHLOROBENZENE		100 U	50 U	500 U	50 U	5 U	
ETHYLBENZENE		270	470	500 J	480	5 U	
STYRENE		100 U	200	500 U	66	5 U	
TOTAL XYLENES		960	1100	500 J	850	5 U	
PESTICIDES/PCB (ug/l)	NA	V	V	V	NA	V	NA
ALPHA-BHC		0.05 U	0.05 U	0.25 U		0.05 U	
BETA-BHC		0.05 U	0.05 U	0.25 U		0.05 U	
DELTA-BHC		0.05 U	0.05 U	0.25 U		0.05 U	
GAMMA-BHC (LINDANE)		0.05 U	0.05 U	0.25 U		0.05 U	
HEPTACHLOR		0.05 U	0.05 U	0.25 U		0.05 U	
ALDRIN		0.05 U	0.05 U	0.25 U		0.05 U	
HEPTACHLOR EPOXIDE		0.05 U	0.05 U	0.25 U		0.05 U	
ENDOSULFAN I		0.05 U	0.05 U	0.25 U		0.05 U	
DIELDRIN		0.10 U	0.10 U	0.50 U		0.10 U	
4,4'-DDE		0.10 U	0.10 U	0.50 U		0.10 U	
ENDRIN		0.10 U	0.10 U	0.50 U		0.10 U	
ENDOSULFAN II		0.10 U	0.10 U	0.50 U		0.10 U	
4,4'-DDD		0.10 U	0.10 U	0.50 U		0.10 U	
ENDRIN ALDEHYDE		0.10 U	0.10 U	0.50 U		0.10 U	
ENDOSULFAN SULFATE		0.10 U	0.10 U	0.50 U		0.10 U	
4,4'-DDT		0.10 U	0.10 U	0.50 U		0.10 U	
METHOXYCHLOR		0.50 U	0.50 U	2.50 U		0.50 U	
ENDRIN KETONE		0.10 U	0.10 U	0.50 U		0.10 U	
CHLORDANE		0.50 U	0.50 U	2.50 U		0.50 U	
TOXAPHENE		1.0 U	1.0 U	5.0 U		1.0 U	
AROCLOR-1016		0.50 U	0.50 U	2.50 U		0.50 U	
AROCLOR-1221		0.50 U	0.50 U	2.50 U		0.50 U	
AROCLOR-1232		0.50 U	0.50 U	2.50 U		0.50 U	
AROCLOR-1242		0.50 U	0.50 U	2.50 U		0.50 U	
AROCLOR-1248		0.50 U	0.50 U	2.50 U		0.50 U	
AROCLOR-1254		1.0 U	1.0 U	5.0 U		1.0 U	
AROCLOR-1260		1.0 U	1.0 U	5.0 U		1.0 U	
INORGANICS (ug/l)	V	V	V	V	V	V	V
SILVER	NA	10 U	8 U	50 U	NA	10 U(Q)	NA
ARSENIC	10 U	35	15	522	10 U	10 U	10 U
BERYLLIUM	NA	3 U	9	15 U	NA	3 U	NA
CADMIUM	NA	5 U	4 U	25 U	NA	5 U(Q)	NA
CYANIDE	NA	100 U	NA	5000 U	NA	100 U	NA
CHROMIUM	17	42	151	45 U	9 U	30	33
COPPER	NA	33	76	50 U	NA	13	NA
IRON	NA	35500	130000	10500	NA	10000	NA
MERCURY	NA	0.2 U	0.2 U	0.2 U	NA	0.2 U	NA
NICKEL	42	87	157	395	32	54	60
NITRATE	NA	100 U	400	NA	NA	NA	NA
LEAD	20	257	19	28	9	46	25
ANTIMONY	NA	67	48 U	220 U	NA	44 U(Q)	NA
SELENIUM	NA	5 U	5 U	25 U	NA	5 U(Q)	NA
THALLIUM	NA	10 U	10 U	50 U	NA	10 U	NA
ZINC	36	116	303	490	28	76	56

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid (NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

007446

SOUTH CAVALCADE SITE - GROUNDWATER ANALYTICAL RESULTS

Sample Number	GW14-001	GW14-002	GW02-001	GW02-002
Zone	S	S	D	D
VOLATILE ORGANICS (ug/l)	V	V	V	NA
CHLOROMETHANE	10 U	10 U	10 U	
BROMOMETHANE	10 U	10 U	10 U	
VINYL CHLORIDE	10 U	10 U	10 U	
CHLOROETHANE	10 U	10 U	10 U	
METHYLENE CHLORIDE	5 U	5 U	5 U	
ACETONE	12	10 U	10 U	
CARBON DISULFIDE	5 U	5 U	5 U	
1,1-DICHLOROETHENE	5 U	5 U	5 U	
1,1-DICHLOROETHANE	5 U	5 U	5 U	
TRANS-1,2-DICHLOROETHENE	5 U	5 U	5 U	
CHLOROFORM	5 U	5 U	5 U	
1,2-DICHLOROETHANE	5 U	5 U	5 U	
2-BUTANONE	10 U	10 U	10 U	
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U	
CARBON TETRACHLORIDE	5 U	5 U	5 U	
VINYL ACETATE	10 U	10 U	5 U	
BROMODICHLOROMETHANE	5 U	5 U	5 U	
1,2-DICHLOROPROPANE	5 U	5 U	5 U	
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	
TRICHLOROETHENE	5 U	5 U	5 U	
DIBROMOCHLOROMETHANE	5 U	5 U	5 U	
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U	
BENZENE	5 U	5 U	5 U	
CIS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	
2-CHLOROETHYLVINYL ETHER	10 U	10 U	10 U	
BROMOFORM	5 U	5 U	5 U	
2-HEXANONE	10 U	10 U	10 U	
4-METHYL-2-PENTANONE	10 U	10 U	10 U	
TETRACHLOROETHENE	5 U	5 U	5 U	
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	5 U	
TOLUENE	9	11	5 U	
CHLOROBENZENE	5 U	5 U	5 U	
ETHYLBENZENE	10	13	5 U	
STYRENE	5 U	5 U	5 U	
TOTAL XYLENES	37	30	5 U	
PESTICIDES/PCB (ug/l)	V	NA	V	NA
ALPHA-BHC	0.05 U		0.05 U	
BETA-BHC	0.05 U		0.05 U	
DELTA-BHC	0.05 U		0.05 U	
GAMMA-BHC (LINDANE)	0.05 U		0.05 U	
HEPTACHLOR	0.05 U		0.05 U	
ALDRIN	0.05 U		0.05 U	
HEPTACHLOR EPOXIDE	0.05 U		0.05 U	
ENDOSULFAN I	0.05 U		0.05 U	
DIELDRIN	0.10 U		0.10 U	
4,4'-DDE	0.10 U		0.10 U	
ENDRIN	0.10 U		0.10 U	
ENDOSULFAN II	0.10 U		0.10 U	
4,4'-DDD	0.10 U		0.10 U	
ENDRIN ALDEHYDE	0.10 U		0.10 U	
ENDOSULFAN SULFATE	0.10 U		0.10 U	
4,4'-DDT	0.10 U		0.10 U	
METHOXYCHLOR	0.50 U		0.50 U	
ENDRIN KETONE	0.10 U		0.10 U	
CHLORDANE	0.50 U		0.50 U	
TOXAPHENE	1.0 U		1.00 U	
AROCLOR-1016	0.50 U		0.50 U	
AROCLOR-1221	0.50 U		0.50 U	
AROCLOR-1232	0.50 U		0.50 U	
AROCLOR-1242	0.50 U		0.50 U	
AROCLOR-1248	0.50 U		0.50 U	
AROCLOR-1254	1.0 U		1.00 U	
AROCLOR-1260	1.0 U		1.00 U	
INORGANICS (ug/l)	V	V	V	V
SILVER	10 U	NA	8 U	8 U
ARSENIC	83.0	41	10 U	10 U
BERYLLIUM	6	NA	2 U	2 U
CADMIUM	5 U	NA	3 U	5 U
CYANIDE	100 U	NA	10 U	10 U
CHROMIUM	68	56	7 U	9 U
COPPER	14	NA	15 U	9 U
IRON	39500	NA	80	78 U
MERCURY	0.2 U	NA	0.2 U	0.2 U
NICKEL	29 U	66	25 U	25 U
NITRATE	NA	NA	100 U	100 U
LEAD	29	20	5 U	5 U
ANTIMONY	44 U	NA	50 U	50 U
SELENIUM	5 U	NA	5 U	5 U
THALLIUM	10 U	NA	10 U(Q)	10 U(Q)
ZINC	121	80	12 U	9 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (I) Invalid
(NV) Not validated; (Q) Qualified; (S) Shallow; (D) Deep.

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APPENDIX R – FIELD ANALYTICAL DATA QUALITY ASSURANCE REPORT

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APPENDIX R

FIELD ANALYTICAL DATA QUALITY ASSURANCE REPORT

1.0 General

An assessment of the field quality assurance analytical test data from the surface water/sediment, soil boring, and groundwater analytical testing programs was conducted to evaluate quality assurance objectives. The field analytical data quality assurance program generally consisted of analysis of duplicates, field blanks, and trip blanks. The field analytical data quality assurance program generally followed guidelines established in the Field Sampling and Analytical Plan.

2.0 Field Analytical Data QA Sample Totals

2.1 Surface Water/Sediment QA Sample Totals. Table R-1 presents a summary of the surface water and sediment QA sample totals. The percent completed objectives met the percent required objectives for the duplicates, field blanks, and trip blanks of both media.

2.2 Soil QA Sample Totals. Table R-2 presents a summary of the soil QA sample totals. The percent completed objective for the total samples analyzed was exceeded, but the duplicate objective was not met.

2.3 Groundwater QA Sample Totals. Table R-3 presents a summary of the groundwater QA sample totals. The percent completed objectives were exceeded for the duplicates, field blanks, and trip blanks.

3.0 QA Data Analytical Results Tables. Complete summaries of the field quality assurance analytical test data is

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TABLE R-1
SURFACE WATER AND SEDIMENT QA SAMPLE TOTALS

	Surface Water				Sediment			
	Required	Completed	% Required	% Completed	Required	Completed	% Required	%Completed
SAMPLE ROUNDS	2	2	NA	NA	2	2	NA	NA
SAMPLES[1]	8	10	NA	NA	10	12	NA	NA
DUPLICATES	2	2	1/round	100	2	2	1/round	100
FIELD BLANKS	2	2	1/round	100	2	2	1/round	100
TRIP BLANKS	2	2	1/lot	100	2	2	1/lot	100

NOTES:

1. Does not include duplicates, field blanks, or trip blanks.
2. NA = Not applicable.

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TABLE R-2
SOIL QA SAMPLE TOTALS

	SOIL			
	Required	Completed	% Required	% Completed
SAMPLES[1]	58[2]	82	15	21
DUPLICATES	9	6	10	7.3

NOTES:
1. Does not include duplicates.
2. Value based on 15 percent of number of sampl s-of-record analyzed in the fluorescence surrogate testing program, which was 389.

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TABLE R-3
GROUNDWATER QA SAMPLE TOTALS

	GROUNDWATER			
	Required	Completed	% Required	% Completed[1]
SAMPLES ROUNDS[2]	2	2	NA	NA
SAMPLES[3]	60	60	NA	NA
DUPLICATES	6	9	10	15
FIELD BLANKS	3	8	5	13
TRIP BLANKS	9	10	1/lot	111[4]

NOTES:
1. % Required/% Completed based on total number of samples-of-record and does not include duplicates, field blanks, or trip blanks.
2. Round 2 samples not taken for Monitoring Wells SCK-MW05 and SCK-MW23.
3. Does not include duplicates, field blanks, or trip blanks.
4. Value based on number of sample lots taken for volatiles analysis, which was nine.
5. NA = Not applicable.

presented in the computer printouts after Table R-7. The printouts present the samples-of-record and their corresponding duplicates and splits grouped together, and are followed by the field blanks and trip blanks. The field blank and trip blank numbers for their corresponding samples-of-record are referenced below the sample-of-record. The data validation status of each sample, including QA samples, is also presented.

4.0 Data Quality Objectives: Precision

Precision is the measure of the variability of individual sample measurements and is inferred through the use of replicate samples. If replicate samples contain identical contaminant concentrations, any variability in the laboratory analysis must be due to variability induced by sampling, handling, or laboratory procedures.

Precision is reported as Percent Relative Standard Deviation (RSD). The lower the RSD, the more precise the data. The equation for calculating Precision (RSD) is:

$$RSD = \frac{2 \cdot (OR-DR)}{(OR+DR)} \times (100/\sqrt{2})$$

where OR = original (sample) result
DR = duplicate (sample) result

If OR or DR are less than the method detection limit, precision cannot be quantified.

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The calculated results of RSD on duplicate and split samples with CDM are summarized in Tables R-4 through R-7. The average values of RSD are calculated only from the values within the tables showing concentrations above the minimum detection level.

Some levels shown in the tables are outside of the historic CLP data. This is most likely caused by the inhomogeneity of the collected samples rather than the analytical techniques. The historic CLP data are generated from analysis of homogeneous samples and concentrates and are not subject to sampling errors. In most cases a similar range of RSD occurs within each sample for the parameters tested. An example can be seen in Table R-4 where the sample/duplicate pair designated as A contains RSD values in the 50 percent range, except for naphthalene which was at 66 percent; this again is evidence of sample inhomogeneity.

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5.0 Data Quality Objectives: Blank Data Usage

Data from analysis of field blanks and trip blanks were used to assess field equipment cleaning procedures and laboratory sample handling procedures. Blank data were used in the data validation process and assisted in discriminating between existing site sample media contaminants and contaminants introduced to sample media through field and laboratory procedures. A more detailed discussion of data validation criteria and assessment of blank data is presented in Appendix E, Volume 3.

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TABLE R-4
SUMMARY OF RSD FOR SOIL SAMPLE ANALYSES[1]

PARAMETERS	SAMPLE DESIGNATION[2]												
	A	B	C	D	E	F	G	H	I	J	K	L	AVE. RSD
SEMI-VOLATILES													
NAPHTHALENE	66.0	-	25.0										45.5
2-METHYLNAPHTHALENE	59.2	-	-										59.2
DIBENZOFURAN	57.9	-	-										57.9
PHENANTHRENE	57.9	57.6	17.7										44.4
ANTHRACENE	51.1	-	-										51.1
FLUORANTHENE	57.6	38.6	24.4										40.2
PYRENE	54.4	47.1	18.9										40.1
ACENAPHTHENE	-	-	24.6										24.6
FLUORENE	-	-	31.0										31.0
BIS(2-ETHYLHEXYL) PHTHALATE	-	-	3.72										3.72
INORGANICS													
IRON	92.1	-	-	12.2	49.7	86.5	87.4	50.4	28.0	8.43	9.96	15.1	44.0
ARSENIC	-	-	-	57.1	-	-	-	38.8	10.9	-	0	-	35.6
CHROMIUM	-	-	-	13.6	-	38.6	8.07	4.78	0	0	2.57	14.1	10.2
LEAD	-	-	-	12.7	-	24.1	3.91	4.31	11.5	6.07	14.6	2.53	10.0
ZINC	-	-	-	21.2	-	31.0	9.18	1.23	15.7	14.1	79.4	6.73	22.3
COPPER	-	-	-	-	-	97.3	74.9	3.25	-	-	0	-	43.7

NOTES:
1. Results are calculated only for parameters with detectable levels in both the sample and duplicate.
2. Sample designation symbol is for purposes of this table only. Samples-of-record are given below; Sample ID/Duplicate ID:

A:A01-SB06-18/A37-SB04-12
B:A08-SB02-27/A42-SB03-12
C:A13-SB01-10/A37-SB05-21
D:A01-SB06-24/FD24(CDM)
E:A01-SB07-06/FD23(CDM)
F:A01-SB09-07/FC900(CDM)
G:A01-SB10-07/MFC190(CDM)
H:A06-SB06-31/A43-SB01-15
I:A08-SB02-27/A42-SB03-12
J:A13-SB01-10/A37-SB05-21
K:A17-SB02-31/A35-SB09-15
L:A26-SB07-23/A33-SB04-16

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TABLE R-5
SUMMARY OF RSD FOR GROUNDWATER SAMPLE ANALYSES[1]

PARAMETERS	SAMPLE DESIGNATION[2]										
	A	B	C	D	E	F	G	H	I	J	AVE. RSD
VOLATILES											
ACETONE	2.40										2.40
SEMI-VOLATILES											
2,4-DIMETHYLPHENOL		26.2	-	-	23.6						24.9
DI-N-BUTYLPHTHALATE		-	33.7	-	-						33.7
PYRENE		-	0	-	-						0
NAPHTHALENE		-		43.6	18.4						31.0
PHENANTHRENE		-	-	33.4	-						33.4
METALS											
ARSENIC		3.36	50.5	28.4	-	-	22.7	24.1	-	-	25.8
IRON		128	48.1	54.9	1.79	2.99	-	7.74	-	44.9	41.2
NICKEL		57.2	36.6	-	-	6.49	5.17	-	-	-	26.4
LEAD		51.6	59.3	16.0	-	23.6	11.0	-	4.29	-	27.6
ZINC		77.7	54.4	47.1	-	1.66	6.80	0	11.7	-	28.5
CHROMIUM		-	67.9	17.0	-	32.9	28.3	-	11.3	-	31.5
COPPER		-	43.9	-	-	-	-	-	-	-	43.9
NITRATE		-	47.1	-	-	-	-	-	-	0	23.6

Notes:
1. Results are calculated only for parameters with detectable levels in both the sample and duplicate.
2. Sample designation symbol is for purposes of this table only. Samples-of-record are given below; Sample ID/Duplicate ID:

A:MW16-002/MW13-002
B:MW01-001/MW19-001
C:MW08-001/FD273(CDM)
D:MW12-001/MW20-001
E:OW02-001/MW13-001
F:MW03-002/MW19-002
G:MW07-002/MW20-002
H:OW02-001/MW13-001
I:MW08-002/MW99
J:MW16-002/MW13-002

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TABLE R-6
SUMMARY OF RSD FOR SEDIMENT SAMPLE ANALYSES[1]

METALS	SAMPLE DESIGNATION[2] A	B	AVE. RSD
ARSENIC	8.84	-	8.84
CHROMIUM	94.3	-	94.3
COPPER	4.68	-	4.68
IRON	42.2	-	42.2
MERCURY	2.40	-	2.40
LEAD	18.1	60.6	39.4
ZINC	66.0	56.2	61.1
VOLATILES			
METHYLENE CHLORIDE	10.0		10.0

Notes:
1. Results are calculated only for parameters with detectable levels in both the sample and duplicate.
2. Sample designation symbol is for purposes of this table only. Samples-of-record are given below; Sample ID/Duplicate ID:

   A:SD03-01/SD06-01
   B:SD01-02/SD07-01

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TABLE R-7
SUMMARY OF RSD FOR SURFACE WATER SAMPLE ANALYSES[1]

SAMPLE DESIGNATION[2]

METALS	A	B	AVE. RSD
ARSENIC	6.73	0	3.4
IRON	16.0	8.84	12.4
ZINC	7.22	26.1	16.7
LEAD	-	37.4	37.4

Notes:
1. Results are calculated only for parameters with detectable levels in both the sample and duplicate.
2. Sample designation symbol is for purposes of this table only. Samples-of-record are given below; Sample ID/ Duplicate ID:

   A:SW03-01/SW05-01
   B:SW01-02/SW06-01

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SOUTH CAVALCADE SITE - SURFACE WATER QA ANALYTICAL RESULTS

Sample Number	SW03-01	SW05-01	SW01-02	SW06-01	SW07-01	SW08-01
QA/QC PAIR (O) Original (B) Blank (D) Duplicate	O	D	O	D	B	B
SAMPLING ROUND	1	1	2	2	1	2
FIELD BLANK NUMBER	SW07-01	SW07-01	SW08-01	SW08-01		
SEMIVOLATILE ORGANICS (ug/l)						
Validation Status :	V	V	V	V	V	V
PHENOL	20 U	10 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	20 U	10 U	10 U	10 U	10 U	10 U
2-CHLOROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
1,3-DICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
BENZYL ALCOHOL	20 U	10 U	10 U	10 U	10 U	10 U
1,2-DICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
2-METHYLPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	20 U	10 U	10 U	10 U	10 U	10 U
4-METHYLPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
N-NITROSODIPROPYLAMINE	20 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROETHANE	20 U	10 U	10 U	10 U	10 U	10 U
NITROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
ISOPHORONE	20 U	10 U	10 U	10 U	10 U	10 U
2-NITROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
2,4-DIMETHYLPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
BENZOIC ACID	100 U	50 U	50 U	50 U	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	20 U	10 U	10 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
NAPHTHALENE	20 U	10 U	10 U	10 U	10 U	10 U
4-CHLOROANILINE	20 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROBUTADIENE	20 U	10 U	10 U	10 U	10 U	10 U
P-CHLORO-M-CRESOL	20 U	10 U	10 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	20 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	20 U	10 U	10 U	10 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	100 U	50 U	50 U	50 U	50 U	50 U
2-CHLORONAPHTHALENE	20 U	10 U	10 U	10 U	10 U	10 U
2-NITROANILINE	100 U	50 U	50 U	50 U	50 U	50 U
DIMETHYL PHTHALATE	20 U	10 U	10 U	10 U	10 U	10 U
ACENAPHTHYLENE	20 U	10 U	10 U	10 U	10 U	10 U
3-NITROANILINE	100 U	50 U	50 U	50 U	50 U	50 U
ACENAPHTHENE	20 U	10 U	10 U	10 U	10 U	10 U
2,4-DINITROPHENOL	100 U	50 U	50 U	50 U	50 U	50 U
4-NITROPHENOL	100 U	50 U	50 U	50 U	50 U	50 U
DIBENZOFURAN	20 U	10 U	10 U	10 U	10 U	10 U
2,4-DINITROTOLUENE	20 U	10 U	10 U	10 U	10 U	10 U
2,6-DINITROTOLUENE	20 U	10 U	10 U	10 U	10 U	10 U
DIETHYL PHTHALATE	20 J	10 U	10 U	10 U	10 U	10 U
4-CHLOROPHENYL PHENYL ETHER	20 U	10 U	10 U	10 U	10 U	10 U
FLUORENE	20 U	10 U	10 U	10 U	10 U	10 U
4-NITROANILINE	100 U	50 U	50 U	50 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	100 U	50 U	50 U	50 U	50 U	50 U
N-NITROSODIPHENYLAMINE	20 U	10 U	10 U	10 U	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	20 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
PENTACHLOROPHENOL	100 U	50 U	50 U	50 U	50 U	50 U
PHENANTHRENE	20 J	10 J	10 U	10 U	10 U	10 U
ANTHRACENE	20 U	10 U	10 U	10 U	10 U	10 U
DI-N-BUTYL PHTHALATE	20 U	10 U	10 U	10 U	10 U	10 U
FLUORANTHENE	20 U	10 U	10 U	10 U	10 U	10 U
PYRENE	20 U	10 U	10 U	10 U	10 U	10 U
BUTYL BENZYL PHTHALATE	20 U	10 U	10 U	10 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	40 U	20 U	20 U	20 U	20 U	20 U
BENZO(A)ANTHRACENE	20 U	10 U	10 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	20 U	10 U	23	10 J	10 U	11
CHRYSENE	20 U	10 U	10 U	10 U	10 U	10 U
DI-N-OCTYL PHTHALATE	20 U	10 U	10 U	10 U	10 U	10 U
BENZO(B)FLUORANTHENE	20 U	10 U	10 U	10 U	10 U	10 U
BENZO(K)FLUORANTHENE	20 U	10 U	10 U	10 U	10 U	10 U
BENZO(A)PYRENE	20 U	10 U	10 U	10 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	20 U	10 U	10 U	10 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	20 U	10 U	10 U	10 U	10 U	10 U
BENZO(GHI)PERYLENE	20 U	10 U	10 U	10 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (V) Valid; (Q) Qualified; (NV) Not validated.

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SOUTH CAVALCADE SITE - SURFACE WATER QA ANALYTICAL RESULTS

Sample Number	SW03-01	SW05-01	SW01-02	SW06-01	SW07-01	SW08-01	TRIP BLANK 1
QA/QC PAIR (O) Original (B) Blank (D) Duplicate	O	O	O	D	B	B	B
SAMPLING ROUND	1	1	2	2	1	2	1
FIELD BLANK NUMBER	SW07-01	SW07-01	SW08-01	SW08-01			
TRIP BLANK NUMBER	1	1	2	2	1	2	
VOLATILE ORGANICS (ug/l)							
Validation Status :	V	V	NA	NA	V	Q	V
CHLOROMETHANE	10 U	10 U			10 U	10 U	10 U
BROMOMETHANE	10 U	10 U			10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U			10 U	10 U	10 U
CHLOROETHANE	10 U	10 U			10 U	10 U	10 U
METHYLENE CHLORIDE	5 J	5 U			7700	5 U	5 U
ACETONE	10	10 U			21000	10 U	10
CARBON DISULFIDE	5 U	5 J			5 U	5 U	5 U
1,1-DICHLOROETHENE	5 U	5 U			5 U	5 U	5 U
1,1-DICHLOROETHANE	5 U	5 U			5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U			5 J	5 U	5 U
CHLOROFORM	5 U	5 U			5 U	5 U	5 U
1,2-DICHLOROETHANE	5 U	5 U			5 U	5 U	5 U
2-BUTANONE	10 U	10 U			10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	5 U	5 U			5 U	5 U	5 U
CARBON TETRACHLORIDE	5 U	5 U			5 U	5 U	5 U
VINYL ACETATE	10 U	10 U			10 U	10 U	10 U
BROMODICHLOROMETHANE	5 U	5 U			5 U	5 U	5 U
1,2-DICHLOROPROPANE	5 U	5 U			5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U			5 U	5 U	5 U
TRICHLOROETHENE	5 U	5 U			5 U	5 U	5 U
DIBROMOCHLOROMETHANE	5 U	5 U			5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5 U	5 U			5 U	5 U	5 U
BENZENE	5 J	5 U			15	5 U	5 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U			5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U			10 U	10 U	10 U
BROMOFORM	5 U	5 U			5 U	5 U	5 U
2-HEXANONE	10 U	10 U			10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U			10 U	10 U	10 U
TETRACHLOROETHENE	5 U	5 U			5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U			5 U	5 U	5 U
TOLUENE	5 J	5 U			5 U	5 U	5 U
CHLOROBENZENE	5 U	5 U			5 U	5 U	5 U
ETHYLBENZENE	5 U	5 U			5 U	5 U	5 U
STYRENE	5 U	5 U			5 U	5 U	5 U
TOTAL XYLENES	5 U	5 U			5 U	5 U	5 U
TOTAL PETROLEUM HYDROCARBONS (mg/l)	5.0 U	5.0 U	5.00 U	5.00 U	5.0 U	5.00 U	NA
INORGANICS (ug/l)							
Validation Status :	V	V	V	V	V	V	NA
SILVER	11	9 U	10 U	10 U	9 U	10 U	
ARSENIC	50	55	16	16	10 U	10 U	
BERYLLIUM	2 U	2 U	3 U	3 U	2 U	3 U	
CADMIUM	4 U	4 U	5 U	5 U	4 U	5 U	
CYANIDE	100 U	100 U	10 U	10 U	100 U	10 U	
CHROMIUM	9 U	9 U	9 U	9 U	9 U	9 U	
COPPER	10 U	10 U	10 U	10 U	10 U	10 U	
IRON	540	430	680	600	38 U	30 U	
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
NICKEL	20 U	20 U	29 U	29 U	20 U	29 U	
LEAD	7.3	5 U	6.4	11	5 U	12	
ANTIMONY	60 U	60 U	44 U	44 U	60 U	44 U	
SELENIUM	5 U	5 U	5 U	5 U	5 U	5 U	
THALLIUM	10 U	10 U	10 U	10 U	10 U	10 U	
ZINC	51	47	31	45	9 U	8 U	

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid (NV) Not validated; (Q) Qualified.

