APPENDIX N

SAMPLING LOGS FROM THE REMEDIAL INVESTIGATION GROUND-WATER AND SURFACE-WATER SAMPLING PROGRAMS

ORMET CORPORATION
HANNIBAL, OHIO

APPENDIX N-1	**Sampling Logs From the Phase I RI Ground-Water Sampling Program**
APPENDIX N-2	**Sampling Logs From the Phase II RI Ground-Water Sampling Program**
APPENDIX N-3	**Sampling Logs From the Phase II RI CAL and Ormet Ranney Well Sampling**
APPENDIX N-4	**Sampling Logs From the Phase II RI Ohio River Surface-Water Sampling Program**

APPENDIX N-1

SAMPLING LOGS FROM THE PHASE I RI GROUND-WATER SAMPLING PROGRAM

ORMET CORPORATION
HANNIBAL, OHIO

GERAGHTY & MILLER, INC.
Ground-Water Consultants

R0738H08-WTRL06-0062

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

~~Site/Well No.~~ Field blank #12 Coded/ Replicate No. _____ Date 7-7-88

Weather Hot 100° Time Sampling Began 1710 Time Sampling Completed 1718

EVACUATION DATA

Description of Measuring Point (MP) NA

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well NA Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method ——

SAMPLING DATA/FIELD PARAMETERS

Color None Odor _____ Appearance Clear Temperature _____ °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 1.2 pH 6.70

Sampling Method and Material Out of DI Water Container

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONG LIST		

Remarks _____

Sampling Personnel J Campbell, R Fargo

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0001

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Ground-Water Consultants

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-1 Coded/Replicate No. _____ Date 6-27-88

Weather 80° Sunny Time Sampling Began 1433 Time Sampling Completed 1506

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.96 MP Elevation 668.07

Total Sounded Depth of Well Below MP 71.11 Water-Level Elevation 612.82

Held _____ Depth to Water Below MP 55.25 Diameter of Casing 2"

Wet _____ Water Column in Well 15.86 Gallons Pumped/Bailed Prior to Sampling (7.5) 8

Gallons per Foot 0.16

Gallons in Well 2.5 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance V cloudy Temperature 15 °F/(C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 540 pH 6.43

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks _____

Sampling Personnel J Campbell, T Naser, J Chepega, T Ratusky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0002

WATER SAMPLING LOG

Project/No. ORMET PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-2 Coded/ Replicate No. _____ Date 7-6-88

Weather Sunny hot 100° Time Sampling Began 1354 Time Sampling Completed 1420

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.96 MP Elevation 668.12

Total Sounded Depth of Well Below MP 85.23 Water-Level Elevation 608.10

Held _____ Depth to Water Below MP 60.02 Diameter of Casing 2"

Wet _____ Water Column in Well 25.21 Gallons Pumped/Bailed Prior to Sampling (12.1) 12.5

Gallons per Foot .16

Gallons in Well 4.03 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Black-Brown Odor — Appearance Sl Cloudy, Stained Temperature 15 °F/(C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 6000 pH 10.44

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Sheen noticed in beaker while Taking Ph + Cond

Sampling Personnel J Campbell, J Naser, J Chepega, K Souza

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0003

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WATER SAMPLING LOG

Project/No. ORMET / Pg 0738H008 Page 1 of 1

Site Location Hannibal, OHIO

Site/Well No. MW-3 Coded/ Replicate No. _____ Date 6/24/88

Weather Sunny, mid 70s Time Sampling Began 10:20 Time Sampling Completed 10:45

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 2.11 MP Elevation 645.17

Total Sounded Depth of Well Below MP 78.03 Water-Level Elevation 611.39

Held _____ Depth to Water Below MP 33.78 Diameter of Casing 2"

Wet _____ Water Column in Well ~~49.38~~ 44.25 Gallons Pumped/Bailed Prior to Sampling (21.24) 22

Gallons per Foot 0.16

Gallons in Well 7.08 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color lt. brown Odor — Appearance sl. silty Temperature 13.5 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 725 pH 5.96

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks _____

Sampling Personnel J. Naser, J. Chepega, J. Campbell, T. Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0004

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WATER SAMPLING LOG

Project/No. PA0738 H008 Ormet

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Site Location Hannibal OH

Site/Well No. MW-4

Coded/ Replicate No.

Date 6-22-88

Weather Clear, Hot

Time Sampling Began 10:11

Time Sampling Completed 10:55

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.87

MP Elevation 661.07

Total Sounded Depth of Well Below MP 75.42

Water-Level Elevation 598.39

Held

Depth to Water Below MP 62.68

Diameter of Casing 2"

Wet

Water Column in Well 12.74

Gallons Pumped/Bailed Prior to Sampling (6.1) 6.5

Gallons per Foot 0.16

Gallons in Well 2.0

Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance Silty Temperature 17.5 °F (°C)

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm 550 pH 7.03

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M	Preservative
SHORT LIST-A		

Remarks

Sampling Personnel JAC, JBN, TC, TTR

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0005

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WATER SAMPLING LOG

Project/No. PA0738H008 ORMET

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Site Location Hannibal Ohio

Site/Well No. MW-5

Coded/ Replicate No.

Date 7-6-88

Weather Sunny Warm 80

Time Sampling Began 0830

Time Sampling Completed 0856

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.93

MP Elevation 668.16

Total Sounded Depth of Well Below MP 91.88

Water-Level Elevation 599.86

Held _____ Depth to Water Below MP 68.30

Diameter of Casing 2"

Wet _____ Water Column in Well 23.58

Gallons Pumped/Bailed Prior to Sampling (11.31) 11.5

Gallons per Foot .16

Gallons in Well 3.77

Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brn-Black Odor — Appearance Stained Temperature 15 °F/°C

Other (specific ion; OVA; HNU; etc.) HCN-0

Specific Conductance umhos/cm 2050 pH 9.63

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks

Sampling Personnel J Campbell, J. Naser, J. Chepega, K. Souza

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08 - WTRLOG-0006

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WATER SAMPLING LOG

Project/No. Ormet / PA0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-7 Coded/ Replicate No. _____ Date 6-22-88

Weather Hot, Pt Cldy Time Sampling Began 11:20 Time Sampling Completed 11:53

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.72 MP Elevation 667.94

Total Sounded Depth of Well Below MP 79.7 Water-Level Elevation 607.66

Held _____ Depth to Water Below MP 60.28 Diameter of Casing 2"

Wet _____ Water Column in Well 19.42 Gallons Pumped/Bailed Prior to Sampling (9.3) 10

Gallons per Foot 0.16

Gallons in Well 3.1 Sampling Pump Intake Setting (feet below land surface) Top of Water

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance Silty Temperature 26 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 760 pH 5.82 (5.88 6/23/88 @ 8:23)

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
SHORT LIST - A		

Remarks Started orange-brn grading to brown (pH re-measured w/ correct meter span)

Sampling Personnel _____

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-00007

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WATER SAMPLING LOG

Project/No. Ormet, PR0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-8 Coded/ Replicate No. _____ Date 6-23-88

Weather Hot/Cloudy/Rain Time Sampling Began 9:07 Time Sampling Completed 10:45

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.08 MP Elevation 667.71

Total Sounded Depth of Well Below MP 99.78 Water-Level Elevation 592.22

Held _____ Depth to Water Below MP 75.49 Diameter of Casing 2"

Wet _____ Water Column in Well 24.29 Gallons Pumped/Bailed Prior to Sampling (11.7) 12