007460

SOUTH CAVALCADE SITE - SURFACE WATER QA ANALYTICAL RESULTS

Sample Number	TRIP BLANK 2
QA/QC PAIR	
(S) Original	B
(B) Blank	
(D) Duplicate	
SAMPLING ROUND	2
FIELD BLANK NUMBER	
TRIP BLANK NUMBER	
VOLATILE ORGANICS (ug/l)	
Validation Status :	V
CHLOROMETHANE	10 U
BROMOMETHANE	10 U
VINYL CHLORIDE	10 U
CHLOROETHANE	10 U
METHYLENE CHLORIDE	5 U
ACETONE	10 U
CARBON DISULFIDE	5 U
1,1-DICHLOROETHENE	5 U
1,1-DICHLOROETHANE	5 U
TRANS-1,2-DICHLOROETHENE	5 U
CHLOROFORM	5 U
1,2-DICHLOROETHANE	5 U
2-BUTANONE	10 U
1,1,1-TRICHLOROETHANE	5 U
CARBON TETRACHLORIDE	5 U
VINYL ACETATE	10 U
BROMODICHLOROMETHANE	5 U
1,2-DICHLOROPROPANE	5 U
TRANS-1,3-DICHLOROPROPENE	5 U
TRICHLOROETHENE	5 U
DIBROMOCHLOROMETHANE	5 U
1,1,2-TRICHLOROETHANE	5 U
BENZENE	5 U
CIS-1,3-DICHLOROPROPENE	5 U
2-CHLOROETHYLVINYL ETHER	10 U
BROMOFORM	5 U
2-HEXANONE	10 U
4-METHYL-2-PENTANONE	10 U
TETRACHLOROETHENE	5 U
1,1,2,2-TETRACHLOROETHANE	5 U
TOLUENE	5 U
CHLOROBENZENE	5 U
ETHYLBENZENE	5 U
STYRENE	5 U
TOTAL XYLENES	5 U
TOTAL PETROLEUM HYDROCARBONS (mg/l)	NA
INORGANICS (ug/l)	
Validation Status :	NA
SILVER	
ARSENIC	
BERYLLIUM	
CADMIUM	
CYANIDE	
CHROMIUM	
COPPER	
IRON	
MERCURY	
NICKEL	
LEAD	
ANTIMONY	
SELENIUM	
THALLIUM	
ZINC	

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid (NV) Not validated; (Q) Qualified.

007461

SOUTH CAVALCADE SITE - SEDIMENT QA ANALYTICAL RESULTS

Sample Number	S003-01	S006-01	S001-02	S007-01	S008-00	S009-01
QA\QC PAIR (O) Original (B) Blank (D) Duplicate	O	D	O	D	B	B
SAMPLING ROUND	1	1	2	2	1	2
FIELD BLANK NUMBER	S008-00	S008-00	S009-01	S009-01		
SEMIVOLATILE ORGANICS (ug/kg)						
Validation Status :	V	V	V	V	V	V
PHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	17000 U	19000 U	460 U	440 U	10 U	10 U
2-CHLOROPHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
1,3-DICHLOROBENZENE	17000 U	19000 U	460 U	440 U	10 U	10 U
1,4-DICHLOROBENZENE	17000 U	19000 U	460 U	440 U	10 U	10 U
BENZYL ALCOHOL	17000 U	19000 U	460 U	440 U	10 U	10 U
1,2-DICHLOROBENZENE	17000 U	19000 U	460 U	440 U	10 U	10 U
2-METHYLPHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	17000 U	19000 U	460 U	440 U	10 U	10 U
4-METHYLPHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
N-NITROSODIPROPYLAMINE	17000 U	19000 U	460 U	440 U	10 U	10 U
HEXACHLOROETHANE	17000 U	19000 U	460 U	440 U	10 U	10 U
NITROBENZENE	17000 U	19000 U	460 U	440 U	10 U	10 U
ISOPHORONE	17000 U	19000 U	460 U	440 U	10 U	10 U
2-NITROPHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
2,4-DIMETHYLPHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
BENZOIC ACID	85000 U	95000 U	2300 U	2200 U	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	17000 U	19000 U	460 U	440 U	10 U	10 U
2,4-DICHLOROPHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	17000 U	19000 U	460 U	440 U	10 U	10 U
NAPHTHALENE	17000 U	19000 U	460 U	440 U	10 U	10 U
4-CHLOROANILINE	17000 U	19000 U	460 U	440 U	10 U	10 U
HEXACHLOROBUTADIENE	17000 U	19000 U	460 U	440 U	10 U	10 U
P-CHLORO-M-CRESOL	17000 U	19000 U	460 U	440 U	10 U	10 U
2-METHYLNAPHTHALENE	17000 U	19000 U	460 U	440 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	17000 U	19000 U	460 U	440 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	17000 U	19000 U	460 U	440 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	85000 U	95000 U	2300 U	2200 U	50 U	50 U
2-CHLORONAPHTHALENE	17000 U	19000 U	460 U	440 U	10 U	10 U
2-NITROANILINE	85000 U	95000 U	2300 U	2200 U	50 U	50 U
DIMETHYL PHTHALATE	17000 U	19000 U	460 U	440 U	10 U	10 U
ACENAPHTHYLENE	17000 U	19000 U	460 U	440 U	10 U	10 U
3-NITROANILINE	85000 U	95000 U	2300 U	2200 U	50 U	50 U
ACENAPHTHENE	17000 U	19000 U	460 U	440 U	10 U	10 U
2,4-DINITROPHENOL	85000 U	95000 U	2300 U	2200 U	50 U	50 U
4-NITROPHENOL	85000 U	95000 U	2300 U	2200 U	50 U	50 U
DIBENZOFURAN	17000 U	19000 U	460 U	440 U	10 U	10 U
2,4-DINITROTOLUENE	17000 U	19000 U	460 U	440 U	10 U	10 U
2,6-DINITROTOLUENE	17000 U	19000 U	460 U	440 U	10 U	10 U
DIETHYL PHTHALATE	17000 U	19000 U	460 U	440 U	10 U	10 J
4-CHLOROPHENYL PHENYL ETHER	17000 U	19000 U	460 U	440 U	10 U	10 U
FLUORENE	17000 U	19000 U	460 U	440 U	10 U	10 U
4-NITROANILINE	85000 U	95000 U	2300 U	2200 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	85000 U	95000 U	2300 U	2200 U	50 U	50 U
N-NITROSODIPHENYLAMINE	17000 U	19000 U	460 U	440 U	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	17000 U	19000 U	460 U	440 U	10 U	10 U
HEXACHLOROBENZENE	17000 U	19000 U	460 U	440 U	10 U	10 U
PENTACHLOROPHENOL	85000 U	95000 U	2300 U	2200 U	50 U	50 U
PHENANTHRENE	17000 U	19000 U	460 U	440 U	10 U	10 U
ANTHRACENE	17000 U	19000 U	460 U	440 U	10 U	10 U
DI-N-BUTYL PHTHALATE	17000 U	19000 U	460 U	440 U	10 U	10 U
FLUORANTHENE	17000 J	19000 J	460 J	440 U	10 U	10 U
PYRENE	17000 J	19000 J	460 J	440 U	10 U	10 U
BUTYL BENZYL PHTHALATE	17000 U	19000 U	460 U	440 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	34000 U	38000 U	920 U	880 U	20 U	20 U
BENZO(A)ANTHRACENE	17000 U	19000 U	460 U	440 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	17000 U	19000 U	460 U	440 U	10 U	10 U
CHRYSENE	17000 J	19000 U	460 U	440 U	10 U	10 U
DI-N-OCTYL PHTHALATE	17000 U	19000 U	460 U	440 U	10 U	10 U
BENZO(B)FLUORANTHENE	17000 J(Q)	19000 U	460 J	440 J	10 U	10 U
BENZO(K)FLUORANTHENE	17000 U(Q)	19000 U	460 U	440 U	10 U	10 U
BENZO(A)PYRENE	17000 U	19000 U	460 U	440 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	17000 U	19000 U	460 U	440 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	17000 U	19000 U	460 U	440 U	10 U	10 U
BENZO(GHI)PERYLENE	17000 U	19000 U	460 U	440 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (V) Valid; (Q) Qualified; (NV) Not validated;

007462

SOUTH CAVALCADE SITE - SEDIMENT QA ANALYTICAL RESULTS

Sample Number	S003-01	S006-01	S001-02	S007-01	S008-00	S009-01	TRIP BLANK 1
QA/QC PAIR (O) Original (B) Blank (D) Duplicate	O	D	O	D	B	D	B
SAMPLING ROUND	1	1	2	2	1	2	1
FIELD BLANK NUMBER	S008-00	S008-00	S009-01	S003-01			
TRIP BLANK NUMBER	1	1	2	2	1	2	
VOLATILE ORGANICS (ug/kg)							
Validation Status :	V	V	NA	NA	V	V	V
CHLOROMETHANE	17 U	18 U			10 U	10 U	10 U
BROMOMETHANE	17 U	18 U			10 U	10 U	10 U
VINYL CHLORIDE	17 U	18 U			10 U	10 U	10 U
CHLOROETHANE	17 U	18 U			10 U	10 U	10 U
METHYLENE CHLORIDE	46	53			82	3 J	5 U
ACETONE	17 U	10			1100	16	10
CARBON DISULFIDE	8 U	9 U			98	5 U	5 U
1,1-DICHLOROETHENE	8 U	9 U			5 U	5 U	5 U
1,1-DICHLOROETHANE	8 U	9 U			5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	8 U	9 U			5 U	5 U	5 U
CHLOROFORM	8 U	9 U			5 U	5 U	5 U
1,2-DICHLOROETHANE	8 U	9 U			5 U	5 U	5 U
2-BUTANONE	17 U	18 U			10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	8 U	9 U			5 U	5 U	5 U
CARBON TETRACHLORIDE	8 U	9 U			5 U	5 U	5 U
VINYL ACETATE	17 U	18 U			10 U	10 U	10 U
BROMODICHLOROMETHANE	8 U	9 U			5 U	5 U	5 U
1,2-DICHLOROPROPANE	8 U	9 U			5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	8 U	9 U			5 U	5 U	5 U
TRICHLOROETHENE	8 U	9 U			5 U	5 U	5 U
DIBROMOCHLOROMETHANE	8 U	9 U			5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	8 J	9 U			5 U	5 U	5 U
BENZENE	8 U	9 U			5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	8 U	9 U			5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	17 U	18 U			10 U	10 U	10 U
BROMOFORM	8 U	9 U			5 U	5 U	5 U
2-HEXANONE	17 U	18 U			10 U	10 U	10 U
4-METHYL-2-PENTANONE	17 U	18 U			10 U	10 U	10 U
TETRACHLOROETHENE	8 U	9 U			5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	8 U	9 U			5 U	5 U	5 U
TOLUENE	8 U	9 U			5 U	5 U	5 U
CHLOROBENZENE	8 U	9 U			5 U	5 U	5 U
ETHYLBENZENE	8 U	9 U			5 U	5 U	5 U
STYRENE	8 U	9 U			5 U	5 U	5 U
TOTAL XYLENES	8 U	9 U			5 U	5 U	5 U
INORGANICS (mg/kg)							
Validation Status :	V	V	V	V	V	V	NA
SILVER	4 U	4 U	5 U	8 U	9 U	10 U	
ARSENIC	34	30	6.8	5 U	10 U	10 U	
BERYLLIUM	1 U	1 U	1.5 U	1.5 U	2 U	3 U	
CADMIUM	4 U	5.0	2.5 U	2.5 U	4 U	5 U	
CYANIDE	1 U	1 U	5 U	5 U	NA	10 U	
CHROMIUM	72	360	5 U	6.0	5 U	9 U	
COPPER	73	78	0.05 U	5 U	10 U	10 U	
IRON	8100	15000	NA	NA	38 U	30 U	
MERCURY	0.29	0.30	0.05 U	0.05 U	0.2 U	0.2 U	
NICKEL	10 U	10 U	14 U	16	20 U	29 U	
LEAD	340	440	10	4	5 U	5 U	
ANTIMONY	30 U	30 U	22 U	22 U	60 U	44 U	
SELENIUM	4 U	5 U	2.5 U	2.5 U	5 U	5 U	
THALLIUM	9	9 U	5 U	5 U	10 U	10 U	
ZINC	1200	3300	58	25	24	8 U	

NOTE: (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid (NV) Not Validated; (Q) Qualified.

007463

SOUTH CAVALCADE SITE - SEDIMENT QA ANALYTICAL RESULTS

Sample Number	TRIP BLANK 2
QA\QC PAIR (O) Original (B) Blank (D) Duplicate	B
SAMPLING ROUND	2
FIELD BLANK NUMBER	
TRIP BLANK NUMBER	

VOLATILE ORGANICS (ug/kg)

Validation Status :	V
CHLOROMETHANE	10 U
BROMOMETHANE	10 U
VINYL CHLORIDE	10 U
CHLOROETHANE	10 U
METHYLENE CHLORIDE	5 U
ACETONE	10 U
CARBON DISULFIDE	5 U
1,1-DICHLOROETHENE	5 U
1,1-DICHLOROETHANE	5 U
TRANS-1,2-DICHLOROETHENE	5 U
CHLOROFORM	5 U
1,2-DICHLOROETHANE	5 U
2-BUTANONE	10 U
1,1,1-TRICHLOROETHANE	5 U
CARBON TETRACHLORIDE	5 U
VINYL ACETATE	10 U
BROMODICHLOROMETHANE	5 U
1,2-DICHLOROPROPANE	5 U
TRANS-1,3-DICHLOROPROPENE	5 U
TRICHLOROETHENE	5 U
DIBROMOCHLOROMETHANE	5 U
1,1,2-TRICHLOROETHANE	5 U
BENZENE	5 U
CIS-1,3-DICHLOROPROPENE	5 U
2-CHLOROETHYLVINYL ETHER	10 U
BROMOFORM	5 U
2-HEXANONE	10 U
4-METHYL-2-PENTANONE	10 U
TETRACHLOROETHENE	5 U
1,1,2,2-TETRACHLOROETHANE	5 U
TOLUENE	5 U
CHLOROBENZENE	5 U
ETHYLBENZENE	5 U
STYRENE	5 U
TOTAL XYLENES	5 U

INORGANICS (mg/kg)

Validation Status :	NA
SILVER	
ARSENIC	
BERYLLIUM	
CADMIUM	
CYANIDE	
CHROMIUM	
COPPER	
IRON	
MERCURY	
NICKEL	
LEAD	
ANTIMONY	
SELENIUM	
THALLIUM	
ZINC	

NOTE: (U) Undetected; (J) Present below detection limit; (NA) Not Analyzed; (V) Valid (NV) Not Validated; (Q) Qualified.

007464

SOUTH CAVALCADE SITE - SOIL BORING QA ANALYTICAL RESULTS

Sample Number	A01-SB06-18	A37-SB04-12	A01-SB06-24	FD24(COM)	A01-SB07-06	FD23(COM)	A01-SB09-07	FC300(COM)
Depth (ft)	47.5	47.5	59.5	59.5	12	12	24	24
QA\QC PAIR (O) Original (D) Duplicate (S) Split	O	D	O	S	O	S	O	S
UNIT NUMBER	2	2	3	3	1	1	2	2
SEMIVOLATILE ORGANICS (ug/kg)								
Validation Status :	V	V	V		V		V	
PHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BIS(2-CHLOROETHYL)ETHER	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2-CHLOROPHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
1,3-DICHLOROBENZENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
1,4-DICHLOROBENZENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BENZYL ALCOHOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
1,2-DICHLOROBENZENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2-METHYLPHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BIS(2-CHLOROISOPROPYL)ETHER	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
4-METHYLPHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
N-NITROSODIPROPYLAMINE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
HEXACHLOROETHANE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
NITROBENZENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
ISOPHORONE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2-NITROPHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2,4-DIMETHYLPHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BENZOIC ACID	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 J	10000 U
BIS(2-CHLOROETHOXY)METHANE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2,4-DICHLOROPHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
1,2,4-TRICHLOROBENZENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
NAPHTHALENE	110000	40000	410 U	400 U	400 U	400 U	3800	10000 U
4-CHLOROANILINE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
HEXACHLOROBUTADIENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
P-CHLORO-M-CRESOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2-METHYLNAPHTHALENE	100000	41000	410 U	400 U	400 U	400 U	820 J	10000 U
HEXACHLOROCYCLOPENTADIENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2,4,6-TRICHLOROPHENOL	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2,4,5-TRICHLOROPHENOL	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
2-CHLORONAPHTHALENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2-NITROANILINE	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
DIMETHYL PHTHALATE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
ACENAPHTHYLENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
3-NITROANILINE	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
ACENAPHTHENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 J	10000 U
2,4-DINITROPHENOL	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
4-NITROPHENOL	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
DIBENZOFURAN	74000	31000	410 U	400 U	400 U	400 U	1500	10000 U
2,4-DINITROTOLUENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
2,6-DINITROTOLUENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
DIETHYL PHTHALATE	23000 U	12000 U	410 J	400 U	670	400 U	820 U	10000 U
4-CHLOROPHENYL PHENYL ETHER	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
FLUORENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 J	10000 U
4-NITROANILINE	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
4,6-DINITRO-2-METHYLPHENOL	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
N-NITROSODIPHENYLAMINE	23000 U	12000 U	410 U	400 BU	400 U	400 BU	820 U	10000 U
4-BROMOPHENYL PHENYL ETHER	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
HEXACHLOROBENZENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
PENTACHLOROPHENOL	115000 U	60000 U	2050 U	2000 U	2000 U	2000 U	4100 U	10000 U
PHENANTHRENE	310000	130000	410 J	400 U	400 U	400 U	310000	10000 U
ANTHRACENE	49000	23000	410 U	400 U	400 U	400 U	22000	10000 U
DI-N-BUTYL PHTHALATE	23000 U	12000 U	410 U	400 U	400 U	400 U	1600	10000 U
FLUORANTHENE	140000	59000	410 U	400 U	400 U	400 U	110000	10000 U
PYRENE	99000	44000	410 U	400 U	400 U	400 U	2500	10000 U
BUTYL BENZYL PHTHALATE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
3,3'-DICHLOROBENZIDINE	46000 U	24000 U	820 U	800 U	800 U	800 U	1640 U	10000 U
BENZO(A)ANTHRACENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BIS(2-ETHYLHEXYL)PHTHALATE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
CHRYSENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
DI-N-OCTYL PHTHALATE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BENZO(B)FLUORANTHENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BENZO(K)FLUORANTHENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BENZO(A)PYRENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
INDENO(1,2,3-CD)PYRENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
DIBENZO(AH)ANTHRACENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U
BENZO(GHI)PERYLENE	23000 U	12000 U	410 U	400 U	400 U	400 U	820 U	10000 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid; (B) Detected in Blank.

007465

SOUTH CAVALCADE SITE - SOIL BORING QA ANALYTICAL RESULTS

Sample Number	A01-SB10-07	FC876(CDM)	A06-SB06-31	A43-SB01-15	A08-SB02-27	A42-SB03-12	A13-SB01-10	A37-SB05-21
Depth (ft)	23	23	67.5	67.5	62	62	23	23
QA\QC PAIR (O) Original (D) Duplicate (S) Split	O	S	O	O	O	O	O	O
UNIT NUMBER	2	2	3	3	3	3	2	2
SEMIVOLATILE ORGANICS (ug/kg)	-							
Validation Status :	Q		V	V	V	V	V	V
PHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
BIS(2-CHLOROETHYL)ETHER	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2-CHLOROPHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
1,3-DICHLOROBENZENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
1,4-DICHLOROBENZENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
BENZYL ALCOHOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
1,2-DICHLOROBENZENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2-METHYLPHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 J	12000 J
BIS(2-CHLOROISOPROPYL)ETHER	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
4-METHYLPHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000	12000 J
N-NITROSODIPROPYLAMINE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
HEXACHLOROETHANE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
NITROBENZENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
ISOPHORONE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2-NITROPHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2,4-DIMETHYLPHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 J	12000 J
BENZOIC ACID	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
BIS(2-CHLOROETHOXY)METHANE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2,4-DICHLOROPHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
1,2,4-TRICHLOROBENZENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
NAPHTHALENE	430 U	10000 U	440 U	430 U	410 U	410 U	110000	77000
4-CHLOROANILINE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
HEXACHLOROBUTADIENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
P-CHLORO-M-CRESOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2-METHYLNAPHTHALENE	430 U	10000 U	440 U	430 U	410 U	410 U	18000	12000 J
HEXACHLOROCYCLOPENTADIENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2,4,6-TRICHLOROPHENOL	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2,4,5-TRICHLOROPHENOL	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
2-CHLORONAPHTHALENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2-NITROANILINE	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
DIMETHYL PHTHALATE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
ACENAPHTHYLENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 J	12000 J
3-NITROANILINE	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
ACENAPHTHENE	430 U	10000 U	440 U	430 U	410 U	410 J	27000	19000
2,4-DINITROPHENOL	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
4-NITROPHENOL	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
DIBENZOFURAN	430 U	10000 U	440 U	430 U	410 J	410 J	17000	12000 J
2,4-DINITROTOLUENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
2,6-DINITROTOLUENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
DIETHYL PHTHALATE	430 U	10000 U	440 U	430 U	410 J	410 U	12000 U	12000 U
4-CHLOROPHENYL PHENYL ETHER	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
FLUORENE	430 U	10000 U	440 U	430 U	580	410 J	25000	16000
4-NITROANILINE	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
4,6-DINITRO-2-METHYLPHENOL	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
N-NITROSODIPHENYLAMINE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
4-BROMOPHENYL PHENYL ETHER	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
HEXACHLOROBENZENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
PENTACHLOROPHENOL	2150 U	10000 U	2200 U	2150 U	2050 U	2050 U	60000 U	60000 U
PHENANTHRENE	430 U	10000 U	440 U	430 U	3800	1600	63000	49000
ANTHRACENE	430 U	10000 U	440 U	430 U	410 U	410 J	12000 U	12000 J
DI-N-BUTYL PHTHALATE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
FLUORANTHENE	430 U	10000 U	440 U	430 U	1400	800	17000	12000
PYRENE	430 U	10000 U	440 U	430 U	1100	550	17000	13000
BUTYL BENZYL PHTHALATE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
3,3'-DICHLOROBENZIDINE	860 U	10000 U	880 U	860 U	820 U	820 U	24000 U	24000 U
BENZO(A)ANTHRACENE	430 U	10000 U	440 U	430 U	410 U	410 J	12000 J	12000 J
BIS(2-ETHYLHEXYL)PHTHALATE	6200	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
CHRYSENE	430 U	10000 U	440 U	430 U	410 U	410 J	12000 J	12000 J
DI-N-OCTYL PHTHALATE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
BENZO(B)FLUORANTHENE	430 U	10000 U	440 U	430 U	410 U	410 J	12000 U	12000 U
BENZO(K)FLUORANTHENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
BENZO(A)PYRENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
INDENO(1,2,3-CD)PYRENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
DIBENZO(AH)ANTHRACENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U
BENZO(GHI)PERYLENE	430 U	10000 U	440 U	430 U	410 U	410 U	12000 U	12000 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007466

SOUTH CAVALCADE SITE - SOIL BORING QA ANALYTICAL RESULTS

Sample Number	A17-SB02-31	A35-SB09-15	A26-SB07-23	A33-SB04-16		
Depth (ft)	70	70	55.5	55.5		
QA\QC PAIR (O) Original (D) Duplicate (S) Split	O	D	O	D		
UNIT NUMBER	3	3	3	3		
SEMIVOLATILE ORGANICS (ug/kg)						
Validation Status :	V	V	V	V		
PHENOL	440 U	440 U	400 U	390 U		
BIS(2-CHLOROETHYL)ETHER	440 U	440 U	400 U	390 U		
2-CHLOROPHENOL	440 U	440 U	400 U	390 U		
1,3-DICHLOROBENZENE	440 U	440 U	400 U	390 U		
1,4-DICHLOROBENZENE	440 U	440 U	400 U	390 U		
BENZYL ALCOHOL	440 U	440 U	400 U	390 U		
1,2-DICHLOROBENZENE	440 U	440 U	400 U	390 U		
2-METHYLPHENOL	440 U	440 U	400 U	390 U		
BIS(2-CHLOROISOPROPYL)ETHER	440 U	440 U	400 U	390 U		
4-METHYLPHENOL	440 U	440 U	400 U	390 U		
N-NITROSODIPROPYLAMINE	440 U	440 U	400 U	390 U		
HEXACHLOROETHANE	440 U	440 U	400 U	390 U		
NITROBENZENE	440 U	440 U	400 U	390 U		
ISOPHORONE	440 U	440 U	400 U	390 U		
2-NITROPHENOL	440 U	440 U	400 U	390 U		
2,4-DIMETHYLPHENOL	440 U	440 U	400 U	390 U		
BENZOIC ACID	2200 U	2200 U	2000 U	1950 U		
BIS(2-CHLOROETHOXY)METHANE	440 U	440 U	400 U	390 U		
2,4-DICHLOROPHENOL	440 U	440 U	400 U	390 U		
1,2,4-TRICHLOROBENZENE	440 U	440 U	400 U	390 U		
NAPHTHALENE	440 U	440 U	400 U	390 U		
4-CHLOROANILINE	440 U	440 U	400 U	390 U		
HEXACHLOROBUTADIENE	440 U	440 U	400 U	390 U		
P-CHLORO-M-CRESOL	440 U	440 U	400 U	390 U		
2-METHYLNAPHTHALENE	440 U	440 U	400 U	390 U		
HEXACHLOROCYCLOPENTADIENE	440 U	440 U	400 U	390 U		
2,4,6-TRICHLOROPHENOL	440 U	440 U	400 U	390 U		
2,4,5-TRICHLOROPHENOL	2200 U	2200 U	2000 U	1950 U		
2-CHLORONAPHTHALENE	440 U	440 U	400 U	390 U		
2-NITROANILINE	2200 U	2200 U	2000 U	1950 U		
DIMETHYL PHTHALATE	440 U	440 U	400 U	390 U		
ACENAPHTHYLENE	440 U	440 U	400 U	390 U		
3-NITROANILINE	2200 U	2200 U	2000 U	1950 U		
ACENAPHTHENE	440 U	440 U	400 U	390 U		
2,4-DINITROPHENOL	2200 U	2200 U	2000 U	1950 U		
4-NITROPHENOL	2200 U	2200 U	2000 U	1950 U		
DIBENZOFURAN	440 U	440 U	400 U	390 U		
2,4-DINITROTOLUENE	440 U	440 U	400 U	390 U		
2,6-DINITROTOLUENE	440 U	440 U	400 U	390 U		
DIETHYL PHTHALATE	440 U	440 U	400 U	390 U		
4-CHLOROPHENYL PHENYL ETHER	440 U	440 U	400 U	390 U		
FLUORENE	440 U	440 U	400 U	390 U		
4-NITROANILINE	2200 U	2200 U	2000 U	1950 U		
4,6-DINITRO-2-METHYLPHENOL	2200 U	2200 U	2000 U	1950 U		
N-NITROSODIPHENYLAMINE	440 U	440 U	400 J	390 U		
4-BROMOPHENYL PHENYL ETHER	440 U	440 U	400 U	390 U		
HEXACHLOROBENZENE	440 U	440 U	400 U	390 U		
PENTACHLOROPHENOL	2200 U	2200 U	2000 U	1950 U		
PHENANTHRENE	440 U	440 U	400 U	390 U		
ANTHRACENE	440 U	440 U	400 U	390 U		
DI-N-BUTYL PHTHALATE	440 U	440 U	400 U	390 U		
FLUORANTHENE	440 U	440 U	400 U	390 U		
PYRENE	440 U	440 U	400 U	390 U		
BUTYL BENZYL PHTHALATE	440 U	440 U	400 U	390 U		
3,3'-DICHLOROBENZIDINE	880 U	880 U	800 U	780 U		
BENZO(A)ANTHRACENE	440 U	440 U	400 U	390 U		
BIS(2-ETHYLHEXYL)PHTHALATE	440 U	440 U	3900	3700		
CHRYSENE	440 U	440 U	400 U	390 U		
DI-N-OCTYL PHTHALATE	440 U	440 U	400 U	390 U		
BENZO(B)FLUORANTHENE	440 U	440 U	400 U	390 U		
BENZO(K)FLUORANTHENE	440 U	440 U	400 U	390 U		
BENZO(A)PYRENE	440 U	440 U	400 U	390 U		
INDENO(1,2,3-CD)PYRENE	440 U	440 U	400 U	390 U		
DIBENZO(AH)ANTHRACENE	440 U	440 U	400 U	390 U		
BENZO(GHI)PERYLENE	440 U	440 U	400 U	390 U		

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007467

SOUTH CAVALCADE SITE - SOIL BORING QA ANALYTICAL RESULTS

Sample Number	A01-SB06-18	A37-SB04-12	A01-SB06-24	F024(CBM)	A01-SB07-06	F023(CBM)	A01-SB09-07	FC900(CBM)	A01-SB10-07	MFC190(CBM)	A06-SB05-31	A43-SB01-15	A08-SB02-27	A42-SB07-12
Sample Depth (ft)	47.5	47.5	59.5	59.5	12	12	24	24	23	23	67.5	67.5	62	62
QA/QC PAIR														
(O) Orginal	O	O	O	S	O	S	O	S	O	S	O	O	O	O
(B) Blank														
(D) Duplicate														
(S) Split														
UNIT NUMBER	2	2	3	3	1	1	2	2	2	2	3	3	3	3
INORGANICS (mg/kg)														
Validation Status	V	V	V		V		V		V		O	O	V	V
SILVER	NA	NA	NA	6 U	NA	6 U	NA	2.6 U	NA	2.5 U	NA	NA	NA	NA
ARSENIC	5.8 U	5.8 U	15.3	36	6 U	6 U	4.7 U	12	6.5 U	11	24.6	43.2	7.8	9.1
BERYLLIUM	NA	NA	NA	1.2 U	NA	1.2 U	NA	3.3	NA	1.2 U	NA	NA	NA	NA
CADMIUM	NA	NA	NA	6.5	NA	2.4 U	NA	4.0	NA	2.5 U	NA	NA	NA	NA
CYANIDE	1.7 U	1.7 U	1.8 U	.24 U	1.8 U	0.48	1.8 U	0.68 U	1.9 U	0.63 U	0.66 U	0.64 U	1 U	1 U
CHROMIUM	9.2	5.2 U	19.8	24	5.4 U	6 U	16.0	28	21.3	19	15.3	14.3	12	12
COPPER	4 U	4 U	4.3 U	12 U	4.2 U	12 U	5.55	30	6.46	21	20	19.1	5 U	5 U
IRON	2090	461	28100	33400	1660	3460	6290	26100	5290	22400	16700	7920	8700	13000
MERCURY	NA	NA	NA	.12 U	NA	.12 U	NA	0.064 U	NA	0.063 U	NA	NA	NA	NA
NICKEL	NA	NA	NA	24 U	NA	24 U	NA	45	NA	24 U	NA	NA	NA	NA
LEAD	2.8 U	2.9 U	11.61	9.7	3.0 U	3 U	8.50	12	12.3	13	20.7	22	4.5	5.3
ANTIMONY	NA	NA	NA	36 U	NA	36 U	NA	17 U	NA	16 U	NA	NA	NA	NA
SELENIUM	NA	NA	NA	3 U	NA	3 U	NA	64 U	NA	3.2 U	NA	NA	NA	NA
THALLIUM	NA	NA	NA	6 U	NA	6 U	NA	6.4 U	NA	6.3 U	NA	NA	NA	NA
ZINC	4.6 U	4.6 U	48.8	66	4.8 U	12 U	31.2	80	56.2	64	62.8	63.9	20	25

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid.

007468

SOUTH CAVALCADE SITE - SOIL BORING QA ANALYTICAL RESULTS

Sample Number	A13-SB01-10	A37-SB05-21	A17-SB02-31	A35-SB09-15	A26-SB07-23	A33-SB04-16				
Sample Depth (ft)	23	23	70	70	55.5	55.5				
QA/QC PAIR										
(O) Orginal	O	O	O	O	O	O				
(B) Blank										
(D) Duplicate										
(S) Split										
UNIT NUMBER	2	2	3	3	3	3				
INORGANICS (mg/kg)										
Validation Status :	V	V	V	V	V	V				
SILVER	NA	NA	NA	NA	NA	NA				
ARSENIC	6.8	5 U	12	12	5 U	5 U				
BERYLLIUM	NA	NA	NA	NA	NA	NA				
CADMIUM	NA	NA	NA	NA	NA	NA				
CYANIDE	1.8 U	1.8 U	1.5 U	1.5 U	1 U	1 U				
CHROMIUM	7.0	7.0	28	27	9.0	11				
COPPER	5.0	3.5 U	10	10	5 U	5 U				
IRON	4530	4020	38000	33000	6700	8300				
MERCURY	NA	NA	NA	NA	NA	NA				
NICKEL	NA	NA	NA	NA	NA	NA				
LEAD	3.90	4.25	16	13	5.5	5.7				
ANTIMONY	NA	NA	NA	NA	NA	NA				
SELENIUM	NA	NA	NA	NA	NA	NA				
THALLIUM	NA	NA	NA	NA	NA	NA				
ZINC	13.5	16.5	210	59	20	22				

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid.

007469

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW01-001	MW19-001	MW05-001	FD272(COM)	MW08-001	MW13-003	FD273(COM)
QA\QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	O	O	O	S	O	O	S
SAMPLING ROUND	1	1	1	1	1	1	1
FIELD BLANK NUMBER	MW18-001	MW18-001	MW18-003	MW18-003	MW18-003	MW18-003	MW18-003
SEMIVOLATILE ORGANICS (ug/l)							
Validation Status :	V	Q	Q,V		Q,V	Q,V	
PHENOL	400 U	400 U	10 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2-CHLOROPHENOL	400 U	400 U	10 U	10 U	10 U	10 U	10 U
1,3-DICHLOROBENZENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
BENZYL ALCOHOL	400 U	400 U	10 U	10 U	10 U	10 U	10 U
1,2-DICHLOROBENZENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2-METHYLPHENOL	110 J	140 J	10 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	400 U	400 U	10 U	10 U	10 U	10 U	10 U
4-METHYLPHENOL	64 J	65 J	10 U	10 U	10 U	10 U	10 U
N-NITROSODIPROPYLAMINE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROETHANE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
NITROBENZENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
ISOPHORONE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2-NITROPHENOL	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2,4-DIMETHYLPHENOL	550	800	10 U	10 U	10 U	10 U	10 U
BENZOIC ACID	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	400 U	400 U	10 U	10 U	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
NAPHTHALENE	3100	3800	10 U	10 U	24	10 U	10 U
4-CHLOROANILINE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROBUTADIENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
P-CHLORO-M-CRESOL	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	110 J	140 J	10 U	10 U	7 J	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
2-CHLORONAPHTHALENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2-NITROANILINE	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
DIMETHYL PHTHALATE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
ACENAPHTHYLENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
3-NITROANILINE	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
ACENAPHTHENE	110 J	170 J	10 U	10 U	22	10 U	5 J
2,4-DINITROPHENOL	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
4-NITROPHENOL	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
DIBENZOFURAN	65 J	95 J	10 U	10 U	20	10 U	10 U
2,4-DINITROTOLUENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
2,6-DINITROTOLUENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
DIETHYL PHTHALATE	400 U	400 U	10 U	10 U	10 U	2 J	10 U
4-CHLOROPHENYL PHENYL ETHER	400 U	400 U	10 U	10 U	10 U	10 U	10 U
FLUORENE	47 J	67 J	10 U	10 U	20	10 U	10 U
4-NITROANILINE	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	2000 U	2000 U	50 U	10 U	50 U	50 U	10 U
N-NITROSODIPHENYLAMINE	400 U	400 U	10 U	50 U	10 U	10 U	50 U
4-BROMOPHENYL PHENYL ETHER	400 U	400 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROBENZENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
PENTACHLOROPHENOL	2000 U	2000 U	50 U	50 U	50 U	50 U	50 U
PHENANTHRENE	28 J	40 J	10 U	10 U	57	10 U	10 U
ANTHRACENE	400 U	400 U	10 U	10 U	7 J	10 U	10 U
DI-N-BUTYL PHTHALATE	400 U	400 U	21	10 U	39	10 U	24
FLUORANTHENE	400 U	400 U	10 U	10 U	19	10 U	5 J
PYRENE	400 U	400 U	10 U	10 U	13	10 U	13
BUTYL BENZYL PHTHALATE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	800 U	800 U	20 U	20 U	20 U	20 U	20 U
BENZO(A)ANTHRACENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	400 U	400 U	10 U	10 U	10 U	10 U	7 J
CHRYSENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
DI-N-OCTYL PHTHALATE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
BENZO(B)FLUORANTHENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
BENZO(K)FLUORANTHENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
BENZO(A)PYRENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U
BENZO(GHI)PERYLENE	400 U	400 U	10 U	10 U	10 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007470

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW03-002	MW19-002	MW07-002	MW20-002	MW08-002	MW99	MW16-002	MW13-002
QA/QC PAIR (B) Original (E) Blank (D) Duplicate (S) Split	O	D	O	D	O	D	O	D
SAMPLING ROUND	2	2	2	2	2	2	2	2
FIELD BLANK NUMBER	MW21-002	MW21-002	MW21-002	MW21-002	MWA-FB	MWA-FB	MW18-002	MW18-002
SEMIVOLATILE ORGANICS (ug/l)								
Validation Status :	Q	Q	Q	Q	V	V	V	V
PHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BIS(2-CHLOROETHYL)ETHER	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2-CHLOROPHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
1,3-DICHLOROBENZENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
1,4-DICHLOROBENZENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BENZYL ALCOHOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
1,2-DICHLOROBENZENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2-METHYLPHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BIS(2-CHLOROISOPROPYL)ETHER	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
4-METHYLPHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
N-NITROSODIPROPYLAMINE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
HEXACHLOROETHANE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
NITROBENZENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
ISOPHORONE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2-NITROPHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2,4-DIMETHYLPHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BENZOIC ACID	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
BIS(2-CHLOROETHOXY)METHANE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2,4-DICHLOROPHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
1,2,4-TRICHLOROBENZENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
NAPHTHALENE	10 U	20 U	50 U	20 U	2 J	20 U	20 U	50 U
4-CHLOROANILINE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
HEXACHLOROBUTADIENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
P-CHLORO-M-CRESOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2-METHYLNAPHTHALENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
HEXACHLOROCYCLOPENTADIENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2,4,6-TRICHLOROPHENOL	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2,4,5-TRICHLOROPHENOL	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
2-CHLORONAPHTHALENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2-NITROANILINE	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
DIMETHYL PHTHALATE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
ACENAPHTHYLENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
3-NITROANILINE	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
ACENAPHTHENE	10 U	20 U	50 U	20 U	12 J	5 J	20 U	50 U
2,4-DINITROPHENOL	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
4-NITROPHENOL	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
DIBENZOFURAN	10 U	20 U	50 U	20 U	9 J	4 J	20 U	50 U
2,4-DINITROTOLUENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
2,6-DINITROTOLUENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
DIETHYL PHTHALATE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
4-CHLOROPHENYL PHENYL ETHER	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
FLUORENE	10 U	20 U	50 U	20 U	4 J	20 U	20 U	50 U
4-NITROANILINE	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
4,6-DINITRO-2-METHYLPHENOL	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
N-NITROSODIPHENYLAMINE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
4-BROMOPHENYL PHENYL ETHER	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
HEXACHLOROBENZENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
PENTACHLOROPHENOL	50 U	100 U	250 U	100 U	100 U	100 U	100 U	250 U
PHENANTHRENE	10 U	20 U	50 U	20 U	25	11 J	20 U	50 U
ANTHRACENE	10 U	20 U	50 U	20 U	7 J	3 J	20 U	50 U
DI-N-BUTYL PHTHALATE	10 U	20 U	50 U	20 U	7 J	4 J	20 U	50 U
FLUORANTHENE	10 U	20 U	50 U	20 U	15 J	7 J	20 U	50 U
PYRENE	10 U	20 U	50 U	20 U	15 J	6 J	20 U	50 U
BUTYL BENZYL PHTHALATE	10 U	20 U	50 U	20 U	20 U	20 U	43	30 J
3,3'-DICHLOROBENZIDINE	20 U	40 U	100 U	40 U	40 U	40 U	40 U	100 U
BENZO(A)ANTHRACENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BIS(2-ETHYLHEXYL)PHTHALATE	17	20 U	50 U	20 U	44	20 U	20 U	50 U
CHRYSENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
DI-N-OCTYL PHTHALATE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BENZO(B)FLUORANTHENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BENZO(K)FLUORANTHENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BENZO(A)PYRENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
INDENO(1,2,3-CD)PYRENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
DIBENZO(AH)ANTHRACENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U
BENZO(GHI)PERYLENE	10 U	20 U	50 U	20 U	20 U	20 U	20 U	50 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007471

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW12-001	MW20-001	MW23-001	FD732(COM)	DW02-001	MW13-001	DW02-001	DW03-001
QA-QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	O	O	O	S	O	D	O	D
SAMPLING ROUND	1	1	1	1	1	1	1	1
FIELD BLANK NUMBER	MW21-001	MW21-001	MW23-002	MW23-002	MW22-001	MW22-001	DW04-001	DW04-001
SEMIVOLATILE ORGANICS (ug/l)								
Validation Status :	Q	Q	V		Q	Q	V	V
PHENOL	140 J	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2-CHLOROPHENOL	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
1,3-DICHLOROBENZENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
1,4-DICHLOROBENZENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
BENZYL ALCOHOL	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
1,2-DICHLOROBENZENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2-METHYLPHENOL	450	330 J	10 U	17 U	870 U	1300 J	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
4-METHYLPHENOL	720	610 J	10 U	17 U	990 U	1400 J	10 U	10 U
N-NITROSODIPROPYLAMINE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
HEXACHLOROETHANE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
NITROBENZENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
ISOPHORONE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2-NITROPHENOL	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2,4-DIMETHYLPHENOL	1400	1000	10 U	17 U	4500	6300	10 U	10 U
BENZOIC ACID	1000 U	5000 U	50 U	83 U	5000 U	10000 U	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2,4-DICHLOROPHENOL	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
NAPHTHALENE	7400	14000	10 U	17 U	20000	26000	10 U	10 U
4-CHLOROANILINE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
HEXACHLOROBUTADIENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
P-CHLORO-M-CRESOL	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2-METHYLNAPHTHALENE	570	960 J	10 U	17 U	1200	1400 J	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	1000 U	5000 U	50 U	83 U	5000 U	10000 U	50 U	50 U
2-CHLORONAPHTHALENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2-NITROANILINE	1000 U	5000 U	50 U	17 U	5000 U	10000 U	50 U	50 U
DIMETHYL PHTHALATE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
ACENAPHTHYLENE	11 J	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
3-NITROANILINE	1000 U	5000 U	50 U	17 U	5000 U	10000 U	50 U	50 U
ACENAPHTHENE	650	880 J	10 U	17 U	770 J	940 J	10 U	10 U
2,4-DINITROPHENOL	1000 U	5000 U	50 U	83 U	5000 U	10000 U	50 U	50 U
4-NITROPHENOL	1000 U	5000 U	50 U	5 J	5000 U	10000 U	50 U	50 U
DIBENZOFURAN	410	600 J	10 U	17 U	450 J	510 J	10 U	10 U
2,4-DINITROTOLUENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
2,6-DINITROTOLUENE	200 U	1000 U	10 U	NA	1000 U	2000 U	10 U	10 U
DIETHYL PHTHALATE	200 U	1000 U	10 U	3 J	1000 U	2000 U	10 U	10 U
4-CHLOROPHENYL PHENYL ETHER	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
FLUORENE	310	440 J	10 U	17 U	350 J	390 J	10 U	10 U
4-NITROANILINE	1000 U	5000 U	50 U	83 U	5000 U	10000 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	5000 U	50 U	83 U	5000 U	10000 U	50 U	50 U
N-NITROSODIPHENYLAMINE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
HEXACHLOROBENZENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
PENTACHLOROPHENOL	1000 U	5000 U	50 U	3 J	5000 U	10000 U	50 U	50 U
PHENANTHRENE	680	1100	10 U	17 U	330 J	360 J	10 U	10 U
ANTHRACENE	96 J	180 J	10 U	17 U	1000 U	2000 U	10 U	10 U
DI-N-BUTYL PHTHALATE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
FLUORANTHENE	200	380 J	10 U	17 U	1000 U	2000 U	10 U	10 U
PYRENE	166 J	250 J	10 U	17 U	1000 U	2000 U	10 U	10 U
BUTYL BENZYL PHTHALATE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	400 U	2000 U	20 U	33 U	2000 U	4000 U	20 U	20 U
BENZO(A)ANTHRACENE	28 J	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	200 U	1000 U	45	17 U	1000 U	2000 U	10 U	10 U
CHRYSENE	26 J	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
DI-N-OCTYL PHTHALATE	200 U	1000 U	7 J	17 U	1000 U	2000 U	10 U	10 U
BENZO(B)FLUORANTHENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
BENZO(K)FLUORANTHENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
BENZO(A)PYRENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U
BENZO(GHI)PERYLENE	200 U	1000 U	10 U	17 U	1000 U	2000 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007472

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	DW02-002	DW02-003	FD259(COM)	MW17-001	MW18-001	MW18-003	MW21-001	MW22-001
QA/QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	O	O	S	B	B	B	B	B
SAMPLING ROUND	2	2	2	1	1	1	1	1
FIELD BLANK NUMBER	DW02-004	DW02-004	DW02-004					
SEMIVOLATILE ORGANICS (ug/l)								
Validation Status :	V	V		V	V	V,Q	V	V
PHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2-CHLOROPHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
1,3-DICHLOROBENZENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BENZYL ALCOHOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
1,2-DICHLOROBENZENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2-METHYLPHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROISOPROPYL)ETHER	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
4-METHYLPHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
N-NITROSODIPROPYLAMINE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
HEXACHLOROETHANE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
NITROBENZENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
ISOPHORONE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2-NITROPHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2,4-DIMETHYLPHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BENZOIC ACID	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
NAPHTHALENE	10 U	10 U	10 U	1 J	10 U	35	2 J	10 U
4-CHLOROANILINE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
HEXACHLOROBUTADIENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
P-CHLORO-M-CRESOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
2-CHLORONAPHTHALENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2-NITROANILINE	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
DIMETHYL PHTHALATE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
ACENAPHTHYLENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
3-NITROANILINE	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
ACENAPHTHENE	10 U	10 U	10 U	20 U	10 U	31	10 U	10 U
2,4-DINITROPHENOL	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
4-NITROPHENOL	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
DIBENZOFURAN	10 U	10 U	10 U	20 U	10 U	29	10 U	10 U
2,4-DINITROTOLUENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
2,6-DINITROTOLUENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
DIETHYL PHTHALATE	10 U	10 U	10 U	20 U	10 U	10 U	2 J	10 U
4-CHLOROPHENYL PHENYL ETHER	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
FLUORENE	10 U	10 U	10 U	20 U	10 U	28	10 U	10 U
4-NITROANILINE	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
N-NITROSODIPHENYLAMINE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
4-BROMOPHENYL PHENYL ETHER	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
HEXACHLOROBENZENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
PENTACHLOROPHENOL	50 U	50 U	50 U	100 U	50 U	50 U	50 U	50 U
PHENANTHRENE	10 U	10 U	10 U	20 U	10 U	75	10 U	10 U
ANTHRACENE	10 U	10 U	10 U	20 U	10 U	11	10 U	10 U
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	20 U	10 U	51	10 U	10 U
FLUORANTHENE	10 U	10 U	10 U	20 U	10 U	25	10 U	10 U
PYRENE	10 U	10 U	10 U	20 U	10 U	14	10 U	10 U
BUTYL BENZYL PHTHALATE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	20 U	20 U	20 U	40 U	20 U	20 U	20 U	20 U
BENZO(A)ANTHRACENE	10 U	10 U	10 U	20 U	10 U	2 J	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	10 U	10 U	20 U	130	10 U	10 U	10 U
CHRYSENE	10 U	10 U	10 U	20 U	10 U	2 J	10 U	10 U
DI-N-OCTYL PHTHALATE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
DIBENZO(AH)ANTHRACENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U
BENZO(GHI)PERYLENE	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007473

SOUTH CHVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW23-002	DW04-001	MW17-002	MW18-002	MW21-002	DW02-004	MWA-FB
QA\QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	B	B	B	B	B	B	B
SAMPLING ROUND	1	1	2	2	2	2	2
FIELD BLANK NUMBER							
SEMIVOLATILE ORGANICS (ug/l)							
Validation Status :	V	V	V	V	Q	V	V
PHENOL	10 U	10 U	2 J	20 U	20 U	10 U	20 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2-CHLOROPHENOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
1,3-DICHLOROBENZENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
1,4-DICHLOROBENZENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BENZYL ALCOHOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
1,2-DICHLOROBENZENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2-METHYLPHENOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BIS(2-CHLOROISOPROPYL)ETHER	10 U	10 U	10 U	20 U	20 U	10 U	20 U
4-METHYLPHENOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
N-NITROSODIPROPYLAMINE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
HEXACHLOROETHANE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
NITROBENZENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
ISOPHORONE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2-NITROPHENOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2,4-DIMETHYLPHENOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BENZOIC ACID	50 U	50 U	50 U	100 U	100 U	50 U	100 U
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2,4-DICHLOROPHENOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
NAPHTHALENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
4-CHLOROANILINE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
HEXACHLOROBUTADIENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
P-CHLORO-M-CRESOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2-METHYLNAPHTHALENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2,4,5-TRICHLOROPHENOL	50 U	50 U	50 U	100 U	100 U	50 U	100 U
2-CHLORONAPHTHALENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2-NITROANILINE	50 U	50 U	50 U	100 U	100 U	50 U	100 U
DIMETHYL PHTHALATE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
ACENAPHTHYLENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
3-NITROANILINE	50 U	50 U	50 U	100 U	100 U	50 U	100 U
ACENAPHTHENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2,4-DINITROPHENOL	50 U	50 U	50 U	100 U	100 U	50 U	100 U
4-NITROPHENOL	50 U	50 U	50 U	100 U	100 U	50 U	100 U
DIBENZOFURAN	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2,4-DINITROTOLUENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
2,6-DINITROTOLUENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
DIETHYL PHTHALATE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
4-CHLOROPHENYL PHENYL ETHER	10 U	10 U	10 U	20 U	20 U	10 U	20 U
FLUORENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
4-NITROANILINE	50 U	50 U	50 U	100 U	100 U	50 U	100 U
4,6-DINITRO-2-METHYLPHENOL	50 U	50 U	50 U	100 U	100 U	50 U	100 U
N-NITROSODIPHENYLAMINE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
4-BROMOPHENYL PHENYL ETHER	10 U	10 U	10 U	20 U	20 U	10 U	20 U
HEXACHLOROBENZENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
PENTACHLOROPHENOL	50 U	50 U	50 U	100 U	100 U	50 U	100 U
PHENANTHRENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
ANTHRACENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
FLUORANTHENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
PYRENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BUTYL BENZYL PHTHALATE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
3,3'-DICHLOROBENZIDINE	20 U	20 U	20 U	40 U	40 U	20 U	40 U
BENZO(A)ANTHRACENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BIS(2-ETHYLHEXYL)PHTHALATE	45	10 U	4 J	20 U	20 U	10 U	7 J
CHRYSENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
DI-N-OCTYL PHTHALATE	7 J	10 U	10 U	20 U	20 U	10 U	20 U
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BENZO(A)PYRENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
INDENO(1,2,3-CD)PYRENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
DIBENZO(AH)ANTHRACENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U
BENZO(GHI)PERYLENE	10 U	10 U	10 U	20 U	20 U	10 U	20 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid; (NV) Not validated; (Q) Qualified; (I) Invalid.