Gallons per Foot 0.16

Gallons in Well 3.9 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance Clear Temperature 15 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance umhos/cm 550 pH 8.33

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Split & Split duplicate collected for M&E

Sampling Personnel Batvasky, Naser, Chepega, Campbell

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0008

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WATER SAMPLING LOG

Project/No. Ormet, PA0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-9 Coded/ Replicate No. _____ Date 6-23-88

Weather Hot, Sunny Time Sampling Began 14:45 Time Sampling Completed 15:25

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.61 MP Elevation 666.59

Total Sounded Depth of Well Below MP 103.05 Water-Level Elevation 592.91

Held _____ Depth to Water Below MP 73.68 Diameter of Casing 2"

Wet _____ Water Column in Well 29.37 Gallons Pumped/Bailed Prior to Sampling (14) 14.5

Gallons per Foot 0.16

Gallons in Well 4.7 Sampling Pump Intake Setting (feet below land surface) Top of Water

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color light brown Odor — Appearance slightly cloudy Temperature 16.5 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 755 pH 7.25

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
short List		

Remarks _____

Sampling Personnel Chepega, Naser, Campbell, Rativsky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0009

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WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-10 Coded/ Replicate No. _____ Date 6-23-88

Weather Hot, Pt. Cloudy Time Sampling Began 11:30 Time Sampling Completed 12:06

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 0.82 MP Elevation 667.16

Total Sounded Depth of Well Below MP 100.72 Water-Level Elevation 591.65

Held _____ Depth to Water Below MP 75.51 Diameter of Casing 2"

Wet _____ Water Column in Well 25.21 Gallons Pumped/Bailed Prior to Sampling (12.09) 14

Gallons per Foot 0.16

Gallons in Well 4.03 Sampling Pump Intake Setting (feet below land surface) Top Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color v. light brown Odor — Appearance slightly cloudy Temperature 17 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 750 pH 7.23

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks Dust (alumina) problem, near silos.

Sampling Personnel Neser Campbell Chepega Ratinsky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0010

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WATER SAMPLING LOG

Project/No. ORMET / RA0738H008 Page 1 of 1

Site Location Hannibal, OHIO

Site/Well No. MW-11 Coded/ Replicate No. _____ Date 6/24/88

Weather Sunny, 70s Time Sampling Began 0837 Time Sampling Completed 0904

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.56 MP Elevation 667.31

Total Sounded Depth of Well Below MP 97.35 Water-Level Elevation 599.13

Held _____ Depth to Water Below MP 68.18 Diameter of Casing 2"

Wet _____ Water Column in Well 29.17 Gallons Pumped/Bailed Prior to Sampling (14.01) 14.5

Gallons per Foot 0.16

Gallons in Well 4.67 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor — Appearance clear Temperature 14.5 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 565 pH 8.43

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J. Naser, J. Chepega, ~~J. Chepega~~, T. Ratvasky, J. Campbell

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0011

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WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-12 Coded/ Replicate No. _____ Date 6-29-88

Weather Cloudy 80 Time Sampling Began 1558 Time Sampling Completed 1623

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.43 MP Elevation 636.73

Total Sounded Depth of Well Below MP 68.24 Water-Level Elevation 611.47

Held _____ Depth to Water Below MP 25.26 Diameter of Casing 2"

Wet _____ Water Column in Well 42.98 Gallons Pumped/Bailed Prior to Sampling (20.63)

Gallons per Foot 0.16

Gallons in Well 6.87 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color none Odor — Appearance clear Temperature 16 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 515 pH 7.51

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J Campbell, J Naser, J Chrepga, T Rativsky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0012

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WATER SAMPLING LOG

Project/No. PA0738H008 / ORMET

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Site Location HANNIBAL, OH

Site/Well No. MW-13

Coded/ Replicate No.

Date 7/1/88

Weather MORNING FOG BRIGHT, SUNNY

Time Sampling Began 8:07

Time Sampling Completed 8:44

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.93

MP Elevation 661.44

Total Sounded Depth of Well Below MP 88.55

Water-Level Elevation 617.95

Held _____ Depth to Water Below MP 43.49

Diameter of Casing 2"

Wet _____ Water Column in Well 45.06

Gallons Pumped/Bailed Prior to Sampling (21.63) 22.0 ON 6/30/88 7 more on 7/1/8

Gallons per Foot 0.16

Gallons in Well 7.21

Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Light grayish Brown Odor — Appearance SLT. CLOUDY Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) CN Tube taken during filtering = 0

Specific Conductance, umhos/cm 485 pH 7.44

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks VAN PARKED ≈300 M FROM SAMPLING LOCATION: BLOWING DUST FROM PONDS INTERMITTENT

Sampling Personnel T. RATVASKY J. NASER J. CAMPBELL J. CHEPEGA

Evacuated on 6/30/88, Sampled on 7/1/88

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0013

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WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 2

Site Location HANNIBAL, OH

Site/Well No. MW-13 Coded/ Replicate No. _____ Date 6/30/88

Weather P+Ly CLOUDY Hi 70's Time Sampling Began _____ Time Sampling Completed _____

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.93 MP Elevation 661.44

Total Sounded Depth of Well Below MP 88.55 Water-Level Elevation 617.95

Held _____ Depth to Water Below MP 43.49 Diameter of Casing 2"

Wet _____ Water Column in Well 45.06 Gallons Pumped/Bailed Prior to Sampling (21.63) 22.0

Gallons per Foot 0.16

Gallons in Well 7.21 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color _____ Odor _____ Appearance _____ Temperature _____ °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm _____ pH _____

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Dust from Ponds blowing around intermittently during evacuation & sampling

Sampling Personnel T. RATUASKY J. Campbell, J. NASER J. Chepoga

Replicate Collected = MW-45

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0014

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Ground-Water Consultants

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW-14 Coded/ Replicate No. MW-45 Date 6/30/88

Weather SUNNY, COOL 60°'s @ 7:25 AM Time Sampling Began 9:10 Time Sampling Completed 10:20

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.75 MP Elevation 653.59

Total Sounded Depth of Well Below MP 86.90 Water-Level Elevation 613.40

Held _____ Depth to Water Below MP 40.19 Diameter of Casing 2"

Wet _____ Water Column in Well 46.71 Gallons Pumped/Bailed Prior to Sampling (22.42) 22.5

Gallons per Foot .16

Gallons in Well 7.47 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method TEFLON Bailer

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance Slightly brown Temperature 15° °F/°C

Other (specific ion; OVA; HNU; etc.) CN tube used during filtration = 0

Specific Conductance, umhos/cm 530 pH 7.9

Sampling Method and Material Teflon BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks 10:15 J. CAMPBELL REPORTS POND DUST BLOWING AROUND SAMPLING AREA

Sampling Personnel T. RATVASKY J. CAMPBELL J. Chepega J. NASER

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0015

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Ground-Water Consultants

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW-15 Coded/ Replicate No. _____ Date 7/1/88

Weather PtLy cloudy mid 70's Time Sampling Began 15:31 Time Sampling Completed 15:56

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.85 MP Elevation 657.31

Total Sounded Depth of Well Below MP 57.86 Water-Level Elevation 617.01

Held _____ Depth to Water Below MP 40.30 Diameter of Casing 2"

Wet _____ Water Column in Well 17.56 Gallons Pumped/Bailed Prior to Sampling (8.4) 10

Gallons per Foot 0.16

Gallons in Well 2.8 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance OPAQUE Temperature 14 °F (°C)

Other (specific ion; OVA; HNU; etc.) Cn tube taken during filtration = 0

Specific Conductance, umhos/cm 600 pH 7.05

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab x or G&M ____	Preservative
Long List		

Remarks dust blowing from ponds, may be reaching this sampling area

Sampling Personnel T. RATVASKY J. NASER J. CAMPBELL J. Chepega

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0016

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Ground-Water Consultants

WATER SAMPLING LOG

Project/No. ORMET PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-16 Coded/ Replicate No. _____ Date 7-6-88

Weather Sunny hot 90's Time Sampling Began 1022 Time Sampling Completed 1130

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.75 MP Elevation 662.72

Total Sounded Depth of Well Below MP 83.11 Water-Level Elevation 611.62

Held _____ Depth to Water Below MP 51.10 Diameter of Casing 2"

Wet _____ Water Column in Well 32.01 Gallons Pumped/Bailed Prior to Sampling (15.31) 15.5

Gallons per Foot .16

Gallons in Well 5.12 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown-Black Odor _____ Appearance Stained Temperature 135 °F/(C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 1410 pH 9.65

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J. Campbell, J Naser, J Chrpega, K Souza

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0017

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WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW-17 Coded/ Replicate No. _____ Date 6/30/88

Weather Pt. Cloudy Hi 70's Time Sampling Began 4:25 Time Sampling Completed 4:51

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.18 MP Elevation 655.03

Total Sounded Depth of Well Below MP 77.91 Water-Level Elevation 614.47

Held _____ Depth to Water Below MP 40.56 Diameter of Casing 2"

Wet _____ Water Column in Well 37.35 Gallons Pumped/Bailed Prior to Sampling (17.93) 18.0

Gallons per Foot 0.16

Gallons in Well 5.98 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Lite Brown Odor — Appearance Slightly Cloudy Temperature 14 °F (°C)

Other (specific ion; OVA; HNU; etc.) CN tube taken during filtering = 0

Specific Conductance, umhos/cm 475 pH 7.46

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Dust from ponds blowing intermittently throughout evacuation & sampling

Sampling Personnel T. RATVASKY J. NASER J. CAMPBELL J. Chepega

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0019

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WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL

Site/Well No. MW-19 Coded/ Replicate No. _____ Date 7/1/88

Weather PTLY CLOUDY LOW 70'S Time Sampling Began 14:20 Time Sampling Completed 14:40

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.60 MP Elevation 662.03

Total Sounded Depth of Well Below MP 65.20 Water-Level Elevation 618.45

Held _____ Depth to Water Below MP 43.58 Diameter of Casing 2"

Wet _____ Water Column in Well 21.62 Gallons Pumped/Bailed Prior to Sampling (10.34) 11

Gallons per Foot 0.16

Gallons in Well 3.46 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance V. Silty Temperature 13 °F/°C

Other (specific ion; OVA; HNU; etc.) Cn tube taken during filtering = 0

Specific Conductance, umhos/cm 600 pH 7.28

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Protective cover ABOUT TO BREAK, though not broken NOW

Sampling Personnel T. RATVASKY J. NASER J. CAMPBELL J. Chepega

WELL CASING VOLUMES

GAL./FT	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0020

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WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW-20 Coded/ Replicate No. _____ Date 7/1/88

Weather Ptly cloudy mid 70's Time Sampling Began 11:15 Time Sampling Completed 11:28

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.65 MP Elevation 632.33

Total Sounded Depth of Well Below MP 65.02 Water-Level Elevation 619.94

Held _____ Depth to Water Below MP 12.39 Diameter of Casing 2"

Wet _____ Water Column in Well 52.63 Gallons Pumped/Bailed Prior to Sampling (25.26) 25.5

Gallons per Foot 0.16

Gallons in Well 8.42 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Very Lite Brown Odor ~ Appearance slighty ~~brown~~ cloudy Temperature 15 °F/°C

Other (specific ion; OVA; HNU; etc.) CN tube take = 0

Specific Conductance, umhos/cm 520 pH 6.87

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks _____

Sampling Personnel T. RATVASKY J. NASER J. Chepega J. Campbell

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0021

WATER SAMPLING LOG

Project/No. ORMET PA0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-21S Coded/ Replicate No. _____ Date 6-21-88

Weather Sunny 90 Time Sampling Began 1128 Time Sampling Completed 1155

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 2.10 MP Elevation 664.02

Total Sounded Depth of Well Below MP 76.09 Water-Level Elevation 593.4

Held _____ Depth to Water Below MP 70.62 Diameter of Casing 2"

Wet _____ Water Column in Well 5.47 Gallons Pumped/Bailed Prior to Sampling (2.64) 3

Gallons per Foot 0.16

Gallons in Well 0.88 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor ~ Appearance V. Cloudy Temperature 17 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 850 pH 7.27

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks _____

Sampling Personnel J Naser, J Chepaga, J. Campbell, T. Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0022

WATER SAMPLING LOG

Project/No. PA0738H008 O&MET

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Site Location Hanibal Ohio

Site/Well No. MW-21d

Coded/ Replicate No. M&E 88SG04 S69

Date 6-21-88

Weather Clear & Hot

Time Sampling Began 0830

Time Sampling Completed 1035

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.64

MP Elevation 663.60

Total Sounded Depth of Well Below MP 94.13

Water-Level Elevation 593.39

Held _____ Depth to Water Below MP 70.21

Diameter of Casing 2"

Wet _____ Water Column in Well 23.92

Gallons Pumped/Bailed Prior to Sampling (11.5) 12

Gallons per Foot 0.16

Gallons in Well 3.83

Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon [illegible]

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance V Cloudy Temperature 17.5 °F/°C

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm 860, pH 7.25,

Sampling Method and Material Teflon Bailer - screen

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks

Sampling Personnel JC, JC, JN, TP

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0023

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-22S Coded/ Replicate No. _____ Date 6-22-88

Weather Overcast, Hot Time Sampling Began 8:30 Time Sampling Completed 9:25

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 2.10 MP Elevation 667.47

Total Sounded Depth of Well Below MP 80.24 Water-Level Elevation 593.01

Held _____ Depth to Water Below MP 74.46 Diameter of Casing 2"

Wet _____ Water Column in Well 5.78 Gallons Pumped/Bailed Prior to Sampling (2.0) 4.5

Gallons per Foot 0.16

Gallons in Well 0.92 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor _____ Appearance Silty Temperature 15.5 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 680 pH 7.44

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks Very silty

Sampling Personnel Rotvaday Campbell, Naren Chopega

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0024

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WATER SAMPLING LOG

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Project/No. ORMET PA0738H008 Page 1 of

Site Location Hannibal OHIO

Site/Well No. MW-22d Coded/ Replicate No. MW-46 Date 6-21-88

Weather Hazy 97 Time Sampling Began 1626 Time Sampling Completed 1700

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.74 MP Elevation 667.21

Total Sounded Depth of Well Below MP 95.66 Water-Level Elevation 592.99

Held ____ Depth to Water Below MP 74.22 Diameter of Casing 2"

Wet ____ Water Column in Well 21.44 Gallons Pumped/Bailed Prior to Sampling (10.3) 11

Gallons per Foot 0.16

Gallons in Well 3.43 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance V Cloudy Temperature 16 °F/C

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm 740 pH 7.38

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks Replicate Collected, Labelled MW-46

Sampling Personnel J. Campbell, J Naser, J. Chepaga, T Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0025

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WATER SAMPLING LOG

Project/No. ORMET / PA 0738 H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-23S Coded/ Replicate No. _____ Date 6-21-88