007474

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW01-001	MW13-001	MW05-001	FD273(COM)	MW08-001	MW13-003	FD273(COM)
QA/QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	O	D	O	S	O	D	S
SAMPLING ROUND	1	1	1	1	1	1	1
FIELD BLANK NUMBER	MW18-001	MW18-001	MW18-003	MW18-003	MW18-003	MW18-003	MW18-003
TRIP BLANK NUMBER	2	2	NA	NA	NA	NA	NA
VOLATILE ORGANICS (ug/l)							
Validation Status :	V	V	V		V	V	
CHLOROMETHANE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	5 U	5 U	4 J	5 U	5 U	5 U	31 B
ACETONE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
CARBON DISULFIDE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	5 U	5 U	10 U	5 U	10 U	10 U	5 U
1,1-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROFORM	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-BUTANONE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
VINYL ACETATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
DIBROMOCHLOROMETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	2 J	14	5 U	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U	10 U	NA	10 U	10 U	NA
BROMOFORM	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-HEXANONE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
TETRACHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TOLUENE	3 J	29	5 U	5 U	5 U	5 U	5 U
CHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ETHYLBENZENE	2 J	10	5 U	5 U	5 U	5 U	5 U
STYRENE	5 U	5 J	5 U	5 U	5 U	5 U	5 U
TOTAL XYLENES	3 J	20	5 U	5 U	5 U	5 U	5 U
PESTICIDES/PCB (ug/l)							
Validation Status :	V	V	Q		Q	Q	
ALPHA-BHC	0.05 U	0.05 U	0.005 U	0.05 U	0.005 U	0.025 U	.05 U
BETA-BHC	0.05 U	0.05 U	0.005 U	0.05 U	0.005 U	0.025 U	.05 U
DELTA-BHC	0.05 U	0.05 U	0.005 U	0.05 U	0.005 U	0.025 U	.05 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.005 U	0.05 U	0.005 U	0.025 U	.05 U
HEPTACHLOR	0.05 U	0.05 U	0.005 UB	0.05 U	0.005 U	0.025 U	.05 U
ALDRIN	0.05 U	0.05 U	0.005 U	0.05 U	0.005 U	0.025 U	.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.005 U	0.05 U	0.005 U	0.025 U	.05 U
ENDOSULFAN I	0.05 U	0.05 U	0.005 U	0.05 U	0.005 U	0.025 U	.05 U
DIELDRIN	0.10 U	0.10 U	0.010 U	0.10 U	0.010 U	0.050 U	.1 U
4,4'-DDE	0.10 U	0.10 U	0.010 U	0.10 U	0.010 U	0.050 U	.1 U
ENDRIN	0.10 U	0.10 U	0.010 U	0.10 U	0.010 U	0.050 U	.1 U
ENDOSULFAN II	0.10 U	0.10 U	0.010 U	0.10 U	0.010 U	0.050 U	.1 U
4,4'-DDD	0.10 U	0.10 U	0.010 U	0.05 U	0.010 U	0.050 U	.05 U
ENDRIN ALDEHYDE	0.10 U	0.10 U	0.010 U	NA	0.010 U	0.050 U	NA
ENDOSULFAN SULFATE	0.10 U	0.10 U	0.010 U	0.10 U	0.010 U	0.050 U	.1 U
4,4'-DDT	0.10 U	0.10 U	0.010 U	0.10 U	0.010 U	0.050 U	.1 U
METHOXYCHLOR	0.50 U	0.50 U	0.050 U	0.50 U	0.050 U	0.250 U	.5 U
ENDRIN KETONE	0.10 U	0.10 U	0.010 U	0.10 U	0.010 U	0.050 U	.1 U
CHLORDANE	0.50 U	0.50 U	0.050 U	0.50 U	0.050 U	0.025 U	.5 U
TOXAPHENE	1.0 U	1.0 U	0.100 U	1.0 U	0.100 U	0.500 U	1. U
AROCLOR-1016	0.50 U	0.50 U	0.050 U	0.50 U	0.050 U	0.250 U	.5 U
AROCLOR-1221	0.50 U	0.50 U	0.050 U	0.50 U	0.050 U	0.250 U	.5 U
AROCLOR-1232	0.50 U	0.50 U	0.050 U	0.50 U	0.050 U	0.250 U	.5 U
AROCLOR-1242	0.50 U	0.50 U	0.050 U	0.50 U	0.050 U	0.250 U	.5 U
AROCLOR-1248	0.50 U	0.50 U	0.050 U	0.50 U	0.050 U	0.250 U	.5 U
AROCLOR-1254	1.0 U	1.0 U	0.100 U	1.0 U	0.100 U	0.500 U	1. U
AROCLOR-1260	1.0 U	1.0 U	0.100 U	1.0 U	0.100 U	0.500 U	1. U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid (NV) Not validated; (Q) Qualified; (I) Invalid; (B) Found in Blank.

007475

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW12-001	MW20-001	MW23-001	F0732(COM)	OW02-001	MW13-001	OW02-001	OW03-001
QA/QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	O	O	O	S	O	O	O	D
SAMPLING ROUND	1	1	1	1	1	1	1	1
FIELD BLANK NUMBER	MW21-001	MW21-001	MW23-002	MW23-002	MW22-001	MW22-001	OW04-001	OW04-001
TRIP BLANK NUMBER	3,4	3,4	7	7	5	5	6	6
VOLATILE ORGANICS (ug/l)								
Validation Status :	V	V	V	NV	V	V	Q	Q
CHLOROMETHANE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
BROMOMETHANE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
VINYL CHLORIDE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
CHLOROETHANE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
METHYLENE CHLORIDE	500 U	100 U	5	5 U	500 U	250 U	5 U	5 U
ACETONE	1000 U	240	10 U	10 U	1000 U	500 U	10 U	10 U
CARBON DISULFIDE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
1,1-DICHLOROETHENE	500 U	100 U	10 U	10 U	500 U	250 U	5 U	5 U
1,1-DICHLOROETHANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
CHLOROFORM	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
1,2-DICHLOROETHANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
2-BUTANONE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
1,1,1-TRICHLOROETHANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
CARBON TETRACHLORIDE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
VINYL ACETATE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
BROMODICHLOROMETHANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
1,2-DICHLOROPROPANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
TRICHLOROETHENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
DIBROMOCHLOROMETHANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
1,1,2-TRICHLOROETHANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
BENZENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	1000 U	200 U	10 U	NA	1000 U	500 U	10 U	10 U
BROMOFORM	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
2-HEXANONE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
4-METHYL-2-PENTANONE	1000 U	200 U	10 U	10 U	1000 U	500 U	10 U	10 U
TETRACHLOROETHENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
TOLUENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
CHLOROBENZENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
ETHYLBENZENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
STYRENE	500 U	100 U	5 U	5 U	500 U	250 U	5 U	5 U
TOTAL XYLENES	500 U	46 J	5 U	5 U	500 U	250 U	5 U	5 U
PESTICIDES/PCB (ug/l)								
Validation Status :	V	V	V	NA	V	V	V	V
ALPHA-BHC	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
BETA-BHC	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
DELTA-BHC	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
ALDRIN	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN ALDEHYDE	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	0.10 U	0.10 U	0.10 U		0.10 U	0.10 U	0.10 U	0.10 U
CHLORDANE	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	1.0 U	1.0 U	1.00 U		1.0 U	1.0 U	1.00 U	1.00 U
AROCLOR-1016	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	1.0 U	1.0 U	1.00 U		1.0 U	1.0 U	1.00 U	1.00 U
AROCLOR-1260	1.0 U	1.0 U	1.00 U		1.0 U	1.0 U	1.00 U	1.00 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid; (B) Found In Blank.

007476

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW03-002	MW19-002	MW07-002	MW20-002	MW16-002	MW13-002	MW17-001	MW18-001
QA/QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	O	O	O	O	O	O	B	B
SAMPLING ROUND	2	2	2	2	2	2	1	1
FIELD BLANK NUMBER	MW21-002	MW21-002	MW21-002	MW21-002	MW18-002	MW18-002		
TRIP BLANK NUMBER	10	10	10	10	9	9	1	2
VOLATILE ORGANICS (ug/l)								
Validation Status :	V	O	NA	NA	V	V	V	V
CHLOROMETHANE	10 U	10 U			10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U			10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U			10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U			10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	5 U	5 U			5 U	5 U	5 U	5 U
ACETONE	10 U	10 U			150	145	10 U	10 J
CARBON DISULFIDE	5 U	5 U			5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	5 U	5 U			5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	5 U	5 U			5 U	5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U			5 U	5 U	5 U	5 U
CHLOROFORM	5 U	5 U			3 J	5 U	5 U	5 U
1,2-DICHLOROETHANE	5 U	5 U			5 U	5 U	5 U	5 U
2-BUTANONE	10 U	10 U			10 U	10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	5 U	5 U			5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE	5 U	5 U			5 U	5 U	5 U	5 U
VINYL ACETATE	10 U	10 U			10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	5 U	5 U			5 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5 U	5 U			5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U			5 U	5 U	5 U	5 U
TRICHLOROETHENE	5 U	5 U			5 U	5 U	5 U	5 U
DIBROMOCHLOROMETHANE	5 U	5 U			5 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5 U	5 U			5 U	5 U	5 U	5 U
BENZENE	5 U	5 U			5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U			5 U	5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U			10 U	10 U	10 U	10 U
BROMOFORM	5 U	5 U			5 U	5 U	5 U	5 U
2-HEXANONE	10 U	10 U			10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U			10 U	10 U	10 U	10 U
TETRACHLOROETHENE	5 U	5 U			5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U			5 U	5 U	5 U	5 U
TOLUENE	5 U	5 U			5 U	5 U	5 U	5 U
CHLOROBENZENE	5 U	5 U			5 U	5 U	5 U	5 U
ETHYLBENZENE	5 U	5 U			5 U	5 U	5 U	5 U
STYRENE	5 U	5 U			5 U	5 U	5 U	5 U
TOTAL XYLENES	5 U	5 U			5 U	5 U	5 U	5 U
PESTICIDES/PCB (ug/l)								
Validation Status :	V	V	V	V	V	V	V	V
ALPHA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
BETA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DELTA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALDRIN	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN ALDEHYDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
CHLORDANE	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1016	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid; (B) Found In Blank.

007477

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW18-003	MW21-001	MW22-001	MW23-002	DW04-001	MW17-002	MW18-002
QA/QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	B	B	B	B	B	B	B
SAMPLING ROUND	1	1	1	1	1	2	2
FIELD BLANK NUMBER							
TRIP BLANK NUMBER	NA	3,4	5	7	6	8	9
VOLATILE ORGANICS (ug/l)							
Validation Status :	V	V	V	V	Q	V	V
CHLOROMETHANE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	21	5 U	40	5 U	5 J	5 J	5 U
ACETONE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
CARBON DISULFIDE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	10 U	5 U	5 U	10 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROFORM	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-BUTANONE	10 U	10 U	10 U	10 U	27	10 U	10 U
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
VINYL ACETATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
DIBROMOCHLOROMETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U	10 U	10 U	10 U	10 U	10 U
BROMOFORM	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-HEXANONE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
TETRACHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TOLUENE	5 U	5 U	5 U	5 U	5 U	5 U	1 J
CHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ETHYLBENZENE	5 U	5 U	5 U	5 U	5 U	5	5 U
STYRENE	5 U	5 U	5 U	5 U	5 U	5 J	5 U
TOTAL XYLENES	5 U	5 U	5 U	5 U	5 U	5 U	5 U
PESTICIDES/PCB (ug/l)							
Validation Status :	Q	V	V	V	V	V	V
ALPHA-BHC	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
BETA-BHC	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DELTA-BHC	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-BHC (LINDANE)	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.030 B	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALDRIN	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN I	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN ALDEHYDE	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR	0.050 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	0.010 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
CHLORDANE	0.050 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	0.100 U	1.0 U	1.0 U	1.00 U	1.00 U	1.0 U	1.0 U
AROCLOR-1016	0.050 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	0.050 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	0.050 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	0.050 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	0.050 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	0.100 U	1.0 U	1.0 U	1.00 U	1.00 U	1.0 U	1.0 U
AROCLOR-1260	0.100 U	1.0 U	1.0 U	1.00 U	1.00 U	1.0 U	1.0 U

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid (NV) Not validated; (Q) Qualified; (I) Invalid; (B) Found In Blank.

007478

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW21-002	TRIP BLANK 1	TRIP BLANK 2	TRIP BLANK 3	TRIP BLANK 4	TRIP BLANK 5
QA/QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	O	B	B	B	B	B
SAMPLING ROUND	2	1	1	1	1	1
FIELD BLANK NUMBER		MW17-001	MW18-001	MW21-001	MW21-001	MW22-001
TRIP BLANK NUMBER	10	1	2	3	4	5
VOLATILE ORGANICS (ug/l)						
Validation Status :	O	V	V	V	V	V
CHLOROMETHANE	10 U	10 U	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	5 U	5 U	5 U	5 U	5 U	44
ACETONE	10 U	10 U	10 U	10 U	10 U	10 U
CARBON DISULFIDE	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROFORM	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U
2-BUTANONE	10 J	10 U	10 U	10 U	10 U	10 U
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE	5 U	5 U	5 U	5 U	5 U	5 U
VINYL ACETATE	10 U	10 U	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U
DIBROMOCHLOROMETHANE	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U
BENZENE	5 U	5 U	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U	10 U	10 U	10 U	10 U
BROMOFORM	5 U	5 U	5 U	5 U	5 U	5 U
2-HEXANONE	10 U	10 U	10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U	10 U	10 U	10 U
TETRACHLOROETHENE	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U
TOLUENE	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
ETHYLBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
STYRENE	5 U	5 U	5 U	5 U	5 U	5 U
TOTAL XYLENES	5 U	5 U	5 U	5 U	5 U	5 U
PESTICIDES/PCB (ug/l)						
Validation Status :	V	NA	NA	NA	NA	NA
ALPHA-BHC	0.05 U					
BETA-BHC	0.05 U					
DELTA-BHC	0.05 U					
GAMMA-BHC (LINDANE)	0.05 U					
HEPTACHLOR	0.05 U					
ALDRIN	0.05 U					
HEPTACHLOR EPOXIDE	0.05 U					
ENDOSULFAN I	0.05 U					
DIELDRIN	0.10 U					
4,4'-DDE	0.10 U					
ENDRIN	0.10 U					
ENDOSULFAN II	0.10 U					
4,4'-DDD	0.10 U					
ENDRIN ALDEHYDE	0.10 U					
ENDOSULFAN SULFATE	0.10 U					
4,4'-DDT	0.10 U					
METHOXYCHLOR	0.50 U					
ENDRIN KETONE	0.10 U					
CHLORDANE	0.50 U					
TOXAPHENE	1.0 U					
AROCLOR-1016	0.50 U					
AROCLOR-1221	0.50 U					
AROCLOR-1232	0.50 U					
AROCLOR-1242	0.50 U					
AROCLOR-1248	0.50 U					
AROCLOR-1254	1.0 U					
AROCLOR-1260	1.0 U					

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid; (B) Found In Blank.

007479

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	TRIP BLANK 6	TRIP BLANK 7	TRIP BLANK 8	TRIP BLANK 9	TRIP BLANK 10
QA/QC PAIR (O) Original (B) Blank (D) Duplicate (S) Split	B	B	B	B	B
SAMPLING ROUND	1	1	2	2	2
FIELD BLANK NUMBER	DW04-001	MW23-002	MW17-002	MW18-002	MW21-002
TRIP BLANK NUMBER	6	7	8	9	10
VOLATILE ORGANICS (ug/l)					
Validation Status :	U	U	U	U	U
CHLOROMETHANE	10 U	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	98	5 J	5 J	5 U	2
ACETONE	10 U	10 U	10 U	10 U	10 U
CARBON DISULFIDE	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U	5 U	5 U	5 U
CHLOROFORM	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE	5 U	5 U	5 U	5 U	5 U
2-BUTANONE	23	10 U	10 U	10 U	15
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE	5 U	5 U	5 U	5 U	5 U
VINYL ACETATE	10 U	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5 U	5 U	5 U	5 U	5 U
DIBROMOCHLOROMETHANE	5 U	5 U	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U	5 U	5 U
BENZENE	5 U	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U	5 U	5 U	5 U
2-CHLOROETHYLVINYL ETHER	10 U	10 U	10 U	10 U	10 U
BROMOFORM	5 U	5 U	5 U	5 U	5 U
2-HEXANONE	10 U	10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U	10 U	10 U
TETRACHLOROETHENE	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	5 U	5 U	5 U
TOLUENE	5 U	5 U	5 U	5 U	5 U
CHLOROBENZENE	5 U	5 U	5 U	5 U	5 U
ETHYLBENZENE	5 U	5 U	5 U	5 U	5 U
STYRENE	5 U	5 U	5 U	5 U	5 U
TOTAL XYLENES	5 U	5 U	5 U	5 U	5 U
PESTICIDES/PCB (ug/l)					
Validation Status :	NA	NA	NA	NA	NA
ALPHA-BHC					
BETA-BHC					
DELTA-BHC					
GAMMA-BHC (LINDANE)					
HEPTACHLOR					
ALDRIN					
HEPTACHLOR EPOXIDE					
ENDOSULFAN I					
DIELDRIN					
4,4'-DDE					
ENDRIN					
ENDOSULFAN II					
4,4'-DDD					
ENDRIN ALDEHYDE					
ENDOSULFAN SULFATE					
4,4'-DDT					
METHOXYCHLOR					
ENDRIN KETONE					
CHLORDANE					
TOXAPHENE					
AROCLOR-1016					
AROCLOR-1221					
AROCLOR-1232					
AROCLOR-1242					
AROCLOR-1248					
AROCLOR-1254					
AROCLOR-1260					

NOTES : (U) Undetected; (J) Present below detection limit; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid; (B) Found in Blank.

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SOUTH CHARLESTON SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW01-001	MW19-001	MW05-001	MFC321(CDM)	MW08-001	MW13-003	MFC322(CDM)	MW12-001	MW20-001	MW23-001	MFB571(CDM)	OW02-001	MW13-001
QA/QC PAIR													
(O) Original	O	D	O	S	O	D	S	O	D	O	S	O	D
(B) Blank													
(D) Duplicate													
Sampling Round	1	1	1	1	1	1	1	1	1	1	1	1	1
Field Blank Number	MW18-001	MW18-001	MW18-003	MW18-003	MW18-003	MW18-003	MW18-003	MW21-001	MW21-001	MW23-002	MW23-002	MW22-001	MW22-001
INORGANICS (ug/l)													
Validation Status	V	V	V		V	V		V	V	V		V	V
SILVER	10 U	10 U	8 U	4 U	8 U	8 U	4 U	10 U	10 U(U)	9 U	10 U	10 U	10 U
ARSENIC	61.7	64.7	10 U	10 U	34.6 (U)	16.4 (U)	10 U	29	43.6	5 U	10 U	69.4	97.9
BERYLLIUM	3 U	3 U	4	5 U	4	2 U	5 U	3 U	3 U	2 U	0.2 U	3 U	3 U
CADMIUM	5 U	5 U	10 U	4 U	5 U	5 U	4 U	5 U	5 U(U)	5 U	2.6 U	5 U	8
CYANIDE	100 U	100 U	5 U	10 U	10 U	10 U	10 U	100 U	100 U	10 U	10 U	100 U	100 U
CHROMIUM	98	9 U	111	113	185	65	260	11	14	8 U	4.4 U	9 U	10
COPPER	41	10 U	12	32	38	20	77	11	10 U	16 U	9.0	10 U	10 U
IRON	100000	4920	38000	38200	78000	32400	111000	9620	4240	2720	2190	4580	5110
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	125	53	127	90	231	136	190	29 U	29 U	34 U	9.2 U	29 U	29 U
NITRATE	NA	NA	500	NA	200	100	NA	NA	NA	400	NA	NA	NA
LEAD	80	37.2	29.8	29	35.9 (U)	14.7 (U)	38	102	128	4 U	5.0 U	5 U	5 U
ANTIMONY	44 U	44 U	50 U	60 U	50 U	50 U	60 U	44 U(U)	65 (U)	54 U	24 U	44 U	44 U
SELENIUM	5 U	5 U	5 U	5 U	5 U(U)	5 U(U)	5 U	5 U(U)	5 U(U)	4 U	7.9	5 U	5 U
THALLIUM	10 U	10 U	10 U	10 U	10 U(U)	10 U(U)	10 U	10 U	10 U	5 U	10 U	10 U	10 U
ZINC	196	57	74	84	180	80	240	60	36	10 U	18	29	29

NOTES : (U) Undetected; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid.

SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	DW02-001	DW03-001	MW03-002	MW19-002	MW07-002	MW20-002	MW08-002	MW99	MW16-002	MW13-002	DW02-002	DW02-003	FD259(COM)
QA/QC PAIR													
(O) Original	O		O		O		O		O		O	O	
(B) Blank		B		B		B		B		B			S
(D) Duplicate						D				D			
Sampling Round	1	1	2	2	2	2	2	2	2	2	2	2	2
Field Blank Number	DW04-001	DW04-001	MW21-002	MW21-002	MW21-002	MW21-002	MWA-FB	MWA-FB	MW18-002	MW18-002	DW02-004	DW02-004	DW02-004
INORGANICS (ug/l)													
Validation Status :	V	V	V	V	V	V	V	V	V	V	V	V	NA
SILVER	8 U	8 U	8 U	8 U	NA	NA	9 U(Q)	9 U(Q)	8 U	8 U	8 U	8 U	
ARSENIC	10 U	10 U	12.4	10 U	54.6	39.5	10 U(Q)	10 U(Q)	10 U	10 U	10 U	10 U	
BERYLLIUM	2 U	2 U	3 U	3 U	NA	NA	2 U	2 U	3 U	3 U	2 U	2 U	
CADMIUM	3 U	3 U	4 U	4 U	NA	NA	5 U	5 U	4 U	4 U	5 U	5 U	
CYANIDE	10 U	10 U	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U	
CHROMIUM	7 U	7 U	37	23	30	20	27	23	12	9 U	9 U	9 U	
COPPER	15 U	15 U	14 U	15	NA	NA	21	16 U	14 U	14 U	9 U	9 U	
IRON	80	78	18500	19300 (Q)	NA	NA	NA	NA	334	606	78 U	240	
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U(Q)	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
NICKEL	25 U	25 U	52	57	85	79	35	21 U	24 U	39	25 U	25 U	
NITRATE	100 U	100 U	100	100 U	NA	NA	NA	NA	200	200	100	100	
LEAD	5 U	5 U	16.8	12	27.4	32	34 (Q)	32 (Q)	5 U	5.2	5 U	5 U	
ANTIMONY	50 U	50 U	49 U	48 U(Q)	NA	NA	54 U	54 U	48 U	48 U	50 U	50 U	
SELENIUM	5 U	5 U	5 U	5 U	NA	NA	5 U(Q)	5 U(Q)	5 U	5 U	5 U	5 U	
THALLIUM	10 U(Q)	10 U(Q)	10 U	10 U	NA	NA	10 U	10 U	10 U	10 U(Q)	10 U(Q)	10 U(Q)	
ZINC	12 U	12 U	42	43	109	99	59	50	17 U	17 U	9 U	9 U	

NOTES : (U) Undetected; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid.

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SOUTH CAVALCADE SITE - GROUNDWATER QA ANALYTICAL RESULTS

Sample Number	MW17-001	MW18-001	MW18-003	MW21-001	MW22-001	MW23-002	DW04-001	MW17-002	MW18-002	MW21-002	DW02-004	MWA-FIELD BLANK
QA/QC PAIR (O) Original (B) Blank (D) Duplicate	B	B	B	B	B	B	B	B	B	B	B	B
Sampling Round	I	1	1	1	1	1	1	2	2	2	2	2
Field Blank Number												
INORGANICS (ug/l)												
Validation Status :	V	Q	V	V	V	V	V,Q	V	V	V	V	V
SILVER	10 U	10 U	8 U	10 U(Q)	10 U	9 U	8 U	8 U	8 U	8 U	8 U	9 U(Q)
ARSENIC	10 U	10 U	10 U(Q)	10 U	10 U	5 U	10 U	10 U	10 U	10 U	10 U	10 U(Q)
BERYLLIUM	3 U	3 U	2 U	3 U	3 U	2 U	2 U	3 U	3 U	3 U	2 U	2 U
CADMIUM	5 U	5 U	5 U	5 U(Q)	5 U	5 U	3 U	4 U	4 U	4 U	5 U	5 U
CYANIDE	100 U	100 U	10 U	100 U	100 U	100 U	10 U	NA	NA	NA	10 U	NA
CHROMIUM	9 U	9 U	9 U	9 U	9 U	8 U	7 U	9 U	9 U	9 U	9 U	8 U
COPPER	10 U	10 U	9 U	10 U	10 U	15 U	15 U	14 U	14 U	14 U	9 U	16 U
IRON	30 U	90	120	30 U	30 U	24 U	65 U	22 U	22 U	23 U	78 U	NA
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U(Q)	0.2 U	0.2 U
NICKEL	38	29 U	33 U	29 U	29 U	34 U	25 U	24 U	24 U	34	25 U	21 U
NITRATE	100 U	NA	100 U	NA	NA	100	100 U	100 U	100	100 U	100 U	NA
LEAD	5 U	5 U	5 U(Q)	5 U	5 U	4 U	5 U	5 U	5 U	5 U	5 U	5.6 (Q)
ANTIMONY	44 U	44 U	50 U	44 U(Q)	44 U	54 U	5 U	48 U	48 U	48 U(Q)	50 U	54 U
SELENIUM	5 U	5 U	5 U(Q)	5 U(Q)	5 U	4 U	5 U	5 U	5 U	5 U	5 U	5 U(Q)
THALLIUM	10 U	10 U	10 U(Q)	10 U	10 U	5 U(Q)	10 U(Q)	10 U	10 U	10 U	10 U(Q)	10 U
ZINC	27	24	9 U	22	18	10 U	12 U	17 U	17 U	17 U	9 U	10 U

NOTES : (U) Undetected; (NA) Not analyzed; (V) Valid
(NV) Not validated; (Q) Qualified; (I) Invalid.

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APPENDIX S – TOXICOLOGICAL PROFILES

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This Appendix presents toxicological profiles for the potential contaminants of concern identified in Section 9.3. The potential contaminants of concern are:

- potentially carcinogenic PAHs
- metals - arsenic, chromium, copper, lead, zinc
- volatile organic compounds (VOCs) - benzene, ethylbenzene, toluene, xylene

The potential toxicity of the potential contaminants of interest is important when evaluating their potential effects on possible receptors, either on-site or off-site. The following sections provide toxicological profiles for the potential contaminants of concern at the South Cavalcade site. It should be noted, however, that while these substances may have the potential to cause the reported effects in humans or animals, the likelihood of this occurring is dependent upon the probability and duration of exposure dose accrued and, to an extent, individual sensitivity.

In these toxicological profiles, both human and animal data are presented, where available. Human epidemiological data from occupational exposures is often insufficient for determining quantitative indices of toxicity due to uncertainties in exposure estimates, and to inherent difficulties in determining causal relationships from epidemological studies. For this reason, animal bioassays are conducted under controlled conditions and their results extrapolated to humans. There are two stages to this extrapolation. First, to account for species differences, conversion factors are used to extrapolate from test animals to humans. Second, the relatively high doses administered to test animals must be extrapolated to the lower doses more typical of potential human exposure. For potential noncarcinogens, safety factors are applied to animal results when developing acceptable human doses. For potential carcinogens, mathematical models are used to extrapolate from potential risks at high doses to potential risks at lower doses.

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The profiles are organized to provide the following information:

- **Summary of toxicological effects** - the summary of toxicological effects presents the pharmacokinetics of the compound, summaries of human exposure data and summaries of animal experiments. The summaries of human and animal data include the duration of exposure: acute (single large dose or repeated doses in a short time period), subchronic (1 to 3 month exposure), and chronic (exposure greater than 3 months); and the type of exposure: oral, inhalation, or, in some cases, dermal.

- **EPA classification of potential carcinogenicity**

- **Quantitative indices of toxicity** - The quantitative indices of toxicity include ingestion and inhalation carcinogenic potency factors for potential carcinogens, and ingestion and inhalation acceptable chronic intakes for potential noncarcinogens.

  These quantitative indices have been developed by the U.S. Environmental Protection Agency for use at Superfund sites. Use of these quantitative indices does not constitute agreement with these factors.

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POTENTIALLY CARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS (PAHS)

Polynuclear Aromatic Hydrocarbons (PAHs) are nonpolar, nonionic compounds of two or more aromatic rings where adjacent rings share two carbon atoms. These compounds are present in the environment from both natural and manmade sources and are ubiquitous in nature, occurring in animal and plant tissue, sediments, soils, air, and surface water.

1.0 Classification of PAHs

Several of the PAHs have been reported to be tumor producing agents in animals. Not all of the PAHs, however, have been reported to have this ability. For this reason, the U.S. EPA has divided PAHs into two categories: potentially carcinogenic and noncarcinogenic PAHs. The U.S. EPA provides carcinogenic rankings for PAHs in the EPA Superfund Public Health Evaluation Manual (U.S. EPA, 1986). The rankings are reproduced in Table 1 for the PAHs labeled by EPA as priority pollutants. Table 2 gives the U.S. EPA weight-of-evidence categories for potentially carcinogenic and noncarcinogenic compounds.

2.0 Human Health Effects

2.1 Summary of Toxicological Effects

Benzo(a)pyrene, B(a)P, is used as a surrogate for the potentially carcinogenic PAHs because of the availability of dose-response information for the oral and inhalation exposure routes. Data from a mouse skin painting study reported B(a)P to be one of the more carcinogenic of the PAHs. Albert et al (1978) applied B(a)P weekly to the skin of mice and reported tumor response. Increasing weekly doses of B(a)P were reported to cause a shortening of the latency period for carcinoma formation.

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TABLE 1

U.S. EPA
CARCINOGENIC RANKING OF PRIORITY POLLUTANT PAHS

	EPA[1] SPHEM	Ranking[2] for this study
Naphthalene	U[3]	N
Acenaphthylene	U	N
Acenaphthene	U	N
Fluorene	U	N
Phenanthrene	D	N
Anthracene	U	N
Fluoranthene	U	N
Pyrene	U	N
Benz(a)anthracene	B2	C
Chrysene	B2	C
Benzo(b)fluoranthene	B2	C
Benzo(k)fluoranthene	D	N
Benzo(a)pyrene	B2	C
Dibenzo(a,h)anthracene	B2	C
Benzo(g,h,i)perylene	U	N
Indeno(1,2,3-c,d)pyrene	C	C

(1) Source: EPA Superfund Public Health Evaluation Manual, ratings follow EPA weight-of-evidence categories given in Table 2.

(2) C indicates carcinogen and N indicates noncarcinogen.

(3) Compounds that have been rated U have been ranked as noncarcinogenic for this study until sufficient evidence of their carcinogenicity is provided.

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TABLE 2

EPA WEIGHT-OF-EVIDENCE CATEGORIES FOR POTENTIAL CARCINOGENS

EPA Category	Description of Category	Description of Evidence
A	Human Carcinogen	EPA considers that sufficient evidence exists from epidemiologic studies to support a causal association between exposure and cancer.
B1	Probable Human Carcinogen	EPA considers that limited evidence exists of carcinogenicity from epidemiolog studies.
B2	Probable Human Carcinogen	EPA considers that sufficient evidence exists of carcinogenicity in animals, and that inadequate evidence exists of carcinogenicity in humans.
C	Possible Human Carcinogen	Limited evidence of carcinogenicity in animals
D	Not Classified	EPA considers that inadequate evidence exists of carcinogenicity in animals.
E	No evidence of Carcinogenicity in Humans	EPA considers that no evidence exists for carcinogenicity in at least two adequate animal tests or in both epidemiologic and animal studies.
U	No rating given	

[1] **Source: EPA Superfund Public Health Evaluation Manual (1986).**

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Pharmacokinetics

The major routes of exposure by which the PAHs could potentially be absorbed include: direct inhalation of contaminated air and tobacco smoke, ingestion of contaminated food and water, or dermal contact with soot, tars, and oils. The observed toxicity of the PAHs by oral and dermal administration indicates that they are highly lipid-soluble which enables their passage through the lipid cell membranes of biological organisms (Santodonato et al 1981).

PAHs are inhaled by adsorption onto carrier particles. Regional deposition in the respiratory tract is largely dependent on the physical size of the PAH-carrier complex. Particles that reach the alveolar region of the lung are rapidly distributed by the bloodstream to most of the internal organs (Santodonato et al, 1981). Localizaiton and retention of these compounds in the fat and fatty tissues enhances the possibility of toxicity of a more reactive metabolite. Particles that are cleared by mucous and ciliary action in the respiratory tract may be swallowed and absorbed from the gastrointestinal tract.

Excretion of the majority of an administered dose of PAHs via the gastrointestinal tract is primarily through the feces and to a lesser extent, the bile. PAHs absorbed via inhalation or dermal contact do not reach the liver and are more likely to reach internal organs in unmetabolized form. Elimination following these exposure routes may not be sufficiently rapid to prevent accumulation in tissues (Santodonato et al, 1981).

Carcinogenicity

The PAH compounds considered by EPA to be potentially carcinogenic tend to be high in molecular weight, contain at least three aromatic rings, have low water solubility, and are relatively easily absorbed by humans (Cassarett and Doulls, 1986).

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2.1.2 Human Data

B(a)P represents only a small percentage of the total PAHs found in industrial environments containing PAH compounds. Few epidemiologic studies of humans exposed to a single PAH, such as B(a)P, have been reported.

Potential dermal toxicity of PAHs: epidermal changes have been reported in humans following acute exposure to B(a)P (Rhoads et al, 1954) and patients to which a 1% solution had been applied to the skin (Cottini and Mazone, 1939). B(a)P has been reported to be more potent when applied dermally than when administered orally (Santodonato et al, 1981) Additional studies on the dermal toxicity of the PAHs can be found in the following references: IARC, 1984; IARC, 1985; and Santodonato et al, 1981.

2.1.3 Animal Data

Subchronic Toxicity

Only sparse information is available regarding acute, subchronic, or chronic toxicity of B(a)P administered either orally or by inhalation to experimental animals. Toxic effects of the PAHs in general usually are not apparent until the administered dose is high enough to produce tumors (U.S. EPA, 1980). In a study conducted by Robinson et al (1975), differences in the genetic characters of mice were reported to affect the subchronic oral toxicity of B(a)P with the Ah locus playing a major role in oral toxicity by influencing the pathways of biotransformation. Nonresponsive AKR/N mice with enzyme systems poorly inducible to biotransformation, reportedly developed aplastic anemia after being administered 120 mg/kg-bw of B(a)P in their diet for four weeks. Data regarding subchronic inhalation toxicity in experimental animals could not be located in the available literature.

Chronic Toxicity

The only available chronic oral toxicity information for B(a)P is from animal bioassays to determine carcinogenicity (see Carcinogenicity section) (U.S. EPA, 1980b). Malmgren et al (1952) reported an immunosuppressive effect in mice administered high doses of 3-methylcholanthrene (MCA) and dibenz(a,h)

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anthracene. Single carcinogenic doses of MCA, B(a)P and 7,12-dimethylbenz(a)anthracene were reported to cause a prolonged depression of the immune response (Stjernsward, 1969). Noncarcinogenic PAHs reportedly have no immunosuppressive activity (U.S. EPA, 1980). Baldwin (1973) reported that the degree of immunosuppression can be correlated with the carcinogenic potency for PAHs. The application of potentially carcinogenic PAHs to mouse skin reportedly results in dermal toxicity characterized by the following effects: destruction of sebaceous glands, hyperplasia, hyperkeratosis, and ulceration (Bock, 1964). No information could be located regarding chronic inhalation toxicity for noncarcinogenic endpoints.

Developmental and Reproductive Effects

Rigdon and Rennels (1964) fed pregnant female rats a diet containing B(a)P at 1000 mg/kg (50 mg/kg/day) for 3.5 months. The majority of rats were reported to abort fetuses before full-term. In another dietary study using rats, however, Rigdon and Neal (1965) reported no apparent reproductive or teratogenic effects. Reduced fertility and reproductive capability were reported by MacKenzie and Angevine (1981) after feeding 10 mg/kg-bw of B(a)P to CD-1 mice during pregnancy. Teratogenic effects from inhalation exposure to B(a)P could not be located in the literature.

Mutagenicity

B(a)P has been used as a positive control in a variety of short-term tests in which positive results were reportedly obtained in bacterial mutation, mutation in Drosphilia melanogaster, chromosomal aberration point mutation and transformation in mammalian cells, and in tests in mammals in vivo (IARC, 1982; Hollstein and McCann, 1979).

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Carcinogenicity

B(a)P has been introduced orally, through inhalation, and dermally to various strains of rodents. A dose-response relationship was reported for the incidence of stomach tumors in male and female CFW-Swiss mice administered 1 to 250 ppm B(a)P in their diets for up to 197 days (Neal and Rigdon, 1967).

Thyssen et al (1981) exposed hamsters to various concentrations of B(a)P by inhalation. Animals exposed to 9.5 mg/m^3 reportedly developed nasal cavity, phaynx, trachea, and pharynx tumors. Tumors in the respiratory tract and upper digestive tract were reportedly present in animals exposed to 44.8 mg/m^3. Dermal application of B(a)P to C/57L mice was reported to produce skin cancers. Increasingly higher doses reportedly induced malignancies in 100% of treated animals in shorter time periods (Stern et al, 1985).

Benzo(a)pyrene has been reported to be both a local and a systemic carcinogen in various experimental animals following oral, inhalation, or dermal exposure (U.S. EPA, 1984)

2.2 EPA Classification of Carcinogenicity

The U.S. EPA classifications for PAH compounds are shown in Table 1.

2.3 Quantitative Indices of Toxicity

Neither an AIS (acceptable intake subchronic) nor an AIC (acceptable intake chronic) have been set for oral or inhalation exposures to PAHs due to the fact that some of the individual PAHs are conservatively assumed to have equal potency (U.S. EPA, 1984). The carcinogenic potency factor of 11.53 $(mg/kg/day)^{-1}$ for oral exposure to B(a)P was based on a study in which stomach tumors were observed in CFW mice exposed to B(a)P (Neal and Rigdon, 1967). The carcinogenic potency factor of 6.11 $(mg/kg/day)^{-1}$ for inhalation exposure to B(a)P was based on a study in which respiratory tumors were observed in Syrian golden hamsters exposed to B(a)P (Thyssen et al., 1981).

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2.4 Regulatory Standards and Criteria

An 8-hour time weighted average (TWA) of 0.2 mg/m^3 was set by OSHA for the benzene-soluble fraction of coal tar pitch volatiles: anthracene, B(a)P, phenanthrene, acridine, chrysene, and pyrene. A 10-hour TWA of 0.1 mg/m^3 is recommended for the cyclohexane-extractable fraction (NIOSH, 1977). U.S. EPA ambient water quality criteria for the protection of human health for the sum of all potentially carcinogenic PAHs in water is 28 ng/l (U.S. EPA, 1984). Based on the nonthreshold assumption for potential carcinogens, zero concentration is recommended for maximum protection of human health, while the concentrations corresponding to a 10^{-6} excess lifetime cancer risk are 2.8 ng/l for the ingestion of aquatic organisms and drinking water and 3.1 ng/l for drinking water only (U.S. EPA, 1986).

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ARSENIC

Arsenic exists as a nonmetal or metalloid that may be present in the environment as a constituent of organic and inorganic compounds. The complexing of arsenic with organic compounds increases its solubility potential. Naturally-occurring arsenic can exist in four oxidation states: $^{-}3$, 0 (the metallic state), $^{+}3$, and $^{+}5$. Arsenate (As^{+5}) is the dominant species in aquatic systems. Biological activity may reduce arsenate to arsenite (As^{+3}) and finally to methylated arsenicals (As^{-3}) (Callahan et al, 1979).

The toxicity of arsenic depends upon its chemical form along with the route, dose, and duration of exposure. In general, arsenites (As^{+3}) are potentially more toxic than arsenates, soluble arsenic compounds are potentially more toxic than insoluble compounds, and inorganic arsenic compounds are potentially more toxic than organic derivatives (U.S. EPA, 1985b).

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1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

Absorption from the gastrointestinal tract (orally) is dependent upon the solubility of the specific arsenic compound and the dose. Solutions of As^{+3} or As^{+5} soluble inorganic compounds are reported to be most completely absorbed by rats (Coulson et al, 1935). Ray-Bettley and O'Shea (1975) have reported that greater than 95% of the soluble inorganic arsenic that humans consume may be absorbed. Insoluble forms of arsenic tend to pass through the gastrointestinal tract (Mappes, 1977). In humans, the rate of arsenic excretion, which is dependent upon dose and oxidation state, is reported to be 50% to 90% within two to four days (Crecelius, 1977). Studies performed to determine the pharmacokinetics of arsenic have primarily used inorganic arsenic compounds. These compounds undergo methylation in mammalian species to organic arsenic compounds, monomethyl and dimethyl arsenic (Buchet, et al, 1981). Buchet et al (1981) reported that after oral administration of 500 ug of arsenite to humans, 25% was excreted in the urine in the inorganic form, 25% as monomethylarsenic acid and 50% in dimethyl form. Crecelius (1977)

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reported urinary excretion after the ingestion of arsenic-rich wire to be approximately 80%: 63% dimethylarsenic acid, 18% monomethylarsenic acid and 9% of both inorganic AS^{+3} and As^{+5}. The primary route of excretion is reported to be via the urine, initially in the form of the ingested compounds followed by the metabolized methyl derivative forms (Crecelius, 1977).

Absorption from the respiratory tract is also dependent upon the specific arsenic compound, along with particle size (from aerosols or dusts). Particles less than 1 to 2 um may be absorbed through the respiratory epithelium; whereas, larger particles are most likely deposited in the upper respiratory tract and ultimately swallowed (U.S. EPA, 1984). For both forms of exposure, excretion is primarily through the urine.

1.1.2 Human Data

Acute Toxicity

Depending upon dose, arsenic is a potential irritant of the skin, mucous membranes, and the gastrointestinal tract. Acute toxicity from the ingestion of higher doses of arsenic may result in vomiting, diarrhea, convulsions, a severe drop in blood pressure, and cardiovascular effects. The lethal dose for humans is reported to be 70 to 180 mg or 1.0 to 2.6 mg/kg-bw for a 70 kg adult (Vallee et al, 1960). Acute toxicity from inhalation exposure to arsenic adsorbed to particulate matter (aerosols) may result in conjunctivitis and pharyngitis.

Subchronic Toxicity

Tay and Seah (1975) reported subchronic effects in patients in Singapore who had ingested arsenic-containing antiasthmatic herbal preparations at doses of 2.5 mg As/day as arsenic oxide (As^{+3}) or 10.3 mg As/day as arsenic sulfides over a period of less than 6 months to 15 years. The major effects reported included: hyperpigmentation (melanosis), multiple arsenical Keratoses, sensorimotor polyneuropathy, persistent chronic headache, lethargy, gastroenteritis, and mild iron deficiency anemia. Inhaled arsenic compounds have been reported to be associated with skin lesions, cardiovascular and respiratory effects, and peripheral neuropathy at varying doses (Stokinger, 1981; IARC, 1980; ACGIH, 1980).

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Chronic Toxicity

Chronic oral exposure of humans to inorganic arsenic compounds has been reported to cause skin lesions, peripheral vascular disease, and peripheral neuropathy at doses of 8.8 mg/day for 28 months (Silver and Wainman, 1952). The incidence of blackfoot disease, a peripheral circulatory disease characterized by gangrene of the extremities, has reportedly been related to the presence of arsenic in the drinking water of residents of the southwest coast of Taiwan (Tseng, 1977). Arsenic concentrations of 0.001 to 1.82 mg/l in the above study have reportedly resulted in positive correlation with arsenic uptake and the incidence of blackfoot disease. Based upon this, a NOAEL (No observed adverse effect level) of 0.001 to 0.017 mg/L was reported by Tseng (1977) for blackfoot disease. Chronic arsenic poisoning was reported in Chile in humans consuming water supplies containing approximately 0.58 mg/L arsenic (Zaldivar, 1974). Symptoms included weight loss, diarrhea, debility, anorexia, bronchitis, and skin disorders. Toxicity was reported in 146 of 100,000 in males and 168 of 100,000 in females with children 0 to ten years of age showing greater sensitivity than adults. The symptoms of chronic inhalation exposure to arsenic compounds are similar to those associated with chronic oral toxicity. A direct relationship between the length and intensity of inhaled arsenic trioxide by smelter workers and peripheral nerve function was reported by Landau (1977).

Mutagenicity

There is limited evidence that occupational exposure to arsenic may cause chromosome changes in humans (Beckman et al., 1977; Wen et al., 1981). Beckman et al (1977) reported an increase in gaps, chromatid aberrations and chromosome aberrations from mine workers at a smelter in northern Sweden.

Carcinogenicity

Epidemiological studies conducted in the U.S. have failed to correlate the incidence of skin cancer with arsenic in drinking water (Morton et al, 1976; Goldsmith et al, 1972). A dose-response relationship between the occurrence of skin cancer and arsenic consumption in the drinking water of Taiwanese, however, was reported by Tseng et al (1977). Drinking water was reported to contain 0.4 to 0.6 mg/L arsenic.

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Arsenic exposure at certain doses may produce a pattern of skin disorders, hyperpigmentation, and keratosis that may develop into basal or squamos cell carcinoma (U.S. EPA, 1985b).

Multiple skin cancers were reported in humans who had used Fowler's solution, a medicinal trivalent arsenical, treated with arsenic (Cuzick et al, 1982). Silver and Wainman (1952) reported that ingestion of 3.3 to 6.7 mg As^{+3} (Fowler's solution) daily for 28 months resulted in increased freckling and gastrointestinal distress after 13 months. Neurological symptoms were reported after 2 years. Sommers and McMannus (1953) reported multiple keratoses of palms and soles of patients exposed to Fowler's solution. Several of these patients were reported to develop a variety of internal cancers. The time reported between exposure and carcinogenicity averaged 24 years. Precise dose levels were not determined but some patients reportedly used small doses. Several epidemiological studies of workers occupationally exposed to arsenic in a copper smelting facility have reported a correlation between this exposure and mortality due to respiratory cancer (Brown and Chu, 1983; Higgins et al, 1982; Enterline and Marsh, 1982). Enterline and Marsh (1982) reported a significant increase in deaths due to respiratory cancer in smelter workers employed from 1940-1964. A dose-related response was reported between arsenic exposure and incidence of lung cancer. Cumulative exposures (ug/m^3-years) ranged from 91.8 to 4,091. Brown and Chu (1983) reported an increasing risk of respiratory cancer at increasing age of initial exposure to arsenic at a copper smelting facility that was independent of the time when exposure ceased.

1.1.3 Animal Data

Acute Toxicity

Heywood and Sortwell (1979) administered 0, 2.8, or 5.6 mg/kg/day As^{+5} orally to 3 pairs of Rhesus monkeys. The monkeys that received the highest dose were sacrificed on day 13 for "humane" reasons and only one of the monkeys receiving 2.8 mg/kg/day As^{+5} was reported to have assumed an unnatural posture in one arm.

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Subchronic Toxicity

Toxicity data from arsenic exposure to rats cannot be readily extrapolated to man as the rat is able to store this compound bound to hemoglobin in red blood cells (Lanz et al, 1950). This binding results in extremely slow excretion by rats compared to other species (Mealey et al, 1959). For this reason, dogs have been used to obtain experimental toxicity information. Subchronic oral toxicity of diets containing sodium arsenite or sodium arsenate fed to dogs report that arsenite is potentially more toxic than arsenate. The NOEL (no observed effect level) was reported to be 50 ppm in the diet (2.1 mg/kg-bw/day) for both substances (Byron et al., 1967).

Chronic Toxicity

Schroeder and Balassa (1967) studied the chronic oral toxicity of arsenic on growth and survival in mice. Ingestion of water containing As^{+3} at 5 mg/L over two years is reported to have resulted in decreased survival and reduced median life span in male and female mice. No information regarding chronic inhalation exposure of experimental animals to arsenic could be located in the available literature.

Developmental and Reproductive Effects

Animal studies to test the teratogenic potential of arsenic have been performed. Most of these studies have involved the administration of As^{+3} to parent animals (Ferm and Carpenter, 1968; Holmberg and Ferm, 1969; Beaudion, 1974; Ferm, et al, 1977). Oral exposure has been reported to result in fetotoxic or teratogenic effects. Single oral doses of 29 mg/kg As^{+5} administered by gavage to pregnant mice on day 9, 10, or 11 of gestation were reported to result in 17% to 26% dead or resorbed fetuses, a 10% to 16% decrease in average fetal weight, and a 1% to 3% rate of malformed fetuses (Hood, et al, 1977). Matsumoto et al (1973) reported decreased fetal weight in oral doses of up to 40 mg-arsenate/kg-bw/day administrated to pregnant mice for three consecutive days. Diets containing up to 100 mg-arsenite/kg-diet, however, were reported to have had no effect on offspring (Kojima, 1974). No data regarding the teratogenicity of inhaled arsenic could be found in the literature.

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Mutagenicity

Arsenic compounds are reported to test weak or negative in most bacterial assays for mutagenicity (Nishioka, 1975).

Carcinogenicity

The majority of tests in which experimental animals were exposed orally to a variety of arsenic compounds produced negative results regarding carcinogenicity (Hueper and Payne, 1962; Baroni et al, 1963; Byron et al, 1967). Hueper and Payne (1962) and Baroni et al (1963) reported no increase in the incidence of tumors in mice that were subjected to 0.0034% or 0.01% arsenic trioxide in drinking water. Negative results were also reported for a similar study in which 5 mg sodium arsenite per liter drinking water was administered to mice (Kanisawa and Schroeder, 1967 and 1969). Another study in which dogs were fed diets containing 5-125 mg/kg-As for two years reported no tumorigenic activity (Byron, et al, 1967). A few studies have, however, reported tumorigenic effects of arsenic treatment (Schrauzer et al, 1978; Knoth, 1966 and 1967). Mice administered Fowler's solution (1% arsenic trioxide) orally once/week for 5 months were reported to show an increase in adenocarcinomas of the skin, lung, peritoneum and lymph nodes (Knoth, 1966 and 1967). Schrauzer et al (1978) reported 2 mg As/L water increased the growth rate and incidence of multiple tumors in test animals already exhibiting tumorigenic effects. Mixed results were reported in arsenic inhalation studies (Ishinishi et al, 1976; Ivankovic et al, 1979). Shirachi et al, 1983; Kanisawa and Schroeder, 1967 and 1969; Ishinishi et al (1976) reported no significant increase of tumor incidence between test animals intratracheally administered 0.26 mg arsenic trioxide, 3.95% arsenic in copper ore, or 10.5% As in refinery blue condensate for 15 weeks over controls. Invankovic et al (1979), however, reported lung tumors in 9 out of 15 rats administered a single dose of 4% calcium arsenate intratracheally.

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1.2 EPA Classification of Carcinogenicity

Based upon epidemiological data, the U.S. EPA has classified arsenic as Group A - Human Carcinogen.

1.3 Quantitative Indices of Toxicity

Arsenic has been classified by the U.S. EPA as a human carcinogen, therefore, neither an AIS (acceptable intake subchronic) nor an AIC (acceptable intake chronic) has been established. A cancer potency factor of 1.5 $(mg/kg/day)^{-1}$ (U.S. EPA, 1987), assuming a human intake of 2 L of water/day and 100% oral absorption, was calculated for oral exposure to arsenic based on a correlation between skin cancer and arsenic ingestion (Tseng et al, 1968). A factor of 50.1 $(mg/kg/day)^{-1}$ has been set by the U.S. EPA (1986a) for inhalation exposure based on epidemiological data from copper smelter workers (Brown and Chu, 1983) and assuming 30% inhalation absorption and that a 70 kg human inhales 20 m^3/day.

1.4 Regulatory Standards and Criteria

ACGIH (1980) has established a TWA of 0.2 mg/m^3 for arsenic and soluble arsenic compounds. NIOSH (1975) recommended a TWA (15-minute ceiling) of 0.002 mg/m^3. OSHA established a standard of 0.01 mg/m^3 for airborne inorganic As (U.S. EPA, 1980b). U.S. EPA water quality criteria for the protection of human health are : 0 (2.2 ng/l) for the consumption of aquatic organisms and drinking water and 0 (25 ng/l) for drinking water only (U.S. EPA, 1986). Based on the nonthreshold concentration for potential carcinogens established by EPA, zero concentration is recommended for maximum protection of human health, while the concentration in parentheses corresponds to a 10^{-6} excess lifetime cancer risk. The MCL (maximum contaminant level) in drinking water is 0.05 mg/l.

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CHROMIUM

Chromium (Cr) can exist in several oxidation states from $^{-}2$ to $^{+}6$. In the environment, where oxygen is present, chromium exists in three principal states: elemental (Cr), trivalent (Cr III), and hexavalent (Cr VI) (Westbrook, 1979). Hexavalent chromium is a moderately strong oxidizing agent and may react with organic matter and other reducing agents to form trivalent chromium. The trivalent and hexavalent forms are predominant.

The hexavalent forms of chromium, such as chromic acid or chromate salts, are potentially more toxic than trivalent chromium compounds. This is most likely due to the strong oxidizing capability of hexavalent chromium. The toxicity data for both hexavalent and trivalent chromium, the most predominant forms of chromium, are summarized in this assessment.

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

In humans and experimental animals, gastrointestinal absorption of inorganic salts of Cr III is reported to be relatively low (less than 3%) (Mertz et al, 1965; Ogawa, 1976). Cr VI and organic complexes of Cr III are reported to be more readily absorbed. Absorption of 2-10% for Cr VI and 10-25% for organic complexes of Cr III have been reported (U.S. EPA, 1987). Cr III is reported to be absorbed very slowly through inhalation due to the fact that it forms insoluble complexes with macromolecules (Baetjer et al, 1959); whereas, water soluble Cr VI is reported to be absorbed rapidly through inhalation (Langard et al, 1978). Only a small fraction of chromium (9% to 12%) is reported to be diffusible and reabsorbed from the kidney (Collins et al., 1961). A large portion of chromium is reported to circulate in primarily a nondiffusible form (Collins et al., 1961). Cr VI reportedly crosses biological membranes by diffusion or attachment to a carrier molecule (Alexander et al., 1982) where it is reduced to Cr III. The primary route of excretion of absorbed chromium is through the urine (Kraintz and Talmage, 1952).

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1.1.2 Human Data

Acute Toxicity

Trivalent chromium is an essential nutrient in trace quantities for glucose metabolism. Lipids and other carbohydrates may also be metabolized by chromium (U.S. EPA, 1985). Acute exposures of humans and animals to soluble Cr VI and Cr III compounds via various routes of administration reportedly may produce liver and kidney damage (ICF-Clement, 1987). Dermal exposure to chromic acid or Cr VI salts reportedly may cause dermatitis and skin ulcerations (Burrows, 1978). Skin effects were reported in an individual patch-tested three times with 0.005% potassium dichromate solution and samples containing 0.0001% and 0.0004% Cr VI (U.S. EPA, 1987). The immediate symptoms of acute exposure to chromium reportedly include: nausea, vomiting, and diarrhea (U.S. EPA, 1985). NIOSH (1983) report fatalities in humans exposed to doses of 0.5 to 1.5 g $K_2Cr_2O_7$ and estimate an LD_{50} in children of 26 mg/kg (9.2 mg/kg Cr VI).