Weather _____ Time Sampling Began _____ Time Sampling Completed _____

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.71 MP Elevation 663.18

Total Sounded Depth of Well Below MP 70.1 Water-Level Elevation 593.78

Held _____ Depth to Water Below MP 69.4 Diameter of Casing 2"

Wet _____ Water Column in Well 0.7 Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot 0.16

Gallons in Well 0.11 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method _____

SAMPLING DATA/FIELD PARAMETERS

Color _____ Odor _____ Appearance _____ Temperature _____ °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm _____ pH _____

Sampling Method and Material _____

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative

Remarks _____

Sampling Personnel well is dry

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0026

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WATER SAMPLING LOG

Project/No. ORMET PA0738H008 Page 1 of 1

Site Location Hannibal OHio

Site/Well No. MW-23d Coded/ Replicate No. _____ Date 6-21-88

Weather Hazy 95° Time Sampling Began 1417 Time Sampling Completed 1520

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 2.26 MP Elevation 663.41

Total Sounded Depth of Well Below MP 85.24 Water-Level Elevation 593.60

Held _____ Depth to Water Below MP 69.81 Diameter of Casing 2"

Wet _____ Water Column in Well 15.43 Gallons Pumped/Bailed Prior to Sampling (7.41) 7.5

Gallons per Foot 0.16

Gallons in Well 2.47 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor ——— Appearance V Cloudy Temperature 16 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 550 pH 7.14

Sampling Method and Material Teflon baile

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks Sample Split w/ Metcalf & Eddy (88JG04570)

Sampling Personnel J. Naser, J Campbell, J. Campbell, T Ratusky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0027

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WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-24d Coded/ Replicate No. _____ Date 6-23-88

Weather Hot, Sunny Time Sampling Began 1620 Time Sampling Completed 1630

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.60 MP Elevation 667.75

Total Sounded Depth of Well Below MP 102.15 Water-Level Elevation 592.24

Held _____ Depth to Water Below MP 75.51 Diameter of Casing 2"

Wet _____ Water Column in Well 26.64 Gallons Pumped/Bailed Prior to Sampling (12.9) 14.5

Gallons per Foot 0.16

Gallons in Well 4.3 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color brown Odor — Appearance Silty Temperature 17 °F/C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 845 pH 7.21

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks Considerable alumina dust in area - contam. source?

Sampling Personnel Ratvasky, Campbell, Chepega, Naser

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0028

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WATER SAMPLING LOG

Project/No. ORMET PA0738H008 Page 1 of 1

Site Location Hanibal OHIO

Site/Well No. MW-25 Coded/ Replicate No. _____ Date 6-22-88

Weather Hazy 90's Time Sampling Began 440 PM Time Sampling Completed 455 PM

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.93 MP Elevation 667.73

Total Sounded Depth of Well Below MP 81.7 Water-Level Elevation 601.40

Held _____ Depth to Water Below MP 66.33 Diameter of Casing 2"

Wet _____ Water Column in Well 15.37 Gallons Pumped/Bailed Prior to Sampling 7.5

Gallons per Foot 0.16

Gallons in Well 2.5 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor _____ Appearance V Cloudy Temperature 22 °F/(C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 520 pH 6.08 (6.40 9:50 [illegible])

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
SHORT LIST - A		

Remarks _____

Sampling Personnel J. Campbell, J Naser, T Ratzvasky J Chepagg

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0029

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WATER SAMPLING LOG

Project/No. ORMET / PA 0738 H008 Page 1 of 1

Site Location Hannibal, OHIO

Site/Well No. MW-26d Coded/ Replicate No. _____ Date 6/24/88

Weather Sunny Mid 70's Time Sampling Began ~~11:50~~ 11:43 Time Sampling Completed 12:02

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 0.04 MP Elevation 665.59

Total Sounded Depth of Well Below MP 94.95 Water-Level Elevation 592.55

Held _____ Depth to Water Below MP 73.04 Diameter of Casing 2"

Wet _____ Water Column in Well 21.91 Gallons Pumped/Bailed Prior to Sampling (10.51)

Gallons per Foot 0.16

Gallons in Well 3.50 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color med brown Odor — Appearance silty (v.cloudy) Temperature 15 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 760 pH 7.35

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Short List		

Remarks _____

Sampling Personnel J. Naser, J. Chepegg, J. Campbell, T. Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0030

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WATER SAMPLING LOG

Project/No. PA0738H008 Ormet

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Site Location Hannibal, OH

Site/Well No. MW-27

Coded/ Replicate No.

Date 6-22-88

Weather Clear, Hot

Time Sampling Began 1440

Time Sampling Completed 1504

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.93

MP Elevation 667.86

Total Sounded Depth of Well Below MP 87.06

Water-Level Elevation 599.95

Held

Depth to Water Below MP 67.91

Diameter of Casing 2"

Wet

Water Column in Well 19.15

Gallons Pumped/Bailed Prior to Sampling (9.3) (10)

Gallons per Foot 0.16

Gallons in Well 3.1

Sampling Pump Intake Setting (feet below land surface) Top of water

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance Cloudy Temperature 30 °F (°C)

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm 1280 pH 6.18 (6.27 6/23/88 8:35)

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M	Preservative
SHORT LIST-A		

Remarks Very silty: sample for filtering collected 1st. (pH re-measured w/correct meter span used)

Sampling Personnel JBN, JRC, JC, TR

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0031

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location Hannibal, OHIO

Site/Well No. MW-28 Coded/ Replicate No. _____ Date 6/28/88

Weather Sunny, mid 70s Time Sampling Began 0930 Time Sampling Completed 1006

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.69 MP Elevation 663.27

Total Sounded Depth of Well Below MP 46.06 Water-Level Elevation 642.01

Held _____ Depth to Water Below MP 21.26 Diameter of Casing 2"

Wet _____ Water Column in Well 24.80 Gallons Pumped/Bailed Prior to Sampling (11.9) 14.0

Gallons per Foot 0.16

Gallons in Well 3.97 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color m. brown Odor — Appearance sl. cloudy Temperature 13 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 665 pH 5.75

Sampling Method and Material teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel Campbell, Naser, Chapega, Ratkasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0032

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Ohion

Site/Well No. MW-295 Coded/ Replicate No. _____ Date 6-27-88

Weather Sunny 80's Time Sampling Began 1655 Time Sampling Completed 1722

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.17 MP Elevation 653.40

Total Sounded Depth of Well Below MP 61.35 Water-Level Elevation 611.56

Held _____ Depth to Water Below MP 41.84 Diameter of Casing 2"

Wet _____ Water Column in Well 19.51 Gallons Pumped/Bailed Prior to Sampling (9.36) 9.5

Gallons per Foot .16

Gallons in Well 3.12 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Lt Brown Odor — Appearance Clear Temperature 16 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance umhos/cm 1090 pH 9.02

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long list		

Remarks _____

Sampling Personnel J. Campbell, J Nuser, J Chepaga, T Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0033

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-29D Coded/ Replicate No. _____ Date 6-27-88

Weather Sunny 80's Time Sampling Began 1557 Time Sampling Completed 1630

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.45 MP Elevation 653.07

Total Sounded Depth of Well Below MP 81.98 Water-Level Elevation 611.59

Held _____ Depth to Water Below MP 41.48 Diameter of Casing 2"

Wet _____ Water Column in Well 40.50 Gallons Pumped/Bailed Prior to Sampling (19.5) 20

Gallons per Foot .16

Gallons in Well 6.5 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color none Odor — Appearance Clear Temperature 15.6 °F(°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 570 pH 8.02

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J Campbell, J Chepega, J Naser, T Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0034

WATER SAMPLING LOG

Project/No. CRMET / PA0738H008 Page 1 of 1

Site Location Hannibal, OHIO

Site/Well No. MW-30 Coded/ Replicate No. _____ Date 6/28/88

Weather Sunny, Mid-70s Time Sampling Began 8:15 AM Time Sampling Completed 8:41 AM

EVACUATION DATA

Description of Measuring Point (MP) top of PVC

Height of MP Above/Below Land Surface 1.47 MP Elevation 667.58

Total Sounded Depth of Well Below MP 60.41 Water-Level Elevation 618.21

Held _____ Depth to Water Below MP 49.37 Diameter of Casing 2"

Wet _____ Water Column in Well 11.04 Gallons Pumped/Bailed Prior to Sampling (5.3) ~~5.5~~ 4.5 well went dry

Gallons per Foot 0.16

Gallons in Well 1.77 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color med brown Odor — Appearance sl. cloudy Temperature 13.5 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 400 pH 6.3

Sampling Method and Material teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Well dewatered, then sampled upon recovery: Possible Cracked Casing

Sampling Personnel J. Niser, T. Retugsky, J. Chepegg, J. Campbell

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0035

WATER SAMPLING LOG

Project/No. ORMET / R0738H08 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-31 Coded/ Replicate No. _____ Date 6/28/88

Weather Sunny, mid-80's Time Sampling Began 11:22 Time Sampling Completed 12:12

EVACUATION DATA

Description of Measuring Point (MP) TOP of PVC

Height of MP Above/Below Land Surface 1.94 MP Elevation 661.59

Total Sounded Depth of Well Below MP 67.51 Water-Level Elevation 612.44

Held _____ Depth to Water Below MP 49.15 Diameter of Casing 2"

Wet _____ Water Column in Well 18.36 Gallons Pumped/Bailed Prior to Sampling (8.81) 9

Gallons per Foot 0.16

Gallons in Well 2.93 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color v. dark brown Odor present Appearance v. cloudy Temperature 5 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 3,500 pH 10.45

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel Rotunsky, Nares, Campbell, Chepega

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0036

WATER SAMPLING LOG

Project/No. ORMET/PA0738H008 Page 1 of 1

Site Location HANNIBAL OH

Site/Well No. MW-32 Coded/ Replicate No. _____ Date 7/5/88

Weather P-cloudy Hot Humid 90's Time Sampling Began 15:19 Time Sampling Completed 15:50

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.83 MP Elevation 656.66

Total Sounded Depth of Well Below MP 57.18 Water-Level Elevation 613.69

Held _____ Depth to Water Below MP 42.97 Diameter of Casing 2"

Wet _____ Water Column in Well 14.21 Gallons Pumped/Bailed Prior to Sampling (6.82) 7.0

Gallons per Foot 0.16

Gallons in Well 2.27 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color TRANSLUCENT BROWN Odor — Appearance Slightly cloudy Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) CN tube during filtering = 0

Specific Conductance, umhos/cm 1040 pH 9.26

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel B. FARGO J. NASER J. CAMPBELL J. CHEPEGA

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0037

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW 33S Coded/ Replicate No. _____ Date 6/30/88

Weather Hi 70°'s PARTLY CLOUDY Time Sampling Began 14:50 Time Sampling Completed 15:17

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.98 MP Elevation 653.24

Total Sounded Depth of Well Below MP 65.15 Water-Level Elevation 616.11

Held _____ Depth to Water Below MP 37.13 Diameter of Casing 2"

Wet _____ Water Column in Well 28.02 Gallons Pumped/Bailed Prior to Sampling (13.45) 13.5

Gallons per Foot 0.16

Gallons in Well 4.48 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Very Lt. brown Odor — Appearance Slighty Silty Temperature 15.5 °F/°C

Other (specific ion; OVA; HNU; etc.) CN tube COMPLETED ON MW 33S during filtering = 0

Specific Conductance, umhos/cm 630 pH 6.77

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Dust from ponds blows intermittantly throughout sampling

Sampling Personnel T. RATUASKY J. NASER J. CAMPBELL J. Chepega

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0038

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW 33 d Coded/ Replicate No. _____ Date 6/30/88

Weather 8:00 AM Cool Low 70°s SUNNY Time Sampling Began 11:00 Time Sampling Completed 11:29

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 2.07 MP Elevation 653.22

Total Sounded Depth of Well Below MP 86.46 Water-Level Elevation 614.62

Held _____ Depth to Water Below MP 38.60 Diameter of Casing 2"

Wet _____ Water Column in Well 47.86 Gallons Pumped/Bailed Prior to Sampling (22.97) 23

Gallons per Foot 0.16

Gallons in Well 7.66 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Very Lt. brown Odor — Appearance clear Temperature 15 °F (°C)

Other (specific ion; OVA; HNU; etc.) CN tube taken during filtering = 0

Specific Conductance, umhos/cm 625 pH 7.02

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Longlist		

Remarks Sheen noticed on surface of evacuation water

Sampling Personnel T. RATVASKY J. NASER J. CHEPEGA J. CAMPBELL

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0039

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW 34 S Coded/ Replicate No. _____ Date 7/5/88

Weather BRIGHT OVERCAST 70's Time Sampling Began 9:58 Time Sampling Completed 10:20

EVACUATION DATA

Description of Measuring Point (MP) TOP of PVC

Height of MP Above/Below Land Surface 1.49 MP Elevation 655.67

Total Sounded Depth of Well Below MP 49.35 Water-Level Elevation 616.27

Held _____ Depth to Water Below MP 39.40 Diameter of Casing 2"

Wet _____ Water Column in Well 9.95 Gallons Pumped/Bailed Prior to Sampling (4.78) 5

Gallons per Foot 0.16

Gallons in Well 1.59 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color BROWN Odor — Appearance OPAQUE Temperature 13.5 °F/°C

Other (specific ion; OVA; HNU; etc.) CN tube during filtering = 0

Specific Conductance, umhos/cm 670 pH 7.21

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks filtering continued after sampling finished

Sampling Personnel J. NASER R. FARGO J. CAMPBELL J. Chepega

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0040

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW 34 D Coded/ Replicate No. _____ Date 7/5/88

Weather BRIGHT OVERCAST 70's Time Sampling Began 10:22 Time Sampling Completed 10:51

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 0.98 MP Elevation 654.67

Total Sounded Depth of Well Below MP 68.24 Water-Level Elevation 616.44

Held _____ Depth to Water Below MP 38.23 Diameter of Casing 2"

Wet _____ Water Column in Well 30.01 Gallons Pumped/Bailed Prior to Sampling (14.4) 14.5

Gallons per Foot 0.16

Gallons in Well 4.80 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color slight Brown Odor — Appearance slightly cloudy Temperature 14° °F (°C)

Other (specific ion; OVA; HNU; etc.) CN tube during filtering = 0

Specific Conductance, umhos/cm 580 pH 7.38

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel R. FARGO J. NASER J. CAMPBELL J. Chepega

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0041

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW-35 Coded/ Replicate No. MW-48 Date 7/5/88

Weather 90's HOT HUMID Time Sampling Began 17:05 Time Sampling Completed 17:52

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.75 MP Elevation 661.90

Total Sounded Depth of Well Below MP 46.70 Water-Level Elevation 625.38

Held _____ Depth to Water Below MP 36.52 Diameter of Casing 2"