Subchronic Toxicity

No data regarding subchronic ingestion by humans of either Cr III or Cr VI could be located in the literature reviewed.

Numerous studies regarding occupational exposure of humans to Cr VI via inhalation have been documented. The most common reported effects were nasal ulceration and performation. These symptoms were reported at various airborne concentrations: 0.12 to 5.6 mg/m^3 (Bloomfield and Blum, 1928), 0.18 to 1.4 mg/m^3 (Kleinfeld and Russo, 1965), and 0.11 to 0.15 mg/m^3 (Vigliani and Zurlo, 1955). Cohen and Kramkowski (1973) also reported nasal ulceration or perforation on chromium-plating plant workers with one year of employment at much lower airborne concentrations, 0.71 to 9.12 ug/m^3. No data regarding subchronic inhalation of Cr III by humans could be located.

Chronic Toxicity

No case studies regarding chronic human exposures to Cr III by inhalation or ingestion could be located in the literature reviewed. No adverse health effects were

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reported in a family that had ingested Cr VI at approximately 0.03 mg/kg/day for three years in a well used for drinking water (Davies and Lieber, 1951). Bloomfield and Blum (1978) reported nasal ulceration or perforation in workers chronically inhaling Cr VI at 0.12 to 5.6 mg/m^3 for one week to three years. Subchronic and chronic dermal exposures to chromic acid (Cr VI) were reported to cause dermatitis and skin ulcerations (Burrows, 1978).

Carcinogenicity

Data regarding the oral carcinogenicity of both trivalent and hexavalent chromium in humans was not available in the literature reviewed. Occupational exposure to chromium by inhalation has been documented in the chromate manufacturing and ferrochromium industries. Exposure was to both Cr III and Cr VI, however, Cr VI was potentially the causative agent in excess cancer risk in workers (U.S. EPA, 1984a). Chromate workers studied by Mancuso (1975) over a series of years were reported to have 50% mortality from lung cancer. Studies in which workers were occupationally exposed only to Cr VI reported a correlation with the incidence of lung cancer (Davies, 1979; Langard and Norseth, 1975).

1.1.3 Animal Data

Acute Toxicity

In rats the oral LD_{50} for Cr III is reported to be from 600 to 2,600 mg/kg (Smyth, et al., 1969). An LD_{50} of 19.8 mg/kg is reported for Cr VI administered orally to rats (NIOSH, 1983).

Subchronic Toxicity

A study of the subchronic oral toxicity of trivalent chromium to rats reported NOEL (No observed effect level) of 25 ppm $CrCL_3$ (8.2 ppm Cr III) (MacKenzie et al, 1958). Akatsuka and Fairhall (1934) reported no effects in cats exposed to Cr III at 3.3 to 83 mg/m^3 via subchronic inhalation exposure.

Subchronic oral exposure of male and female rats at 0 to 25 ppm Cr VI in drinking water for one year resulted in no observed effects at any level of treatment, or a

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NOEL of 2.5 mg/kg/day (MacKenzie et al, 1958). Data regarding subchronic inhalation toxicity of Cr VI to experimental animals could not be located in available literature.

Chronic Toxicity

Only one animal study for chronic oral exposure to Cr III was located. Male and female rats were administered 430 to 2150 mg/kg-bw for 120 weeks resulting in no adverse effects (Ivankovic and Preussman, 1975). Chronic exposure of animals to Cr III by inhalation could not be located in available literature.

One chronic study involving oral exposure of Cr VI to animals was found in the literature reviewed. Anwar et al (1961) administered levels ranging from 0.45 to 11.2 ppm potassium chromate in drinking water to dogs for 4 years. No effects were reported after examination of major organs and weighing spleens, livers, and kidneys. The NOEL, therefore, corresponding to 11.2 ppm is 0.089 mg - Cr VI/kg/day. A chronic inhalation study in which Cr VI was administered in an aerosol to mice at 4.33 mg Cr VI/m^3 or 10 mg Cr VI/m^3 for life reported a LOAEL (Lowest observed adverse effect level) of 4.33 mg Cr VI/m^3 or 1.07 mg Cr VI/kg-bw/day (Nettesheim et al, 1971).

Developmental and Reproductive Effects

Mertz, et al. (1969) reported that the placenta may be highly selective in its permeability to both chromium species. Exposure of pregnant rats to ^{51}Cr as Cr III acetate in drinking water did not result in the transfer of ^{51}Cr to offspring. Gale (1978) and Gale and Bunch (1979) reported increased fetal deaths and external abnormalities in hamsters administered CrO_3 intravenously on a single day after gestation. These effects were reported to occur at levels resulting in depressed weight gain and kidney tubular necrosis in the mother animal. Gale (1982) reported that teratogenic effects to hamsters via intravenous injections of CrO_3 are strain dependent. Fetal weight depression and increased external abnormalities were reported in mice administered 14.64 - 24.4 mg/kg $CrCl_3$ intraperitoneally on day 8 of gestation (Matsumoto, et al, 1976). No reproductive effects were reported in mice or rats administered drinking water containing 500 ppm K_2CrO_4 or mice fed diets containing 1% $ZnCrO_4$ (U.S. EPA, 1988).

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Mutagenicity

Trivalent chromium was not found to be mutagenic in bacterial assays with or without a mammalian activation system (Vennitt and Levy, 1974). Nakamuro et al (1978) reported Cr III to be mutagenic in Bacillus subtilis but with a much lower activity than Cr VI. Hexavalent chromium has been reported to be mutagenic in bacterial systems in the absence of a mammalian activating system (Fukanaga et al, 1982, Bonatti et al, 1976) and not mutagenic when a mammalian activating system is present (Loîroth, 1978). Cr VI is also reported to be mutagenic in eucaryotic test systems (Fukanaga et al, 1982).

Carcinogenicity

Schroeder et al (1965) and Ivankovic and Preussman (1975) reported that trivalent chromium was not carcinogenic in mice by oral administration. Trivalent chromium was also reported not to be carcinogenic by inhalation exposure (Levy and Martin, 1983; Baetjer et al, 1959).

Data regarding the carcinogenicity of hexavalent chromium to experimental animals by oral exposure was not available in the literature reviewed. The induction of tumors in experimental animals upon exposure to Cr III or Cr VI by inhalation has not been reported (Baetjer et al. 1959).

1.2 EPA Classification of Carcinogenicity

Based on inadequate data, the U.S. EPA has classified Cr III as Group D - Not Classified. The U.S. EPA considers that sufficient evidence exists of respiratory cancer in men occupationally exposed to chromium VI. The U.S. EPA, therefore, classifies Cr VI as a Group A - Human Carcinogen.

1.3 Quantitative Indices of Toxicity

Based on a NOAEL (no observed adverse effect level) of 13.99 mg trivalent-Cr/kg-bw/day for depression of spleen and liver weights in rats (Ivankovic and Preussman,1975), and an uncertainty factor of 100, an AIS (acceptable intake

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subchronic) for subchronic oral intake is 13.99 mg/kg/day or 979 mg/man/day for a 70 kg human (U.S. EPA, 1984a). No dose-response data is available from which to derive an AIS for subchronic inhalation of Cr III. The U.S. EPA (1986) has set an AIC (acceptable intake chronic) of 1.0 mg/kg/day for chronic oral exposure in humans and an AIC for chronic inhalation of 0.005 mg/kg/day.

Based on a NOEL (no observed effect level) of 2.5 mg/kg/day for oral exposure of Cr VI in rats (MacKenzie et al, 1958), and an uncertainty factor of 100, an AIS of 0.025 mg/kg/day was established for a 70 kg human (U.S. EPA, 1986). The U.S. EPA (1986) has recently set an AIC for oral exposure to Cr VI of 0.005 mg/kg/day. Since Cr VI is reported shown to be a human carcinogen by inhalation, a cancer potency factor has been derived for this route of exposure of 41 $(mg/kg/day)^{-1}$(U..S. EPA, 1986).

1.4 Regulatory Standards and Criteria

The AGCIH (1983) has set a TWA-TLV for occupational exposure to Cr III at 0.5 mg/m^3. U.S. EPA water quality criteria for the protection of human health are: 170 mg/l for aquatic organisms and drinking water and 179 mg/l for drinking water only. The MCL (maximum contaminant level)for Cr III in drinking water is 0.05 mg/l.

TWAs have been set that are dependent on the solubility and carcinogenic potentials of Cr VI: Noncarcinogenic Cr VI - 0.025 mg/m^3, carcinogenic Cr VI - 0.001 mg/m^3, soluble chromic or chromous salts - 0.500 mg/m^3, insoluble salts - 1.000 mg/m^3, water soluble compounds of Cr VI (noncarcinogenic) - 0.05 mg/m^3, and insoluble compounds of Cr VI (carcinogenic) - 0.05 mg/m^3 (U.S. EPA, 1984b). The U.S. EPA water quality criteria for human health are: 50 ug/l for aquatic organisms and drinking water and 50 ug/l for drinking water only. The MCL for Cr VI in drinking water is 0.05 mg/l. The RMCL (recommended maximum contaminant level) for total chromium is 0.12 mg/l.

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COPPER

Copper occurs in nature as the elemental metal (0 valence), and forms salts and complexes with valences of $^{+}1$, $^{+}2$ and, rarely, $^{+}3$. In aqueous solution, copper exists as Cu^{+2}. Copper tends to form complexes with both organic and inorganic ligands.

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

Copper is an essential nutrient for humans and is necessary for the proper functioning of many important enzyme systems. Copper deficiency results in reduced hemoglobin formation by causing decreased iron absorption (NAS, 1977), reduced elastin formation, teratogenesis and abnormal oxidase activity.

1.1.1 Pharmacokinetics

Copper may be absorbed by dermal, oral, or inhalation exposures. Schroeder et al (1966) estimate an average daily intake of 2.5 to 5 mg-Cu from the diet with an absorption by the GI tract of 3.2 and 0.2 mg, respectively. Copper absorption is, however, affected by geographical location, climate, soil chemistry, diet, water softness, and pH (U.S. EPA, 1984). Weber et al (1969) report an average net absorption of copper of 60% in humans orally administered copper acetate. Evans (1973) reported alimentany absorption in mammals to be localized to the upper GI tract and is influenced by other metals, levels of dietary protein, anions present, and dietary levels of ascorbic acid. Quantitative inhalation absorption data was not available in the literature reviewed, however, the reported presence of copper-containing granulomas in humans exposed to Bordeaux mixture (1-2% copper sulfate) suggests that respiratory absorption does occur (Villar, 1974; Pimental and Menezes, 1975). Batsura (1969) reported absorption in rats exposed to 50-80 mg-Copper oxide/m^3 for 180 minutes. Copper oxide particles were found in the plasma 6 hours after the start of exposure. Bioaccumulation in biological organisms does not tend to occur upon repeated exposure indicating fairly rapid excretion.

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Acute/Subchronic Toxicity

Various effects from acute/subchronic exposures of humans to ingested copper/copper sulfate have been reported and are as follows: nausea, vomiting, epigastric pain, headache, dizziness, and abdominal cramps (Chattani et al, 1965; Semple et al, 1960; Wyllie, 1957). Doses reportedly resulting in these symptoms were: 0.25 - 7.6 g copper from deliberately ingested copper sulfate (Chattani et al, 1965); 0.143 mg/kg copper ingested in drinking water contaminated with copper sulfate (Semple et al, 1960); greater than 0.1 mg/kg ingested in tea (Nicholas and Brist, 1968); and 5.3 - 32 mg copper ingested from a copper cocktail shaker (Wyllie, 1957). Dermal exposure to relatively high doses of copper salts may produce skin irritation and eczema. The inhalation of dusts and mists of copper salts through occupational exposure may result in irritation of the mucous membranes and pharynx and ulceration and perforation of the nasal septum. No adverse effects via the occupational exposure of copper welders to copper fumes were reported at concentrations up to 0.4 mg-Cu/m^3.

Chronic Toxicity

In humans, Wilson's disease is the most studied form of chronic copper toxicity. Wilson's disease is an inherited autosomal recessive disorder of copper metabolism. This ailment reportedly results in increased copper deposition in the liver, brain, and cornea (Schroeder et al, 1966; Evans, 1973). The high levels of accumulated copper may result in damage to erythrocytes, kidneys, corneas, and the central nervous system (Scheinberg and Sternlieb, 1969). These effects occur at otherwise normal exposures and are brought about by a reduced ability to metabolize copper. Chronic exposure to $CuSO_4$ (3 to 15 years) by vineyard sprayers is reported to have resulted in copper-containing benign granulomas in the lungs (Pimental and Menezes, 1975). Metal fume fever in the occupational polishing of metal plates was reported in air samples containing 0.12 to 0.30 mg Cu/m^3 (Gleason, 1968). Reduction to levels of 0.008 mg Cu/m^3 caused no symptoms of this ailment.

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Developmental and Reproductive Effects

No reports of developmental or reproductive or reproductive effects in humans associated with oral or inhalation exposure to copper are available in the literature.

Carcinogenicity

Data regarding the carcinogenicity of copper to humans is not available in the literature.

1.1.2 Animal Data

Acute Toxicity

No information could be found regarding the acute toxicity of copper to experimental animals.

Subchronic Toxicity

Little information exists regarding the subchronic toxicity of copper in experimental animals. Copper was reported to accumulate in livers and kidneys of rats fed copper acetate in their diets for 16 months (Howell, 1959). An estimated exposure level, based on consumption of 5% bw/day, was reported to be approximately 80 mg-Cu/kg-bw/day. Dietary levels of 200 ppm copper have been used as growth promoters in the production of hogs. Kline et al (1971) fed Hampshire and Yorkshire pigs diets containing 0 to 250 ppm copper for 88 days which resulted in accelerated weight gain and elevated levels of copper in the liver with increasing dose. Copper levels of 500 ppm reportedly result in depressed growth rate and blood hemoglobin concentration. Other studies have been conducted in which pigs were fed various levels of copper. A dose of 750 ppm (22 mg Cu^{+2}/kg-bw/day) added to the diets of weaning female pigs were reported to result in toxic effects such as reduced food conversion efficiency, growth depression and reduced hemoglobin (Suttle and Mills, 1966). Data regarding subchronic inhalation toxicity in experimental animals is not available in the literature.

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Chronic Toxicity

Data regarding chronic noncarcinogenic effects from exposure of experimental animals to copper is not available in the literature.

Developmental and Reproductive Effects

Low doses of $CuSO_4$ (500 and 1000 ppm) administered in the diets of mice were reported to stimulate embryonic development by increasing litter size and fetal weights (Lecyk, 1980). Higher doses (3000 and 4000 ppm) of $CuSO_4$ in the same study reportedly resulted in a low level of embryonic malformation. Levels of copper reportedly resulting in teratogenic effects in mice were higher than those resulting in toxic effects in pigs, therefore, these results should not be used for risk assessment purposes (Kline et al, 1971).

Mutagenicity

The available data derived from in vitro bioassays in microorganisms is not sufficient to indicate mutagenicity of copper (U.S. EPA, 1984). Positive results were reported in a reverse mutation assay using 2 to 10 ppm copper sulfate on Escherichia coli (Demerec et al, 1951). Moriya et al (1983), however, reported negative results in E. coli and various strains of Salmonella typhimurium. Negative results were also reported using Saccharomyces cerevisiae and Bacillus subtilis (Singh, 1983; Nishioka, 1975).

Carcinogenicity

Bionetics Research Labs (BRL, 1968) subjected two strains of mice, from 7 days of age until 28 days old, to 1000 mg copper hydroxyquinoline by gavage and then in the diet at 505.6 ppm copper. These animals were sacrificed at the age of 78 weeks and showed no statistically significant increases in tumor incidence. In this same study, 28 day old male and female mice of the two strains tested were maintained on this diet and given a single subcutaneous injection of 1000 mg copper hydroxyquinoline. At 78 weeks of age, the animals were killed and examined for tumors. A statistically significant increase in reticulum cell sarcomas was reported in one strain of male mice.

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1.2 EPA Classification of Carcinogenicity

The lack of human epidemiological data and the lack of carcinogenic activity reported in the literature based on animal studies has caused the U.S. EPA to classify copper as Group D - Not Classified.

1.3 Quantitative Indices of Toxicity

Based on a NOAEL (No observed adverse effect level) of 3.2 mg-Cu/kg-bw in pigs orally exposed to copper sulfate (Kline et al., 1971), and an uncertainty factor of 100, an equivalent exposure can be calculated for a 70 kg man of 2.2 mg-Cu/man/day. Due to the similarity of this quantity with the U.S. EPA derived ADI (allowable daily intake) of 2.6 mg/day, the AIS (acceptable intake subchronic) has been set at 2.6 mg/day for oral intake of copper. An AIS for subchronic inhalation exposure to copper cannot be derived due to the lack of experimental data. The U.S. EPA (1984) established an AIC (acceptable intake chronic) for chronic oral intake of copper of 2.6 mg/day. This number is based on an ADI of 2.6 mg/day estimated as the human LOAEL (lowest observed adverse effect level) for acute gastrointestinal symptoms (Chattani et al., 1965). The AIC for chronic inhalation exposure to copper is 0.14 mg of copper vapors or fumes/day and 0.71 mg copper mists or dusts/day.

1.4 Regulatory Standards and Criteria

The ACGIH (1983) has set the TWA-TLV for copper fumes at 0.2 mg-Cu/m^3 and the TLV for copper dusts and mists at 1 mg-Cu/m^3 of air. The U.S. EPA (1980a), based on the organoleptic threshold of copper has set the ambient water quality criterion for human effects at 1.0 mg/l. This level is also used as the criterion for drinking water based on organoleptic data. The proposed RMCL (recommended maximum contaminant level) for copper is 1.3 mg/l.

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LEAD

Lead is a heavy metal that exists in three oxidation states: 0, $^{+}2$, and $^{+}4$. The inorganic chemistry of lead is dominated by the divalent ($^{+}2$) oxidation state. Lead exists as a metal or alloy in the 0 valence state. A large number of organic lead compounds are known involving the tetravalent ($^{+}4$) oxidation state of lead.

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

Lead can be absorbed by the oral or inhalation exposure route. Gastrointestinal absorption of lead varies considerably depending on chemical form, dietary intake, and age (U.S. EPA, 1984a). Low dietary calcium or iron, high dietary fat, or low or high dietary protein enhances lead absorption (Barltrop and Khoo, 1975). Absorption from liquids is five to eight times the absorption from food (U.S. EPA, 1977). GI absorption of lead in adults is 5 to 10% and 24 to 53% in young children and infants. The deposition and absorption of inhaled lead depends on particle size, chemical form and the rate and depth of breathing (Randall et al., 1975; Nozaki, 1966; Chamberlain et al., 1975).

Absorption via the respiratory tract may be greater in children based on body weight relationship. Children, especially infants, were reported to retain much higher amounts of lead than adults (Barry, 1981). It is reported that adults eliminate approximately 90% of lead that has been ingested in the feces before it is absorbed by the gastrointestinal tract (Wetherill et al, 1974). Elimination after absorption is primarily through the urine (Rabinowitz et al, 1973).

1.1.2 Human Data

Acute Toxicity

Cases of acute lead poisoning in humans are not common and have not been studied in experimental animals as thoroughly as chronic lead poisoning. Short term

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exposures of ten days or less do not have adverse effects (U.S. EPA, 1984b). Symptoms of acute lead poisoning from deliberate ingestion by humans include: vomiting, abdominal pain, hemolysis, liver damage, and reversible tubular necrosis (U.S. EPA, 1984a). Subacute exposures in humans reportedly may produce a variety of neurological effects including: dullness, restlessness, irritability, poor attention span, headaches, muscular tremor, hallucinations, and loss of memory.

Subchronic Toxicity

Adverse health effects result from exposure to lead after the blood lead level exceeds 15 ug/dL, which takes a minimum of 35 days (U.S. EPA, 1985). For this reason, most data on the effects of lead exposure in humans is based on blood lead levels. Symptoms of lead toxicity, however, are not readily apparent even after this time period. No effects have been reported in humans that can be explicitly attributed to subchronic oral exposure to lead (U.S. EPA, 1984b). Information regarding subchronic exposures to humans by inhalation exposure could not be found in the available literature.

Chronic Toxicity

Nortier et al (1980) report encephalopathy and renal damage to be the most serious complications of chronic toxicity in man and the hematopoietic system to be the most sensitive. An early clinical manifestation of lead poisoning is mild anemia which is characterized by pallor, easy fatigability, irritability, and a mild headache. These symptoms are often reported as mild behavior disturbance in young children. The effects of lead on the formation of hemoglobin and other hemoproteins, causing decreased levels or anemia, are detectable at lower levels of lead exposure than on any other organ system (Betts et al, 1973). This system is affected in the following ways: inhibition of several enzymes involved in heme synthesis i.e. delta-aminolevulinic acid dehydratase, ferrochelatase, and delta-aminolevuinic acid synthetase (Zielhuis, 1975; Secchi, et al, 1974), interference with the final step in heme synthesis or the chelation of iron by protoporphyrin IX (Zielhuis, 1975), and decreased red blood cell survival by the inhibition of pyrimidine-5-nucleotidase, especially in children (Angle and McIntire, 1979). Other effects include: inhibition of the enzyme (renal-1-hydroxylase) involved in the final step of the synthesis of the biologically active form of Vitamin D at a level of 12 ug/dL-blood (Manhaffey, 1982),

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hypertension in heavily exposed lead workers (Dingwall-Fordyce and Lane, 1963) and peripheral nerve dysfunction in adults at levels of 30 to 50 ug/dL-blood (Seppalainen and Hernberg, 1982). Children's nervous systems appear to be more sensitive than adults at levels of 15 ug/dL-blood and higher (Benignus et al, 1981).

The U.S. EPA (1984b) in relating blood lead levels to lead exposure from food, water, and dust/soil, have estimated the conversion of lead ingested via different intake media to subsequent lead levels in blood. The U.S. EPA conversion for intake via food is 0.02 ug/dL-blood per ug ingested by adults and 0.16 ug/dL-blood per ug ingested for children. For intake via water, a slope estimate of 0.06 ug/dL per ug/L is suggested. In children, the increase in lead levels in blood resulting from dust or soil exposure was estimated by the U.S. EPA at 0.6 to 6.8 ug/dL-blood per 1000 ug/g lead in dust. Blood lead levels in children from inhalation exposure in air have also been evaluated by EPA and are reported to be 1.92 ug/dL-blood per ug/m^3 in the air.

Developmental and Reproductive Effects

In high doses, lead compounds may cause abortions, premature delivery, and early membrane rupture (Rom, 1976). Premature fetal membrane rupture has been reported to occur in pregnant women with blood lead levels of 26 ug/dL (Fahim et al, 1976).

Carcinogenicity

No epidemiological data regarding the oral carcinogenic potential of lead could be located in the available literature. Lead inhalation at chronic exposures may reportedly result in a statistically significant increase in deaths due to tumors in the digestive organs and respiratory systems in lead smelter workers and battery plant workers (Kang et al, 1980).

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1.1.3 Animal Data

Acute Toxicity

Acute oral lethal doses of lead in animals depend on chemical form, but usually range from 500 to 30,000 mg/kg-bw. As stated earlier, acute toxicity has not been studied extensively in experimental animals.

Subchronic Toxicity

Several reproduction studies of the effects of the subchronic oral exposure of lead on rats have been conducted (Kimmel et al, 1980; Grant et al, 1980; Fowler et al, 1980). These studies report that lead acetate administered in drinking water at various concentrations caused depressed body weights at 50 and 250 mg-Pb/L water, histological changes in the kidneys of offspring, cytokaryomegaly of the tubular epithelial cells of the inner cortex at concentrations greater than or equal to 25 mg/L and postnatal development delays at 50 to 250 mg/L. The LOAEL (Lowest observable adverse effect level) of 5 mg/L corresponds to a dose of 0.5 mg/kg-bw/day. Data regarding subchronic inhalation of lead in experimental animals could not be located in the available literature.

Chronic Toxicity

Chronic oral exposures of female Long-Evans rats to lead (5 mg-Pb/L-water) reportedly resulted in slight effects on tissue excitability, systolic blood pressure, and cardiac ATP concentrations. This reported LOAEL corresponds to a dose of 0.5 mg/kg-bw/day. Data regarding the chronic inhalation of lead in experimental animals could not be located in the literature.

Developmental and Reproductive Effects

Most of the data regarding the teratogenicity and reproductive effects caused by lead are inferred from subchronic and chronic exposures to rats and mice. Orally administered lead in drinking water at levels of 50 to 250 mg/L resulted in postnatal developmental delays (Kimmel et al, 1976). Higher oral doses of lead may result in decreased fertility and fetotoxic effects in a variety of species (Hilderbrand et al,

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1973). A reduction in the number of offspring of rats and mice exposed to 25 mg Pb/L drinking water with a chromium deficient diet was reported by Schroeder et al (1970).

Mutagenicity

Lead is a cellular poison. Mutagenicity cannot, therefore, be determined from short term tests due to cellular toxicity (U.S. EPA, 1985).

Carcinogenicity

Several studies have reported tumor formation in experimental animals orally administered specific lead salts, not normally ingested by humans (Zawirska and Medras, 1972; Boyland et al, 1962; Ito, 1973). The carcinogenicity of inhaled lead to experimental animals could not be located in the available literature.

1.2 EPA Classification of Carcinogenicity

The U.S. EPA (1984b) has classified lead and lead compounds as Group C - Possible Human Carcinogen. Those lead salts causing tumor formation in animals (and to which humans are not environmentally exposed) are classified as Group B2 - Probable Human Carcinogens.

1.3 Quantitative Indices of Toxicity

An AIC (acceptable intake chronic) for oral exposure to lead of 1.4 ug/kg/day has been established by the U.S. EPA (1986).

1.4 Regulatory Standards and Criteria

The ACGIH (1980) has established a TLV (threshold limit value) of 0.15 mg/m^3 and an STEL (short term exposure limit) of 0.45 mg/m^3 for inorganic compounds, dust and fume. Specific TLVs for lead arsenate and lead chromate have been established at 0.15 mg/m^3 and 0.05 mg/m^3, respectively (U.S. EPA, 1984b). U.S. EPA ambient water quality criteria for human health are: 50 ug/l for the ingestion of aquatic organisms and drinking water and 50 ug/l for drinking water only (U.S. EPA, 1986).

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The current MCL (maximum contaminant level) in drinking water is 0.05 mg/l and the proposed RMCL (recommended maximum contaminant level) in drinking water is 0.02 mg/l.

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ZINC

Zinc is a metallic element occurring in nature in the zero valence (metal and alloys) and $^{+}2$ valence (compound) states. Zinc may form compounds with both inorganic and organic ligands.

Zinc is associated with relatively low toxicity and is an essential trace element for humans and domestic animals (National Research Council, 1978). The human recommended daily allowance (RDA) of zinc for adults is 15 mg (NAS, 1980). Zinc toxicity is reported to occur at levels at least an order of magnitude greater than the RDA.