Wet _____ Water Column in Well 10.18 Gallons Pumped/Bailed Prior to Sampling (4.89) 5.0

Gallons per Foot 0.16

Gallons in Well 1.63 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color dk brown Odor – Appearance silty Temperature 14° °F/°C

Other (specific ion; OVA; HNU; etc.) CN to be taken during Filtering = 0

Specific Conductance, umhos/cm 6150 pH 10.36

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

End evacuation 16:00 ---- RECHARGE ---- UNTIL 17:05

Remarks Well dewatered during evacuation, Allowed to recharge

Sampling Personnel B. FARGO J. NASER J CAMPBELL J. Chepega

Duplicate Collected: MW-48

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0042

WATER SAMPLING LOG

REPLICATE

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW-48 Coded/ Replicate No. MW-35 Date 7/5/88

Weather HOT 90'S HUMID Time Sampling Began 17:05 Time Sampling Completed 17:52

EVACUATION DATA

Description of Measuring Point (MP) – TOP OF PVC

Height of MP Above/Below Land Surface – 1.75 MP Elevation – 661.90

Total Sounded Depth of Well Below MP 46.70 Water-Level Elevation – 625.38

Held _____ Depth to Water Below MP 36.52 Diameter of Casing – 2"

Wet _____ Water Column in Well 10.18 Gallons Pumped/Bailed Prior to Sampling (4.89) 5.0

Gallons per Foot 0.16

Gallons in Well 1.63 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color _____ Odor _____ Appearance _____ Temperature 14 °F (°C)

Other (specific ion; OVA; HNU; etc.) CN TUBE taken during filtering = 0

Specific Conductance umhos/cm 650 pH 10.36

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

END EVACUATION 16:00 --- RECHARGE --- UNTIL 17:05

Remarks Well DEWATERED DURING EVACUATION, ALLOWED TO RECHARGE

Sampling Personnel B. FARGO J. NASER J. CAMPBELL J. Chepegz

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0043

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WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW 36 Coded/ Replicate No. _____ Date 7/5/88

Weather 80's SUNNY CLOUDY Time Sampling Began 11:42 Time Sampling Completed 12:45

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.76 MP Elevation 655.04

Total Sounded Depth of Well Below MP 52.08 Water-Level Elevation 615.58

Held _____ Depth to Water Below MP 39.46 Diameter of Casing 2"

Wet _____ Water Column in Well 12.62 Gallons Pumped/Bailed Prior to Sampling (6.06) 6.5

Gallons per Foot 0.16

Gallons in Well 2.02 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon BAILER

SAMPLING DATA/FIELD PARAMETERS

Color DK Brown Odor — Appearance OPAQUE Temperature 14.0 °F/°C

Other (specific ion; OVA; HNU; etc.) CN Tube taken DURING FILTERING = 0

Specific Conductance, umhos/cm 1,255 pH 9.64

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel R. FARGO J. NASER J. Chepega J. CAMPBELL

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0044

WATER SAMPLING LOG

Project/No. Dsmet PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-37 Coded/ Replicate No. MW-49 Date 7-6-88

Weather Sunny hot 100° Time Sampling Began 1712 Time Sampling Completed 1800

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.89 MP Elevation 661.14

Total Sounded Depth of Well Below MP 36.98 Water-Level Elevation 643.18

Held _____ Depth to Water Below MP 17.96 Diameter of Casing 2"

Wet _____ Water Column in Well 19.02 Gallons Pumped/Bailed Prior to Sampling 19.12

Gallons per Foot .16

Gallons in Well 3.04 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Black Odor _____ Appearance Silty Stained Temperature 15 °F/(°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 5500 pH 9.80

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks Duplicate Collected - MW-49

Sampling Personnel J Campbell, J Naser, J Chepega, K Souza

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0045

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW 38 Coded/ Replicate No. MW-47 Date 7/1/88

Weather mid 70's CLEAR SUNNY Time Sampling Began 9:30 Time Sampling Completed 10:09

EVACUATION DATA

Description of Measuring Point (MP) TOP OF PVC

Height of MP Above/Below Land Surface 1.73 MP Elevation 666.64

Total Sounded Depth of Well Below MP 35.95 Water-Level Elevation 646.47

Held _____ Depth to Water Below MP 20.17 Diameter of Casing 2"

Wet _____ Water Column in Well 15.78 Gallons Pumped/Bailed Prior to Sampling (7.57) 8.00

Gallons per Foot 0.16

Gallons in Well 2.52 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color BROWN Odor — Appearance OPAQUE Temperature 12.5 °F/°C

Other (specific ion; OVA; HNU; etc.) No CN tube taken during filtration.

Specific Conductance, umhos/cm 265 pH 6.67

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
short list		

Remarks CN tubes with Jimmy, NOT AVAILABLE Duplicate Collected: MW-47

Sampling Personnel T. RATUASKY, J. CAMPBELL J. NASER J. CHEPEGA

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0046

WATER SAMPLING LOG

Project/No. GRMET / PA0738H008 Page 1 of 1

Site Location Hannibal, OH

Site/Well No. MW-39S Coded/ Replicate No. _____ Date 6/28/88

Weather Hot, mid 80s Time Sampling Began 15:30 Time Sampling Completed 15:50

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.97 MP Elevation 657.30

Total Sounded Depth of Well Below MP 60.23 Water-Level Elevation 613.55

Held _____ Depth to Water Below MP 43.75 Diameter of Casing 2"

Wet _____ Water Column in Well 16.48 Gallons Pumped/Bailed Prior to Sampling (7.91) 9.0

Gallons per Foot 0.16

Gallons in Well 2.64 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color lt. brown Odor — Appearance sl. cloudy Temperature 14.3 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 2550 pH 9.12

Sampling Method and Material teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J. Naser, J. Chepega, T. Ratusky, J. Campbell

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0047

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location Hannibal, Ohio

Site/Well No. MW-39 D Coded/ Replicate No. _____ Date 6/28/88

Weather Sunny, mid 80s Time Sampling Began 16:24 Time Sampling Completed 16:48

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.89 MP Elevation 657.18

Total Sounded Depth of Well Below MP 80.21 Water-Level Elevation 613.92

Held _____ Depth to Water Below MP 43.26 Diameter of Casing 2"

Wet _____ Water Column in Well 36.95 Gallons Pumped/Bailed Prior to Sampling (17.7) 18.0

Gallons per Foot 0.16

Gallons in Well 5.9 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color lt. gray Odor — Appearance sl. cloudy Temperature 14.2 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance umhos/cm 595 pH 7.79

Sampling Method and Material teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		chill

Remarks _____

Sampling Personnel J. Naser, J. Chepega, J. Campbell, T. Ratuasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0048

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Oh

Site/Well No. MW-40s Coded/ Replicate No. _____ Date 6/27/88

Weather Hot/Clear Time Sampling Began 11:42 Time Sampling Completed 12:15

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.65 MP Elevation 662.22

Total Sounded Depth of Well Below MP 70.40 Water-Level Elevation 608.57

Held _____ Depth to Water Below MP 53.65 Diameter of Casing 2"

Wet _____ Water Column in Well 16.75 Gallons Pumped/Bailed Prior to Sampling (8.0) 9

Gallons per Foot 0.16

Gallons in Well 2.7 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Med. Brown Odor — Appearance V. Slt. Brown Temperature 14.8 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 2200 pH 9.21

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J Naser, J Campbell, J Chepega, T Patvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRL06-0049

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page ____ of ____

Site Location Hannibal Ohio

Site/Well No. MW-40s Coded/ Replicate No. ____ Date 6-28-88

Weather Hot/Clear Time Sampling Began 1142 Time Sampling Completed 1215

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface ____ MP Elevation ____

Total Sounded Depth of Well Below MP 70.05 (40) Water-Level Elevation ____

Held ____ Depth to Water Below MP 53.65 Diameter of Casing 2"

Wet ____ Water Column in Well 16.40 Gallons Pumped/Bailed Prior to Sampling (7.8) (8.04) 9

Gallons per Foot 0.16

Gallons in Well 2.6 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Med Brown Odor ____ Appearance V Slightly Cloudy Temperature 14.8 °F/°C

Other (specific ion; OVA; HNU; etc.) ____

Specific Conductance, umhos/cm 2200 pH 9.21

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative

Remarks ____

Sampling Personnel J Naser, J Campbell, J Chepega, T Ratusky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. ORMET PA0738H008 Page ____ of ____

Site Location Hannibal Ohio

Site/Well No. MW-40d Coded/ Replicate No. ____ Date 6-27-88

Weather Hot/clear 70's Time Sampling Began 1052 Time Sampling Completed 1133

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface ____ MP Elevation ____

Total Sounded Depth of Well Below MP ~~90.05~~ 90.40 Water-Level Elevation ____

Held ____ Depth to Water Below MP 53.40 Diameter of Casing 2"

Wet ____ Water Column in Well 37.0 Gallons Pumped/Bailed Prior to Sampling (17.8) 18

Gallons per Foot 0.16

Gallons in Well 5.9 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance Cloudy Temperature 14.8 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA-0

HCN-0 HF-0

Specific Conductance, umhos/cm 1290 pH 9.41

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative

Remarks ____

Sampling Personnel J Naser J Chepega, J Campbell, T Ratiasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0051

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page ____ of ____

Site Location Hannibal Ohio

Site/Well No. MW-40d Coded/Replicate No. ____ Date 6-27-88

Weather Hot/clear Time Sampling Began 10:52 Time Sampling Completed 11:33

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.52 MP Elevation 661.95

Total Sounded Depth of Well Below MP 90.40 Water-Level Elevation 608.55

Held ____ Depth to Water Below MP 53.40 Diameter of Casing 2"

Wet ____ Water Column in Well 37.0 Gallons Pumped/Bailed Prior to Sampling (17.8) 18

Gallons per Foot 0.16

Gallons in Well 5.9 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor — Appearance Cloudy Temperature 14.8 °F/°C

Other (specific ion; OVA; HNU; etc.) ____

Specific Conductance, umhos/cm 1290 pH 9.41

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks ____

Sampling Personnel J Naser J Chepega J Campbell T. Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0052

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WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW42S Coded/ Replicate No. _____ Date 6/29/88

Weather CLOUDY 70's Time Sampling Began 1015 Time Sampling Completed 1112

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.33 MP Elevation 654.37

Total Sounded Depth of Well Below MP 52.3 Water-Level Elevation 612.15

Held _____ Depth to Water Below MP 42.22 Diameter of Casing 2"

Wet _____ Water Column in Well 10.08 Gallons Pumped/Bailed Prior to Sampling (4.84) 5.0

Gallons per Foot .16

Gallons in Well 1.61 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color None Odor — Appearance VSL Cloudy/Suspended Brn Particles Temperature 15 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 870 pH 8.43

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J Campbell, J Naser, J. Chepega, T Ratinsky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0053

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WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. MW42 D Coded/ Replicate No. _____ Date 6/29/88

Weather CLOUDY 70's Time Sampling Began 9:05 Time Sampling Completed 9:42

EVACUATION DATA

Description of Measuring Point (MP) TOP of PVC

Height of MP Above/Below Land Surface 1.50 MP Elevation 654.64

Total Sounded Depth of Well Below MP 85.10 Water-Level Elevation 612.52

Held _____ Depth to Water Below MP 42.12 Diameter of Casing 2"

Wet _____ Water Column in Well 42.98 Gallons Pumped/Bailed Prior to Sampling (20.63) 21.0

Gallons per Foot 0.16

Gallons in Well 6.88 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color LT Tan Odor _____ Appearance Slightly Cloudy Temperature 14.5 °F/(°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 600 pH 9.14

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J Campbell, J Naser, J Chepega, T Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0054

WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-435 Coded/ Replicate No. _____ Date 6-29-88

Weather Warm Time Sampling Began 1420 Time Sampling Completed 1500

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.82 MP Elevation 633.68

Total Sounded Depth of Well Below MP 43.68 Water-Level Elevation 611.97

Held _____ Depth to Water Below MP 21.71 Diameter of Casing 2"

Wet _____ Water Column in Well 21.97 Gallons Pumped/Bailed Prior to Sampling (10.54)

Gallons per Foot .16

Gallons in Well 3.51 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color Lt. Brown Odor — Appearance V Cloudy Temperature 15½ °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 520 pH 6.52

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J. Campbell, J Naser, J Chepega, T Ratvosky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0055

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WATER SAMPLING LOG

Project/No. Ormet PA0738H008 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. MW-43D Coded/ Replicate No. _____ Date 6-29-88

Weather Warm Cloudy Time Sampling Began 1150 Time Sampling Completed 1220

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.66 MP Elevation 633.12

Total Sounded Depth of Well Below MP 65.78 Water-Level Elevation 611.97

Held _____ Depth to Water Below MP 21.15 Diameter of Casing 2"

Wet _____ Water Column in Well 44.63 Gallons Pumped/Bailed Prior to Sampling (21.42) 22

Gallons per Foot .16

Gallons in Well 7.14 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color brown Odor _____ Appearance V Cloudy (silty) Temperature 15 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 520 pH 7.40

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Longlist		

Remarks _____

Sampling Personnel J Campbell, J Maser, J Chepega, T Ratusky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTR06-0056

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WATER SAMPLING LOG

Project/No. ORMET / PA 0738H008 Page 1 of 1

Site Location Hannibal, OHIO

Site/Well No. MW-44s Coded/ Replicate No. _____ Date 6/24/88

Weather Sunny, Mid 80's Time Sampling Began 3:00 Time Sampling Completed 3:35 PM

EVACUATION DATA

Description of Measuring Point (MP) top of PVC

Height of MP Above/Below Land Surface 1.32 MP Elevation 662.01

Total Sounded Depth of Well Below MP 69.05 Water-Level Elevation 607.93

Held _____ Depth to Water Below MP 54.08 Diameter of Casing 2"

Wet _____ Water Column in Well 14.97 Gallons Pumped/Bailed Prior to Sampling (7.19) 7.50 gal

Gallons per Foot 0.16

Gallons in Well 2.4 Sampling Pump Intake Setting (feet below land surface) Top of Screen

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color med/lt brown Odor — Appearance mod cloudy Temperature 16 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 649 pH 6.56

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Long List		

Remarks _____

Sampling Personnel J. Naser, T. Ratussky, J. Chepega, J. Campbell

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0057

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WATER SAMPLING LOG

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Site Location Hannibal, OHIO

Site/Well No. MW-44d Coded/ Replicate No. _____ Date 6/24/88

Weather Sunny, mid-80's Time Sampling Began 16:45 Time Sampling Completed _____

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.97 MP Elevation 661.76

Total Sounded Depth of Well Below MP 94.15 Water-Level Elevation 607.08

Held _____ Depth to Water Below MP 54.68 Diameter of Casing 2"