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

Absorption of zinc may occur orally and through inhalation. Gastrointestinal absorption is dependent upon the intrinsic content of zinc in the organism and dietary levels of other nutrients that may influence uptake levels (U.S. EPA, 1980b). Spencer et al (1965) reported GI absorption levels in human volunteers ranging from 20-80% with a mean of 50%. Zinc uptake has been shown to be enhanced by simultaneous protein intake (NRC, 1978). The fate of inhaled particles (aerosols) containing zinc in a biological organism depends upon particle size and solubility, and upon general lung condition.

1.2 Human Effects

Acute Toxicity

Acute toxicity of zinc in humans has been reported from foods stored in galvanized containers (Brown et al, 1964). Reported levels were: 1000 ppm in chicken with tomato sauce and spinach stored approximately 24 hours in galvanized vats and 2200 mg/l in fruit punch in galvanized containers. Brock et al (1977) reported acute zinc poisoning in a woman administered 7.4 g of zinc sulfate as parenteral nutrition.

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Symptoms included pulmonary edema, jaundice, vomiting, diarrhea, and oliquria. Consumption of punch stored in a galvanized container with a 443 ppm zinc content was reported to result in chills, dizziness, nausea, vomiting, and headache (Lapham et al, 1983). Hooper et al (1980) reported a 25% reduction in high-density lipoprotein-cholesterol levels in young males orally administered 440 mg zinc sulfate/day for 5 weeks. This effect along with an increase in the low-density lipoprotein-cholestrol level was reported by Chandra (1984) in adult males orally administered 150 mg elemental zinc/day for 6 weeks. A reduction in immune response was also reported in the adult males indicating a deleterious effect to the immunologic system as well as the cardiovascular system after ingestion of excessive amounts of zinc.

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Subchronic Toxicity

Various studies in which zinc was administered to humans via subchronic oral exposures have reported a LOAEL (Lowest observed adverse effect level) and a NOAEL (No observed adverse effect level) that are quite similar. A LOAEL of 2.14 mg/kg-bw/day was reported in a study in which zinc was administered orally to accelerate wound healing in young men (Pories et al, 1967). A study conducted by Greaves and Skillen (1970) of a similar nature in which zinc was given to patients also to accelerate the healing of leg ulcerations reportedly resulted in a NOAEL of 2.14 mg/kg-bw/day. A NOAEL of 1.93 mg/kg-bw/day (Hallbrook and Lanner, 1972), a NOAEL of 2.14 mg/kg-bw/day (Serjeant et al, 1970) and a LOAEL of 2.14 mg/kg-bw/day (Prasad et al, 1975) were reported in other studies in which zinc was administered as a healing agent. Subchronic inhalation of zinc in humans is primarily a result of exposure to fumes or dusts in occupational environments.

Chronic Toxicity

Metal fume fever has been reported to occur in workers chronically exposed to zinc. Symptoms reported include: coughing, dyspnea, weakness, fatigue, aching muscles and joints, and general malaise (Anseline, 1972; Fishburn and Zenz, 1969). Recovery usually takes one to two days. Drinker et al (1927) reported a TLV (Threshold limit value) of 15 mg zinc/m^3 for an 8-hour workday. The precise air concentrations causing this effect were not quantified in the study cited. Drinker et al (1927) reported that initial exposure of 2 volunteers to workroom levels of zinc

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oxide fume for 2 to 3 consecutive days reportedly resulted in the onset of metal fume fever. Reexposures, however, were reported to cause milder attacks, if at all, indicating an acquired immune response.

Chmielewski et al (1947) reported frequent occurrences of chronic respiratory tract infections in welders and fitters in a shipyard. Exposure levels exceeded the maximum acceptable concentration of 5 mg/m^3 in air for zinc oxide. Chronic conjunctivitis and dermatitis were reported in all groups examined.

Carcinogenicity

Data regarding the carcinogenicity of zinc to humans could not be located in the available literature.

1.1.3 Animal Data

Acute Toxicity

Several studies have been conducted to determine the acute toxicity to experimental animals associated with oral or inhalation exposure to zinc. Lam et al (1985) reported functional, morphologic and biochemical changes in the respiratory tract of guinea pigs exposed to 5 mg/m^3 zinc oxide for 3 hours/day for 6 days. A decrease in respiratory compliance was reported by Amdur et al (1982) in guinea pigs exposed to 1 mg/m^3 zinc oxide for one hour. Migally et al (1982) reported morphological changes in pulmonary alceolar macrophages of rats after an intratracheal injection of 0.5 mg zinc oxide. Gupta et al (1986), however, reported no toxic effects or gross changes in lung morphology in guinea pigs 7, 15, or 30 days after a 50 mg intratracheal injection of zinc oxide dust. Allen (1968) reported severe enteritis in cattle that consumed 150 g of zinc/day in tainted feed for a couple of days. Loss of appetite, weakness, depression and vomiting was reported in dogs that had ingested zinc in unspecified quantities (Breitschwerdt et al, 1986).

Subchronic Toxicity

Numerous subchronic oral exposure studies using experimental animals have been conducted. Relatively high levels of zinc reportedly result in adverse effects: a

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NOEL (No observed effect level) of 3000 ppm for rats (95 mg/kg-bw/day) and mice (188 mg/kg-bw/day) (Maita et al, 1981) and a NOEL of 2500 ppm (125 mg/kg-bw/day) in a subchronic rat study (Heller and Burke, 1927). Few subchronic inhalation studies have been conducted on experimental animals. Pistorius (1976) exposed rats to zinc oxide dust at 15 mg zinc oxide/m^3 and reported no differences in lung function after continued exposure due to the formation of pulmonary macrophages clearing the lungs of zinc oxide.

Chronic Toxicity

Chronic oral exposure studies conducted by Heller and Burke (1927) reported NOAEL levels for rats of 250 mg zinc/kg-bw/day and 125 mg/kg-bw/day in two separate studies. Aughey et al (1977) administered 100 mg zinc/kg/day to mice in their drinking water and reported hyperactive pituitaries, and hypertrophy of adrenal cortexes and pancreatic islets.

Developmental and Reproductive Effects

An animal study conducted by Kumar (1976), reportedly resulted in a significant increase in fetal resorptions in rats administered 100 ppm zinc orally. There are no data indicating that orally administered zinc is teratogenic. A greater chance of malformations may result from a zinc deficiency (U.S. EPA, 1987). Ferm and Karpenter (1968) report that zinc sulfate administered simultaneously with 2 and 4 mg/kg cadmium to hamsters intravenously reduced the incidence of teratogenic effects in offspring. No malformations in rats fed diets containing 4000 and 5000 ppm zinc during gestation were observed by Ketcheson et al (1969). No information regarding teratogenic or reproductive effects through inhalation exposure could be located in the available literature.

Mutagenicity

NRC (1978) reports no evidence of zinc mutagenicity in available literature. Voroshilin et al (1978) reported chromosomal damage in the form of an increased frequency of hyperdiploid cells in the bone marrow of rats exposed to 0.1 and 0.5 mg/m^3 zinc oxide aerosol continuously for 5 months. Crebelli et al (1985) reported zinc oxide to be nonmutagenic in the Salmonella reversion assay.

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Carcinogenicity

No evidence exists indicating that zinc is a direct carcinogen via inhalation, ingestion, or parenteral administration (U.S. EPA, 1987). Various studies, however, indicate that zinc is involved indirectly in tumor formation as a growth promoter or inhibitor (U.S. EPA, 1987). Wallenius et al (1979) reported that oral cavity cancer was induced earlier in female mice ingesting a diet containing 200 mg/kg zinc than those fed 15 or 50 mg/kg zinc. Fenton and Burke (1985) found that TEPC plasma-cytoma transplanted tumors were smaller in mice maintained on a 0.5 ug/g zinc diet versus 50 ug/g zinc. Fong et al (1978) reported increased formation of esophageal tumors in animals given a zinc-deficient diet versus those administered 60 mg/kg zinc in their diet. Testicular tumors have been reported in fowl and rats following the injection of zinc salts into the testes (Sunderman, 1971; Nriagu, 1980). This route of administration, however, cannot be used alone as evidence of carcinogenic potential.

1.2 EPA Classification of Carcinogenicity

The U.S. EPA has classified zinc as Group D - Not Classified.

1.3 Quantitative Indices of Toxicity

An AIS (acceptable intake subchronic) for oral exposure was derived from a therapeutic level of 2.14 mg/kg/day zinc that was chosen as a human MED (minimum effective dose). This corresponds to 14.9 mg/day for a 70 kg human, applying an uncertainty factor of 10 for subchronic oral exposure (U.S. EPA, 1984). The AIC (acceptable intake chronic) for oral exposure is the same as the AIS, or 2.14 mg/kg/day.

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1.4 Regulatory Standards and Criteria

TLVs have been set for various zinc compounds: 1 mg/m^3 for zinc chloride, 0.05 mg/m^3 for zinc chromates, 5 mg/m^3 for zinc oxide fumes, and 10 mg/m^3 for zinc stearate (U.S. EPA, 1984). The U.S. EPA water quality criteria for human health are: 5 mg/l for the ingestion of aquatic organisms and drinking water and 5 mg/l for drinking water only based on organoleptic effects.

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BENZENE

Benzene is a volatile, colorless, flammable liquid which possesses a distinct odor. The chemical structure of benzene is a monocyclic, aromatic hydrocarbon. As a result of its volatile nature, benzene release in the environment is largely due to air. Therefore, the major source of benzene exposure is believed to be from air (U.S. EPA, 1985).

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

Benzene, a non-charged, low molecular weight, lipid soluble compound, is absorbed readily via inhalation and ingestion. Dermal exposure is relatively minor as it is poorly absorbed from the skin (NIOSH, 1974). Rikert et al (1979) and Parke and Williams (1953) report that administration of benzene in air or via ingestion results in rapid uptake and excretion. Following exposure via inhalation, humans and animals metabolize benzene and eliminate it unchanged in expired air.

Benzene is reported to accumulate primarily in the fatty tissues (Rickert et al, 1979; Andrews et al, 1977). Benzene is metabolized to phenol, catechol, and hydroquinone. These metabolites are formed in the liver and appear to be converted and stored in the bone marrow where they accumulate (Andrews et al, 1977; Rickert et al, 1979).

Approximately 50% of inhaled benzene is absorbed, 30% is retained, and the remainder is expired unchanged (Hunter, 1968; Nomiyama and Nomiyama, 1974). Nomiyama and Nomiyama (1974) report that elimination is biphasic with an initial 16.2% eliminated unchanged in approximately 5 hours.

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1.1.2 Human Data

Acute Toxicity

Acute human exposures to benzene at high levels is characterized by vomiting, nausea, headache, drowsiness followed by depression, coma, and death (Mehlman, 1983). These symptoms reflect toxic effects to the central nervous system (Gerarde, 1960; Browning, 1965). Exposure to 25,000 ppm benzene in the air is reported to be rapidly fatal (NAS,1976). Death is usually the result of respiratory or cardiac failure (Holvey, 1972). The mild central nervous system effects appear to be reversible and dependent on concentration with lower levels not producing these effects regardless of the duration of exposure (U.S. EPA, 1985).

Subchronic Toxicity

Data regarding the toxic effects resulting from subchronic oral or inhalation exposures to humans was not available in the literature reviewed.

Chronic Toxicity

Data regarding the effects of benzene to humans following chronic oral or inhalation exposures could not be located in the literature reviewed. The toxic effects of benzene have primarily been reported in epidemiological studies involving the inhalation of benzene vapors in the workplace. Benzene has been a known hematotoxin since the 19th century with the development of aplastic anemia in workers producing bicycle tires (Santesson, 1897). The most frequent reported hematological disorders include anemia, macrocytosis, and thrombocytopenia (Mehlman, 1983). Hematological effects range from mild cases of anemia, leukopenia, thrombocytopenia to lethal aplastic anemia, or pancytopenia (Mehlman, 1983). The lowest level producing changes in platelet counts in workers was reported to be 10 ppm (Doskin, 1971; Chang, 1972). The life threatening consequences of severe pancytopenia result from leukopenia, causing a decreased ability to fight infection, and to thrombocytopenia, which may precipitate significant bleeding (Mehlman, 1983). Vigliani and Saita (1964) and Savilahti (1956) have reported that occupational exposure to 300 to 700 ppm benzene have been linked with blood dyscrasias. The lower limit of exposure resulting in hematologic effects in humans

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has been estimated to be less than 100 ppm (Pagnotto, 1972). Chronic exposure to benzene may also result in acute myelogenous leukemia (IARC, 1982).

Mutagenicity

Several investigators have reported significant chromosomal aberrations in workers with a current or past history of benzene exposure, some persisting years after exposure occurred (Fredga et al, 1979; Khan and Khan, 1973; Hudak and Gombosi, 1977; Pollini and Biscaldi, 1976).

Carcinogenicity

Data regarding the carcinogenicity of benzene to humans as a result of chronic oral exposure was not located in the literature reviewed. A causal relationship between the incidence of leukemia and occupational exposure to benzene via inhalation has been reported in various studies. Aksoy et al (1974) examined the incidence of leukemia in shoe workers in Turkey exposed to benzene levels as high as 210 to 650 ppm for an average of 9.7 years. An annual leukemia incidence of approximately 13/100,000 workers was reported in this study. Aksoy (1974) also reports that pancytopenia was present in 27.5% of the cases before the occurrence of acute leukemia, occurring 6 months to 6 years later. Vigliani and Saita (1964) reported a 20-fold higher risk of acute leukemia in workers exposed to benzene in northern Italy. Benzene hematotoxicity was observed in 135 shoe workers, 13 of whom developed myelogenous leukemia. Benzene concentrations were reported to be between 200 to 500 ppm. Increases incidence of cancers of the lymphatic and hematopoietic system was reported in male rubber workers compared with all other industrial worker deaths in 1959 (U.S. DHEW, 1961). A statistically significant excess of leukemia was reported by Infante et al (1977) in white males exposed to benzene in the manufacture of a rubber product from 1940-1949. A fivefold excessive risk of all leukemias and a tenfold excessive risk of myelocytic and monocytic leukemias combined were reported in this study. The air

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concentrations were generally below the recommended limit in effect during the period of the study.

1.1.3 Animal Data

Acute Toxicity

No studies involving single, high doses of benzene administered to experimental animals orally or via inhalation could be located in the literature reviewed. Various studies, however, involving subacute (less than or equal to one month) inhalation exposures have reported effects in dogs and mice. Hough and Freeman (1944) reported leukopenia in dogs exposed to 600 to 1000 ppm benzene for 12 to 15 days. Petrini (1941) reported fatal anemia in mice exposed to 600 to 1000 ppm within 12 to 15 days.

Subchronic Toxicity

Wolf et al (1956) reported hematopoietic effects in female Wistar rats exposed to benzene by gavage 5 days/week for 187 days at levels ranging from 10 to 100 mg/kg. No effects were reported in a group receiving 1 mg/kg benzene, slight leukopenia was reported at the 10 mg/kg level, and leukopenia and erythrocytopenia were reported at the 50 and 100 mg/kg dose levels. A NOEL (no observed effect level) of 1 mg/kg is suggested from this study for leukopenia and/or erythrocytopenia in female rats. Subchronic inhalation exposures have also been performed on experimental animals. Deichmann et al (1963) exposed Sprague-Dawley rats to 15 to 831 ppm benzene for 20 hrs/week for 5 to 13 weeks and reported the following: significant leukopenia within 2 to 4 weeks, in the 831, 65, and 61 ppm dose groups exposed 6 hrs/day, 4 days/week; slight leukopenia 5 to 8 weeks, in the 47 and 44 ppm dose groups; and no leukopenia in animals exposed to 31 ppm for 4 months. A NOEL of 31 ppm can be suggested for leukopenia in rats.

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Chronic Toxicity

Data regarding the chronic oral toxicity of benzene in experimental animals was not available in the literature reviewed. Snyder et al (1980) exposed rats and mice to 100 or 300 ppm benzene by inhalation, 6hrs/day, five days/week for life. Rats were reported to exhibit lymphocytopenia, anemia, and decreased survival. These effects were also reported in the mice as well as granulocytosis and reticulocytosis.

Reproductive Effects

Nawrot and Staples (1979) reported significant maternal lethality and embryonic resorption in pregnant mice administered 0.3, 0.5, or 1.0 mg/kg/day benzene by gavage during days 6-15 of gestation. These authors also reported that no significant benzene-related change in the incidence of malformation was seen in the mice given 1.0 mg/kg/day benzene during days 6-15 or 12-15 of gestation. Lyon (1975) reported that male mice administered benzene intraperitoneally and mated to nonexposed females produced no offspring with congenital malformations. Doses were not specified in this study. Kuna and Kapp (1981) exposed Sprague-Dawley rats to 10, 50, and 500 ppm benzene via inhalation 7 hrs/day on days 6-15 of gestation. The following results were reported for the 50 and 500 ppm dose levels: A decrease in maternal weight gain; significantly lower mean body weights of live fetuses compared to controls; and increased frequency of minor skeletal variants and maternal toxicity. No malformations were reported at the 10 and 50 ppm dose levels. A NOEL of 10 ppm is suggested for fetotoxic effects in rats from this study. Murray et al (1979) exposed mice and rabbits to benzene vapors at 500 ppm. Mice administered this dose 7 hrs/day on days 6-15 of gestation were reported to have significantly lower mean body weights versus controls whereas rabbits did not. Mice were also reported to have increases in several minor skeletal variants indicating delayed development and no major malformations, rabbits did not exhibit these effects.

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Mutagenicity

Nylander et al (1978) reported that benzene was not mutagenic in Drosophilia melanogaster. Several mutagenicity tests using bacterial and yeast systems reportedly produced negative results: Salmonella typhimurium tested with and without metabolic activation (Kaden et al, 1979; Lyon, 1976); Escherichia coli (Rosenkranz and Leifer, 1980); and Saccharomyces cerevisiae (Cotruvo et al, 1977). Chromosomal aberrations were reported in bone marrow cells from rabbits (Kissling and Speck, 1971), mice (Meyne and Legator, 1978), and rats (Anderson and Richardson, 1979). Tice et al (1980) reported excessive sister chromatid changes in mice exposed to 3100 ppm benzene by inhalation for four hours.

Carcinogenicity

Maltoni and Scartano (1979) reported both solid tumors and leukemias in 13 week old male and female rats administered benzene by gavage at doses of 50 or 250 mg/kg, 4 to 5 days/week for 52 weeks. After 144 weeks, 25% had Zymbal gland tumors, 6.2% has skin carcinomas, and 12.1% had leukemias.

1.2 EPA Classification of Carcinogenicity

Based upon case reports (IARC, 1982; Goldstein, 1977) and epidemiological studies (Aksoy et al, 1974; Infante, et al, 1977; Ott et al, 1978) sufficient evidence exists for the carcinogenicity of benzene to humans. Maltoni and Scarnato (1979) reported positive results for carcinogenicity in orally exposed rats. Therefore, the U.S. EPA classifies benzene as a Group A - Human Carcinogen.

1.3 Quantitative Indices of Toxicity

Based on the U. S. EPA classification of carcinogenicity for benzene, neither an AIC (acceptable intake chronic) nor an AIS (acceptable intake chronic) for oral or inhalation exposure exists. The carcinogenic potency factor for oral exposure to benzene is .052 (mg/kg/day)-1 and .026 (mg/kg/day)-1 for inhalation exposure (U.S. EPA, 1987a).

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1.4 Regulatory Standards and Criteria

The ACGIH (1980) has established a TWA of 30 mg/m3 (10 ppm) for occupational exposure to benzene. NIOSH (1974) has set a 60 minute ceiling of 3.1 mg/m3 (1 ppm). The U.S. EPA (1986) has set ambient water quality criteria for the protection of human health corresponding to a 10-6 excess lifetime cancer risk at 0.66 ug/L for the consumption of benzene in drinking water and aquatic organisms and 0.67 ug/L for drinking water only.

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ETHYLBENZENE

Ethylbenzene is an aromatic compound consisting of an ethylated benzene ring ($C_6H_5C_2H_5$). It is commercially produced by the alkylation of benzene with ethylene.

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

Bardodejova and Bardodej (1970) reported 64% absorption of ethylbenzene after inhalation exposure of human volunteers to 100 to 370 mg/m^3. Percent absorption following the ingestion of ethylbenzene by rats could not be located in available literature, however, effects have been reported similar to those following inhalation indicating that gastrointestinal tract absorption does occur. Absorption through human hand skin of aqueous ethylbenzene of 118 ug/cm^2/hour was reported by Dutkiewicz and Tyras (1967).

Ethylbenzene undergoes rapid metabolism in humans with the primary metabolites being mandelic acid (64%) and phenylglyoxylic acid (25%) (Sullivan et al, 1976). This compound is reported to be eliminated rapidly through the urine (U.S. EPA, 1985). Excretion in rabbits was reported to be complete within 24 hours after exposure to 1.78 grams ethylbenzene by gavage (U.S. EPA, 1985). Hagemann and Angerer (1979) reported almost complete elimination of ethylbenzene 24 hours after inhalation.

Acute Toxicity

Bardodejova and Bardodej (1970) reported no toxic effects after inhalation exposures of 100 ppm (434 mg/m^3) ethylbenzene for 8 hours by human volunteers. An increase in this concentration (increase not specified) reportedly resulted in fatigue, headache, and mild eye and respiratory irritation. Smyth et al (1962) and Faustov (1960) reported the central nervous system and the lungs to be the target organs for acute exposures to ethylbenzene.

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Subchronic Toxicity

Data regarding the subchronic toxicity of ethylbenzene to humans via oral or inhalation exposures could not be located in the literature reviewed.

Chronic Toxicity

Data regarding the chronic toxicity of ethylbenzene to humans via oral or inhalation exposure could not be located in the literature reviewed.

Carcinogenicity

Data regarding the carcinogenicity of ethylbenzene to humans could not be located in the literature.

1.1.2 Animal Data

Acute Toxicity

Acute LD_{50} values of 3.5 g/kg to 5.46 g/kg were reported for rats by an unspecified exposure route and an acute LD_{50} of 17.8 ml/kg was reported for rabbits dermallly exposed to ethylbenzene (Smyth et al, 1962). An acute inhalation exposure of 4000 ppm (17400 mg/m ^{3}) for 4 hours was reported to be lethal to 50% of the tested rats (Smyth et al, 1962). Systemic effects to the liver, kidney, and central nervous system have been reported (Wolf et al, 1956). Local effects are reported to include conjunctivitis and slight necrosis of the cornea (Wolf et al, 1956; Smyth et al, 1962).

Subchronic Toxicity

The target organs for subchronic and chronic exposures to ethylbenzene in experimental animals via ingestion or inhalation were reported to be the liver and kidneys (Wolf et al, 1956). Liver and kidney effects were reported in rats orally exposed to ethylbenzene for 6 months at doses of 408, and 680 mg/kg/day (Wolf at al, 1956). No effects were reported in the rats at the two lowest dose levels: 13.6 and 136 mg/Kg/day. Wolf et al (1956) exposed rats, guinea pigs and rabbits to ethylbenzene via inhalation at 400, 600, and 1250 ppm 7 hrs/day, 5 days/week, for

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103-138 days, 186 days, and 186 days, respectively. Reported effects included the following: Slight increase in liver and kidney weight in males and female rats at all dose levels, decreased growth in males at a dose level of 2200 ppm; increased liver weight in male and female guinea pigs at 600 and 1250 ppm, decreased growth rate in female guinea pigs at the 1250 ppm dose level; and slight degeneration in testicular germinal epithelium at 600 ppm in male rabbits.

Chronic Toxicity

Data regarding chronic toxicity of ethylbenzene to experimental animals via ingestion or inhalation could not be located in the literature reviewed.

Developmental and Reproductive Effects

Inhalation exposure of pregnant New Zealand rabbits to 435 or 4348 mg/m^3 ethylbenzene vapor for 6 to 7 hours/day on days 1 to 24 of gestation was reported to result in a reduction in the number of live offspring/litter (Hardin et al, 1981). Hardin et al (1981) also exposed pregnant rats to the same doses and reported maternal toxicity at the higher dose as indicated by increased liver, kidney, and spleen weights and the presence of extra ribs in offspring at both doses.

Mutagenicity

Negative results were reported for mutagenicity tests in which several strains of Salmonella typhimurium were exposed to ethylbenzene at concentrations up to 3 mg/plate (Nestmann et al, 1980; Florin et al, 1980). Negative results were also reported for four common metabolites of ethylbenzene used in an Ames bacterial assay (Salmona et al, 1976). Ethylbenzene did not increase recessive lethals in a Drosophila test for this effect (Donner et al, 1979).

Carcinogenicity

Ethylbenzene is on the list of chemicals that have been deferred for carcinogenicity testing (NTP, 1983).

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1.2 EPA Classification of Carcinogenicity

Based on the lack of data regarding the carcinogenicity of ethylbenzene in experimental animals and humans, the U.S. EPA classifies this compound as a Group D - Not Classified chemical.

1.3 Quantitative Indices of Toxicity

The following values have been set by the U.S. EPA (1985) for noncarcinogenic effects resulting from oral exposure to ethylbenzene: an AIS (acceptable intake subchonic) of 0.97 mg/kg/day and an AIC (acceptable intake chronic) of 0.097 mg/kg/day. The AIC was derived from the Wolf et al (1956) study indicating a NOEL (no observed effect level) of 97.14 mg/day in rats. Neither an AIS nor an AIC has been established for inhalation exposure to ethylbenzene. Based on the lack of data regarding the carcinogenicity in humans and experimental animals and humans, a carcinogenic potency factor has not been derived.

1.4 Regulatory Standards and Criteria

The ACGIH (1983) recommends a TLV-TWA of 100 ppm and a TLV-STEL of 125 ppm for occupational exposure to ethylbenzene in the air. The OSHA TWA is 100 ppm. The U.S. EPA has set the following ambient water quality criteria for the protection of human health and the environment: 1.4 mg/L for human consumption of aquatic organisms and drinking water and 2.4 mg/L for the consumption of drinking water only; freshwater acute toxicity for aquatic organisms at 32,000 ug/L and marine acute toxicity at 430 ug/L. The U.S. EPA has proposed an MCLG of 680 ug/l for ethylbenzene.

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TOLUENE

Toluene, also known as methylbenzene, is an aromatic compound consisting of a methylated benzene ring ($C_6H_5CH_3$). This compound is often an intermediate in the synthesis of other orga.ic compounds. Toluene has a lower water solubility and is, therefore, lipophilic in nature. Due to its low water solubility, toluene is rapidly volatilized into ambient air. Inhalation would, therefore, be the primary exposure route for this compound in the environment.

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

Toluene absorption has been reported following oral, dermal, and inhalation exposures. Toluene administered orally to rabbits was reported to be completely absorbed from the gastrointestinal tract as indicated by a 74-80% excretion in the urine and 18-19% excretion in exhaled air (Smith et al, 1954). Gastric intubation of 100 ul of toluene in male rats was reported to be relatively rapid with maximum absorption occurring two hours after administration (Pyykko et al, 1977). Astrand et al (1972) reported absorption through the respiratory tract, as observed in arterial blood, after exposure to 100 to 200 ppm toluene. Inhalation exposures of 100 to 130 ppm toluene for four hours resulted in 40 to 60% retention by humans (Nomiyama and Nomiyama, 1974). Dermal absorption directly related to concentration has been reported in humans exposed to 160 to 600 mg/l (U.S. EPA, 1985).

In humans and animals, toluene excretion was reported to be rapid in expired air (20% of the dose) and as the metabolite, hippuric acid, in the urine (70%) (Ogata et al, 1970). Urinary excretion occurs within 12 hours after exposure (Astrand et al, 1972).

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Acute Toxicity

Acute exposures of humans to toluene is mainly a result of the inhalation of vapors in occupational or experimental scenarios or intentional abuse. Effects on the central nervous system (CNS); such as fatigue, headache, muscular weakness, and incoordination, were reported after exposure to 200 ppm (754 mg/m^3) for 8 hours (Carpenter et al, 1944; von Oettingen et al, 1942). The severity of these effects increased with an increase in toluene concentration. A NOAEL (No observed adverse effect level) of 100 ppm toluene vapor for 8-hour exposure was established based on these studies (von Oettingen et al, 1942).

Subchronic Toxicity

Data regarding subchronic effects following oral or inhalation of toluene by humans could not be located in the literature reviewed. Wilson (1943), however, reported effects similar to those reported for acute exposures to toluene for subacute occupational exposure after 1 to 3 weeks to 50 to 1500 ppm (189 to 5660 mg/m^3).

Chronic Toxicity

Most of the data regarding the chronic toxicity of toluene come from inhalation exposures, either intentional or occupational. Chronic exposures of 200 to 800 ppm toluene vapors are reported to result in CNS disorders and possible peripheral nervous system effects (Seppalainen et al, 1978). These same concentrations have been reported to cause hepatomegaly and hepatic function changes (Grabski, 1961). Cerebral and cerebellar dysfunction was reported by Sasa et al (1978) as observed by ataxia, tremors, impaired speech, vision and hearing, and impaired memory coordination in chronic toluene abusers. Renal disfunction has also been in chronic toluene abusers (Moss et al, 1980). Mild throat and eye irritation at 200 ppm and lacrimation at 400 ppm have been reported for inhalation exposure by Carpenter et al (1944) indicating that toluene may be a mild sensory irritant.

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Carcinogenicity

Data regarding the carcinogenic effects of toluene in humans, either by oral or inhalation exposure, could not be located in the literature reviewed.

1.1.2 Animal Data

Acute Toxicity

The acute oral toxicity of toluene in adult rats is reported to be relatively low with an LD_{50} of 70 g/kg (Kimura et al, 1971). The first sign of acute oral toxicity in the rats was depression of the central nervous system at 2.0 g/kg. The LC_{50} for rats exposed via inhalation for 6 hours is 4618 ppm (17,400 mg/m^3) (Bonnet et al, 1982). No effects were reported at levels of 620 or 1100 ppm (2340 or 4150 mg/m^3), decreased coordination and irritated mucous membranes were reported at 1250 ppm (4710 mg/m^3). A dermal LD_{50} of 12.2 g/kg was reported for rabbits (Smyth et al, 1969).

Subchronic Toxicity

Subchronic oral exposure of female Wistar rats to doses of 118, 354 or 5 90 mg/kg/day of toluene, 5 day/week for 27 to 28 weeks produced no toxic effects or a NOAEL of greater than 590 mg/kg/day (Wolf et al, 1956). Male and female CFY rats were exposed via inhalation to 1000 mg/m^3 toluene for 6 hours/day, 5 days/week for 6 months by Ungvary et al (1980). No toxic effects were seen in the male rats; however, an increased level of cytochrome P-450, decreased body weight, and an increased liver weight to total body weight was reported in the female rats. Similar effects were reported in the male rats exposed to 3500 mg/m^3 toluene. Renal effects were reported in rats treated at 600 ppm (2260 mg/m^3) for 7 hours/day, 5 days/week for 6 weeks (U.S. EPA, 1985).

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Chronic Toxicity

Data regarding chronic oral toxicity of toluene to experimental animals was not available in the literature reviewed. Male and female Fischer rats were exposed to 30, 100, or 300 ppm of toluene (113, 377, or 1130 mg/m^3) 6 hour/day, 5 days/week for 24 months (CIIT, 1980). Increased hemoglobin concentration and a decrease in hematocrit levels was reported in the female rats only at the 100 and 300 ppm levels.

Developmental and Reproductive Effects

Nawrot and Staples (1979) reported an increase in fetal mortality after exposing pregnant CD-1 mice by gavage to 0 .3, 0.5, and 1.0 ml/kg/day (0.26, 0.43, and 0.87 g/kg/day) on days 6 to 15 of gestation. The highest dose level in this study resulted in cleft palate in the offspring. Maternal toxicity was not reported. No fetotoxic or teratogenic effects were reported in pregnant ICR mice exposed to 100 ppm (377 mg/m^3) and 1000 ppm (3770 mg/m^3) toluene vapor for 6 hours/day on days 1 to 17 of gestation (Shigeta et al, 1982). Hudak and Ungvary (1978), however, after exposing CFLP mice to 500 and 1500 mg/m^3 toluene on days 6 to 13 of gestation, reported death in the high dose mice after 24 hours and decreased fetal weight in the offspring of the low dose mice.

Mutagenicity

Toluene has been shown not to be mutagenic in several strains of Salmonella typhimurium (Bos et al, 1981; Snow et al, 1981) in Echerichia coli (Mortelmans and Riccio, 1980) and in Saccharomyces cerevisiae (Mortelmans and Riccio, 1980).

Carcinogenicity

CIIT (1980) reported that inhalation exposures of Fischer 344 rats to 0, 30, 100, or 300 ppm toluene for 24 months did not produce neoplastic, proliferative, inflammatory, or degenerative lesions. No carcinogenic effects were reported after topical application of toluene to the skin of mice for 20 weeks (Frei and Kingsley, 1968). No evidence of promotion was observed when toluene was painted on the skin of mice twice/week for 20 weeks after initiation with 7,12 dimethyl-benz(a)anthracene (Frei and Kingsley, 1968).

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1.2 EPA Classification of Carcinogenicity

Based on no evidence of carcinogenicity in rats exposed to toluene experimentally or humans exposed to toluene occupationally or by intentional use, toluene is classified by the U.S. EPA as a group D - Not classified chemical.

1.3 Quantitative Indices of Toxicity

The following values have been set by the U.S. EPA (1986) for noncarcinogenic effects resulting from oral and inhalation exposure to toluene: An AIS (acceptable intake subchronic) of 0.43 mg/kg/day for oral exposure is based on the NOAEL of 590 mg/kg derived from the Wolf et al (1956) study using rats; an AIC (acceptable intake chronic) of 0.29 mg/kg/day for oral exposure is based on the NOAEL of 1130 mg/m^3 derived from the CIIT (1980) inhalation study also using rats; 1.5 mg/kg/day has been established for both the AIS and AIC for inhalation exposure to toluene. A carcinogenic potency factor has not been derived for toluene based on the negative evidence of carcinogenicity obtained in an animal study and lack of evidence in humans.

1.4 Regulatory Standards and Criteria

ACGIH (1983) recommends a TWA-TLV of 100 ppm and a STEL of 150 ppm for occupational exposure to toluene. OSHA, however, has currently set a TWA of 200 ppm and a ceiling of 300 ppm. The U.S. EPA has set ambient water quality criteria for the protection of human health and aquatic organisms as follows: 14.3 mg/L for the human consumption of aquatic organisms and drinking water; 15 mg/L for the consumption of drinking water only; freshwater acute toxicity to aquatic organisms - 17.5 mg/L; marine acute toxicity - 6.3 mg/L; and marine chronic toxicity - 5.0 mg/L. The U.S. EPA has proposed an MCLG of 2.0 mg/l for toluene.

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XYLENES

Xylene is an aromatic compound consisting of a benzene ring containing two methyl groups. Three isomers of this chemical exist, o-,m-,and p-xylene, depending on the position of the methyl groups on the benzene ring. These isomers, commonly referred to as xylenes, have similar chemical and biological characteristics and would,therefore, exhibit similar toxicological effects. Xylenes have a low water solubility and are rapidly volatilized into ambient air, therefore, inhalation is likely to be the major source of exposure in the environment.

1.0 Human Health Effects

1.1 Summary of Toxicological Effects

1.1.1 Pharmacokinetics

Absorption from the gastrointestinal tract has been inferred from a study in which rabbits were orally administered 0.9 to 1.7 g/animal of xylene isomers reportedly resulting in 85 to 90% urinary excretion (Bray et al, 1949). Xylenes are reported to be readily absorbed after inhalation. Inhalation exposures to humans of 100 to 1300 mg/m^3 were reported to result in 60% absorbtion from the inspired air (Riihimaki et al, 1979; Astrand et al, 1978).

Metabolism of xylenes is by the oxidation of methyl substitution groups and ring hydroxylation. Metabolites include: Methyl hippuric acid (95%) and xylenols (1-2%) (Harper et al, 1975).

The target organs for distribution in mice exposed to xylenes via inhalation are reportedly to the lungs, liver, and kidney as well as brain and adipose tissue. Two hours later distribution to the intestine was reported (Bergman, 1978). The primary route for elimination of xylenes is reported to be through urinary excretion of metabolites, representing 95% of the absorbed dose and the remaining 5% by pulmonary exhalation of xylene (Astrand et al, 1978).

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1.1.2 Human Data

Acute Toxicity

NIOSH (1978) has reported an LD_{50} of 50 mg/kg for humans exposed to xylenes orally. Effects on the central nervous system resulting from xylene exposures are reported to include: changes in numerative ability, short-term memory, and electroencephalographic patterns (U.S. EPA, 1987). No toxic effects were reported in male volunteers exposed to 435 and 1300 mg/m^3 xylenes via a 70 minute inhalation period (Gamberale et al, 1978). Adverse effects on the pshychophysiological functions were reported in a group of male students exposed to m-xylene at 391 mg/m^3 for five consecutive days and one day the next week (Savolainen et al, 1980).

Subchronic Toxicity

Data regarding the subchronic toxicity of xylenes to humans via oral or inhalation exposures was not available in the literature reviewed.

Chronic Toxicity

Data regarding the chronic toxicity of xylenes to humans via oral or inhalation exposures was not available in the literature reviewed.

Carcinogenicity

Data regarding the carcinogenicity of xylene to humans was not available in the literature reviewed.

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1.1.3 Animal Data

Acute Toxicity

The LD_{50} (dose lethal to 50% test animals) values for oral and inhalation exposures to rats are: 4300 to 5000 mg/kg (NIOSH, 1978) and 20600 to 29000 mg/m^3 (4 hour exposure) (Harper, et al, 1975), respectively.

Subchronic Toxicity

The effects of xylene on the livers of male Long-Evans rats were observed reported after an oral dose of 200 mg/kg o-xylene food (200 ppm)(Bowers et al, 1982). Vesicles were reported in the hepatocytes of xylene-treated animals that could potentially be involved in the elimination of xylene or its metabolites or both. The estimated NOAEL (no observed adverse effect level) for rats from this study, based on rat consumption of 5% of its body weight/day, is 10 mg/Kg/day. Carpenter et al (1975) reported no effect on blood cell count, clinical chemistry, urinalysis, body, liver or kidney weight in male dogs exposed to mixed xylenes at 770, 2000, and 3500 mg/m^3 for 6 hrs/day, 5 days/week for 13 weeks. Carpenter et al (1975) exposed male rats to mixed xylenes (8% p-xylene, 65% m-xylene, 8% o-xylene, 19% ethyl/benzene) at doses of 180, 460, and 810 ppm (770, 2000, and 3500 mg/m^3) 6 hours/day, 5 days/week for 13 weeks. No biochemical or histological effects were reported at the two lower doses, however, an increase in erythrocyte and monocyte counts was reported after 3 weeks for the highest dose. This effect disappeared after the seventh week of exposure. Savolainen et al (1982) exposed male Wistar rats to 300 ppm (1300 mg/m^3)xylene 6 hours/day, 5 days/week, for less than 18 weeks. Brain superoxide dismutase and cystolic glutathione peroxidase activity were reported to decrease after 5 and 14 weeks, respectively, however, were comparable to controls at the end of the exposure period.

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Chronic Toxicity

Male CFY rats exposed via inhalation to 4750 mg/m^3 o-xylene 8 hours/day, 7 days/week for one year were reported to have decreased body weights, hepatomegaly, and an altered hepatic enzyme pattern (Tatrai et al, 1981).

Reproductive Effects

Fused sternebrae and extra ribs were reported in offspring of CFY rats exposed via inhalation to 1000 mg/m^3 of mixed xylenes 24 hours/day during the 9th to 14th days of pregnancy (Hudak and Ungvary, 1978). These effects are reported to be embryotoxic rather than teratogenic. Teratogenic effects were not reported in Charles River rats exposed to 0, 100, or 400 ppm (0, 434, or 1730 mg/m^3) during the 6th to 15th day of pregnancy (Litton Bionetics, 1978).

Mutagenicity

Mixed xylenes were not mutagenic in several strains of Salmonella typhimurium (Ames test) (Bos et al, 1981; Florin et al, 1980), several strains of Escherichia coli (McCarroll et al, 1981) or in the Drosophila recessive lethal test(Donner et al, 1980).

Carcinogenicity

Data regarding the carcinogenicity of xylenes to experimental animals was not available in the literature reviewed.

1.2 EPA Classification of Carcinogenicity

Based on the lack of positive evidence of carcinogenicity in humans or experimental animals, the U.S. EPA classifies xylene as a Group D - Not Classified chemical.

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1.3 Quantitative Indices of Toxicity

The following values have been set by the U.S. EPA (1987a) for noncarcinogenic effects resulting from oral or inhalation of mixed xylenes or specific xylene isomers: oral AIS (acceptable intake subchronic) - 4.0 mg/kg/day, inhalation AIS - 0.44 mg/kg/day; oral AIC (acceptable intake chronic) - 2.0 mg/kg/day and an inhalation AIC - 0.44 mg/kg/day. No carcinogenic potency factors have been established for any of the xylene isomers based on the lack of positive evidence in humans or experimental animals.

1.4 Regulatory Standards and Criteria

The ACGIH (1983) recommends a TWA-TLV of 100 ppm (435 mg/m^3) and a STEL-TLV of 150 ppm (655 mg/m^3) for occupational exposure to xylene. NIOSH (1975) recommends a 10 minute ceiling of 200 ppm xylene. OSHA (1981) has promulgated a TWA limit of 100 ppm for exposure to xylene occupationally. No ambient water quality criteria have been established for xylene. The U.S. EPA has proposed an MCLG of 440 ug/l for xylene.

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APPENDIX T - SUMMARY OF GROUNDWATER LEVELS

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TABLE T-1
SUMMARY OF GROUNDWATER LEVELS (ft)

	Shallow Zone																	
WELL NO.:	OW01	OW02	OW07	OW08	OW09	OW10	OW11	OW13	OW14	MW01	MW02	MW03	MW04	MW05	MW06	MW07	MW08	MW09
CASING ELEVATION:	51.48	52.95	53.61	51.84	51.70	49.73	50.91	51.07	51.47	53.24	52.81	51.20	48.55	52.69	48.04	51.97	47.94	46.34
DATE																		
08-Feb-83(1)	49.9	49.4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09-May-83(1)	*	*	45.6	43.9	44.2	41.5	45.8	46.6	46.1	*	*	*	*	*	*	*	*	*
17-May-83(1)	49.6	46.1	46.1	44.6	46.6	43.7	*	49.0	47.7	*	*	*	*	*	*	*	*	*
26-May-83(1)	*	*	46.8	45.5	47.9	43.8	*	49.4	49.3	*	*	*	*	*	*	*	*	*
02-Jun-83(1)	*	46.9	46.6	49.2	*	42.8	*	48.7	47.7	*	*	*	*	*	*	*	*	*
24-Jun-83(1)	49.5	46.9	46.4	44.7	*	*	*	*	48.5	*	*	*	*	*	*	*	*	*
29-Jul-83(1)	49.6	47.0	46.7	44.7	*	42.9	47.3	49.2	*	*	*	*	*	*	*	*	*	*
03-Apr-84(1)	49.9	47.0	45.7	44.9	*	43.4	48.4	49.5	49.1	*	*	*	*	*	*	*	*	*
18-Jan-85	49.9	47.7	46.7	45.6	*	44.1	48.6	49.7	49.6	*	*	*	*	*	*	*	*	*
02-Aug-85	*	43.6	43.7	41.5	*	41.4	44.1	44.4	44.2	*	*	*	*	*	*	*	*	*
16-Aug-85	44.5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
28-Aug-85	46.0	43.2	42.9	41.6	*	41.8	44.7	44.6	44.5	*	*	*	*	*	*	*	*	*
03-Feb-86	49.1	46.2	44.6	44.4	45.9	41.7	47.2	47.9	47.2	*	*	*	*	*	*	*	*	*
21-Apr-86	47.2	44.2	44.0	42.8	43.9	40.9	45.4	46.2	45.3	*	*	*	*	*	*	*	*	*
06-Jun-86	48.9	45.7	44.4	44.8	47.3	43.1	48.0	49.0	48.8	*	*	*	*	*	*	*	*	*
23-Jun-86	48.8	47.0	46.4	44.7	47.9	42.8	48.8	48.7	48.5	*	*	*	*	*	*	*	*	*
23-Jul-86	48.1	45.9	45.6	43.4	45.8	41.3	45.9	47.3	47.1	*	*	*	*	*	*	*	*	*
12-Aug-86	48.4	44.9	44.8	43.2	44.6	41.8	46.8	47.9	47.4	44.0	44.1	*	45.0	*	43.6	45.7	*	45.9
15-Aug-86	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	45.6
19-Sep-86	48.0	45.5	44.7	43.4	45.0	41.6	46.6	48.4	48.0	44.3	44.5	*	45.3	*	43.7	45.9	*	46.0
21-Oct-86	48.4	46.2	45.5	43.9	47.0	41.7	47.1	48.3	48.1	45.4	44.8	*	44.8	*	43.4	46.3	*	45.8
21-Nov-86	48.5	45.9	45.7	43.7	47.0	41.2	46.8	48.1	47.2	45.0	44.6	46.0	44.8	*	43.8	45.5	*	45.4
27-Dec-86	48.9	47.7	46.9	45.1	48.6	43.0	47.9	48.9	48.8	47.6	45.8	47.5	45.5	*	43.3	47.7	*	45.9
28-Aug-87	46.0	44.3	44.4	42.3	42.3	40.2	43.9	44.5	44.4	43.3	43.2	43.8	44.3	41.4	41.9	43.3	39.2	44.7
16-Sep-87	46.2	43.6	43.6	41.7	41.2	40.5	44.0	43.2	44.3	42.6	42.7	43.4	44.1	*	*	43.8	39.0	45.0
17-Sep-87	*	*	*	*	*	*	*	*	*	*	*	*	*	*	42.3	*	*	*
18-Sep-87	*	*	*	*	*	*	*	*	*	*	*	*	*	40.7	*	*	*	*
30-Nov-87	46.8	42.3	42.1	41.5	41.5	41.3	45.6	44.7	44.2	41.7	42.2	44.2	44.5	38.1	*	45.5	40.0	45.8

Notes
1. Denotes groundwater level measurements by others.
2. All elevations referenced to Mean Sea Level datum, National Geodetic Survey, 1978 adjustment.
3. Monitoring wells denoted with OW prefix from Camp Dresser & McKee report to Houston Transit Consultants - Cavalcade Contaminant Survey - Volume 1 - Engineering Report dated July 11, 1983.

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TABLE T-1 (continued)
SUMMARY OF GROUNDWATER LEVELS (ft)

Shallow Zone (continued)

WELL NO.:	MW10	MW11	MW12	MW14	MW16	MW23	P01	P02	P03	P04	P05
CASING ~~ELEVATION~~	~~32.34~~	~~31.66~~	~~53.67~~	~~42.17~~	~~46.20~~	~~42.03~~	51.82	50.86	51.76	53.00	53.53
DATE											
18-Jan-85	*	*	*	*	*	*	*	*	*	*	*
02-Aug-85	*	*	*	*	*	*	*	*	*	*	
16-Aug-85	*	*	*	*	*	*	*	*	*	*	*
28-Aug-85	*	*	*	*	*	*	*	*	*	*	*
03-Feb-86	*	*	*	*	*	*	*	*	*	*	*
21-Apr-86	*	*	*	*	*	*	*	*	*	*	*
06-Jun-86	*	*	*	*	*	*	34.6	35.1	36.1	35.1	33.2
23-Jun-86	*	*	*	*	*	*	34.9	35.7	33.9	35.6	35.0
23-Jul-86	*	*	*	*	*	*	35.0	35.7	34.2	36.5	35.3
12-Aug-86	34.4	*	34.8	34.0	43.0	*	34.7	35.1	33.8	35.2	36.9
15-Aug-86	34.4	*	*	*	43.1	*	*	*	*	*	*
19-Sep-86	34.1	*	34.5	34.8	43.5	*	34.5	35.1	33.7	35.2	34.5
21-Oct-86	34.3	*	34.8	34.0	43.7	*	34.7	36.1	33.8	35.2	34.6
21-Nov-86	34.8	35.1	35.2	35.3	42.6	*	35.2	35.7	34.0	35.5	35.0
27-Dec-86	35.5	35.5	35.9	35.8	43.4	*	35.8	36.4	34.7	36.5	37.8
28-Aug-87	34.1	34.2	34.5	34.9	41.9	*	34.7	34.4	33.0	35.2	36.0
16-Sep-87	33.6	33.8	34.0	*	41.3	*	34.1	33.9	32.7	34.6	38.3
17-Sep-87	*	*	*	34.8	*	*	*	*	*	*	*
30-Nov-87	32.7	32.3	33.2	33.9	41.6	42.9	33.3	33.2	31.8	33.7	37.3

Notes

1. All elevations referenced to Mean Sea Level datum, National Geodetic Survey, 1978 adjustment.

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TABLE T-1 (continued)
SUMMARY OF GROUNDWATER LEVELS (ft)

	Deep Zone				
WELL NO.:	CAV-OW06	CT-OW01	SCK-P06	SCK-P07	SCK-DW02
CASING ELEVATION:	53.67	60.18	50.47	50.30	50.92
DATE					
18-Jan-85	-86.8	*	*	*	*
02-Aug-85	-87.2	*	*	*	*
28-Aug-85	-87.8	*	*	*	*
03-Feb-86	-86.6	*	*	*	*
21-Apr-86	-87.3	*	*	*	*
06-Jun-86	-87.1	*	*	*	*
23-Jun-86	-87.4	*	*	*	*
23-Jul-86	-87.5	*	*	*	*
12-Aug-86	-87.5	*	*	*	*
19-Sep-86	-87.5	*	*	*	*
21-Oct-86	-87.7	*	*	*	*
21-Nov-86	-87.8	-81.6	*	*	*
27-Dec-86	-87.6	*	*	*	*
30-Dec-86	*	-81.6	*	*	*
02-Apr-87	-87.4	-82.4	-93.0	-87.3	*
06-Apr-87	-87.4	-81.5	-93.1	-87.3	*
22-May-87	-87.3	-81.3	-92.4	-87.0	*
01-Jul-87	*	*	*	*	-90.7
16-Jul-87	-87.1	*	*	*	*
28-Jul-87	*	*	*	*	-90.6
04-Aug-87	*	*	*	*	-90.5
28-Aug-87	-87.1	-81.3	-92.4	-87.1	-89.8
16-Sep-87	-87.3	*	*	*	-91.9
17-Sep-87	*	-81.3	-93.0	-87.0	*
30-Nov-87	-87.5	-81.6	-91.1	-87.2	-91.3

Notes

1. All elevations referenced to Mean Sea Level datum, National Geodetic Survey, 1978 adjustment.
2. Monitoring Well CT-OW01 located at former Crosstimbers (Hardy Street) wood preserving plant.
3. Monitoring Wells CAV-OW06 and CT-OW01 from Camp Dresser & McKee report to Houston Transit Consultants - Crosstimbers Contaminant Survey - Volume 1 - Engineering Report dated July 11, 1983.

007600

APPENDIX U - SUMMARY OF GROUNDWATER SAMPLING FIELD MEASUREMENTS

007601

007601

TABLE U-1

SUMMARY OF GROUNDWATER SAMPLING FIELD MEASUREMENTS

Well Location	Purged Well Volumes (gal)		pH		Conductivity (umhos/cm)		Temperature (C)	
	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
SCK-MW01	10.5	10.4	6.30	6.89	790	628	19.0	19.0
SCK-MW02	10.3	10.1	6.70	6.63	720	726	18.5	19.0
SCK-MW03	11.9	11.8	6.20	6.62	670	735	20.0	19.5
SCK-MW04	12.5	12.4	6.84	6.59	1119	787	19.0	20.0
SCK-MW05	6.5	NA	6.87	NA	1420	NA	19.5	NA
SCK-MW06	12.4	11.1	6.50	6.79	700	650	19.0	24.0
SCK-MW07	14.8	14.4	6.85	6.71	870	714	18.5	19.0
SCK-MW08	5.5	6.25	7.05	7.27	944	1394	19.0	22.1
SCK-MW09	10.6	10.6	6.70	7.41	910	397	23.0	21.0
SCK-MW10	22.6	23.0	7.19	6.88	1010	773	18.5	21.0
SCK-MW11	15.5	15.9	7.30	8.19	780	693	18.5	NA
SCK-MW12	20.1	20.5	6.70	6.28	1150	1103	19.0	21.0
SCK-MW14	19.6	19.9	6.50	6.76	820	732	19.0	22.5
SCK-MW16	25.3	24.1	12.15	11.66	4370	2650	22.5	21.0
SCK-MW23	8.8	NA	7.09	NA	462	NA	20.6	NA
SCK-P01	18.5	17.3	7.30	7.34	590	560	19.0	19.0
SCK-P02	18.6	18.5	6.60	6.35	970	766	19.5	21.5
SCK-P03	12.8	13.1	8.00	7.09	570	692	20.0	22.0
SCK-P04	20.1	20.5	7.50	7.36	590	791	22.5	23.0
SCK-P05	22.9	7.3	12.26	11.75	5640	3750	20.5	19.0
CAV-OW01	10.1	10.1	9.00	8.87	1100	1156	18.0	22.0
CAV-OW02	10.0	8.4	7.21	6.46	737	540	21.0	21.0
CAV-OW07	6.4	6.1	6.30	6.72	1610	1355	21.0	18.0
CAV-OW08	7.3	7.1	7.14	6.73	928	723	18.5	21.0
CAV-OW09	7.5	7.5	7.20	6.68	822	727	21.0	NA
CAV-OW10	8.9	8.6	6.70	6.52	725	568	18.5	21.0
CAV-OW11	9.4	9.5	7.10	6.58	800	603	21.5	19.0
CAV-OW13	9.8	9.8	6.60	6.83	485	604	20.5	18.5
CAV-OW14	9.9	9.6	7.83	6.95	588	484	21.0	19.0

Notes:
1. NA = Not Analyzed

007602

TABLE U-2
SUMMARY OF DEEP GROUNDWATER SAMPLING FIELD MEASUREMENTS

	SCK-DW02		CAV-OW06		
	Round 1	Round 2	Round 1	Round 2	Round 3 (HPLC)
Purged Well Volume (gal)	275	250	48	115	160
pH	7.54	7.91	7.0	6.80	7.43
Conductivity (umhos/cm)	800	535	505	465	750
Temperature (^{o}C)	24	28.8	21.0	19.0	23

007603