Wet _____ Water Column in Well 39.47 Gallons Pumped/Bailed Prior to Sampling (18.9) 19.00

Gallons per Foot 0.16

Gallons in Well 6.32 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color lt. brown Odor — Appearance sl. cloudy Temperature 16 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 550 pH 7.75

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
Long List		

Remarks _____

Sampling Personnel J. Naser, J. Campbell, J. Chepega, T. Ratvasky

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0067

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WATER SAMPLING LOG

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Site Location HANNIBAL, OHIO

Site/Well No. FB #1 Coded/ Replicate No. _____ Date 6-21-88

Weather _____ Time Sampling Began 1830 Time Sampling Completed _____

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held _____ Depth to Water Below MP — Diameter of Casing —

Wet _____ Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method —

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance CLEAR Temperature 37.5 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 625 pH 8.02

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
SHORT LIST		

Remarks SAMPLING LOG COMPLETED BY R. FARGO ON 7-12 BASED ON LOG BOOK

Sampling Personnel RATVASKY, NASER, CAMPBELL, CHEPEGA

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08- WTRLOG-0068

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WATER SAMPLING LOG

Project/No. ORMET / R0738H08 Page 1 of 1

Site Location HANNIBAL, OHIO

Site/Well No. FB #2 Coded/ Replicate No. _____ Date 6-22-88

Weather SUNNY, HOT Time Sampling Began 1523 Time Sampling Completed 1605

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held _____ Depth to Water Below MP — Diameter of Casing —

Wet _____ Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method —

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor - Appearance CLEAR Temperature 34 °F/(°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 1.0-17.2 pH 7.40

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
SHORT LIST		

Remarks SAMPLING LOG COMPLETED BY R. FARGO ON 7-12 BASED ON LOG BOOK

Sampling Personnel RATVASKY, NASER, CHEPEGA, CAMPBELL

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRL06-0069

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WATER SAMPLING LOG

Project/No. ORMET / R0738H08 Page 1 of 1

Site Location HANNIBAL, O.

Site/Well No. FB #3 Coded/ Replicate No. _____ Date 6-23-88

Weather _____ Time Sampling Began 1710 Time Sampling Completed 1730

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held _____ Depth to Water Below MP — Diameter of Casing —

Wet _____ Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method —

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance CLEAR Temperature 32 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 20 pH 6.91

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONG LIST		

Remarks SAMPLING LOG COMPLETED BY R. FARGO ON 7-12 BASED ON FIELD BOOK

Sampling Personnel RATVASKY, NASER, CHEPEGA, CAMPBELL

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

R0738H08-WTRLOG-0070

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WATER SAMPLING LOG

Project/No. ORMET / R0738H08 Page 1 of 1

Site Location HANNIBAL, OHIO

Site/Well No. FB #4 Coded/ Replicate No. _____ Date 6-24-88

Weather SUNNY 70's-80's Time Sampling Began 1650 Time Sampling Completed _____

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held _____ Depth to Water Below MP — Diameter of Casing —

Wet _____ Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method —

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance CLEAR Temperature 33 °F/(C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 1.2 pH 6.11

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONG LIST		

Remarks SAMPLING LOG COMPLETED BY R. FARGO ON 7-12 BASED ON LOG BOOK

Sampling Personnel RATVASKY, NASER, CHEPEGA, CAMPBELL

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

K0738H00-WTKL06-0071

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WATER SAMPLING LOG

Project/No. ORMET / R0738H08 Page 1 of 1

Site Location HANNIBAL, OHIO

Site/Well No. FB #5 Coded/ Replicate No. _____ Date 6-27-88

Weather _____ Time Sampling Began 1746 Time Sampling Completed 1805

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held _____ Depth to Water Below MP — Diameter of Casing —

Wet _____ Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method —

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance CLEAR Temperature 24 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 1.75 pH 6.00

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONG LIST		

Remarks SAMPLING LOG COMPLETED BY R. FARGO ON 7-12 BASED ON LOG BOOK

Sampling Personnel RATVASKY, NASER, CHEPEGA, CAMPBELL

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

RO 738H08-WTRLOG-0072

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WATER SAMPLING LOG

Project/No. ORMET/RO738H08 Page 1 of 1

Site Location HANNIBAL, OHIO

Site/Well No. FB #7 Coded/Replicate No. _____ Date 6-29-88

Weather WARM/OVERCAST Time Sampling Began 1700 Time Sampling Completed 1730

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held _____ Depth to Water Below MP — Diameter of Casing —

Wet _____ Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method —

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance CLEAR Temperature 29 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 1.3 pH 5.92

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONG LIST		

Remarks SAMPLING LOG COMPLETED BY R. FARGO ON 7-12 BASED ON LOG BOOK

Sampling Personnel RATVASKY, NASER, CHEPEGA, CAMPBELL

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0058

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. FIELD BLANK #8 Coded/ Replicate No. _____ Date 6/30/88

Weather PARTLY CLOUDY Hi 70's Time Sampling Began 14:09 Time Sampling Completed 14:43

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held — Depth to Water Below MP — Diameter of Casing —

Wet — Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method —

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance CLEAR Temperature 26° °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm .78 pH 5.89

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONGLIST		

Remarks _____

Sampling Personnel T. RATVASKY J. NASER J. CAMPBELL J. Chepega

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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R0738H08-WTRLOG-0059

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. FIELD BLANK #9 Coded/ Replicate No. _____ Date 7/1/88

Weather CLOUDY 70's Time Sampling Began 16:20 Time Sampling Completed 16:43

EVACUATION DATA

Description of Measuring Point (MP) —

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP — Water-Level Elevation —

Held — Depth to Water Below MP — Diameter of Casing —

Wet — Water Column in Well — Gallons Pumped/Bailed Prior to Sampling —

Gallons per Foot —

Gallons in Well — Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Teflon Bailer

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor — Appearance clear Temperature 22 °F (°C)

Other (specific ion; OVA; HNU; etc.) NONE TAKEN DURING FILTRATION OF DIST. WATER.

Specific Conductance, umhos/cm 1.35 pH 6.10

Sampling Method and Material Teflon Bailer

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONG LIST		

Remarks FIELD BLANK TAKEN at trailer.

Sampling Personnel T. RATUASKY J. NASER J. Chepega J. CAMPBELL

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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Ground-Water Consultants

R0738H08-WTRLOG-0060

WATER SAMPLING LOG

Project/No. ORMET / PA0738H008 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. ~~MW~~ FIELD BLANK Coded/ Replicate No. _____ Date 5/7/88

Weather Hot 90's Humid Time Sampling Began 16:40 Time Sampling Completed 16:55

EVACUATION DATA

Description of Measuring Point (MP) –

Height of MP Above/Below Land Surface – MP Elevation –

Total Sounded Depth of Well Below MP – Water-Level Elevation –

Held – Depth to Water Below MP – Diameter of Casing –

Wet – Water Column in Well – Gallons Pumped/Bailed Prior to Sampling –

Gallons per Foot –

Gallons in Well – Sampling Pump Intake Setting (feet below land surface) –

Evacuation Method Teflon BAILER

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor – Appearance CLEAR Temperature 22.5 °F/°C

Other (specific ion; OVA; HNU; etc.) NONE TAKEN

Specific Conductance, umhos/cm 1.05 pH 4.97

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
LONGLIST		

Remarks

Sampling Personnel B. FARGO J. NASER J. CAMPBELL J. CHEPEGA

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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Ground-Water Consultants

R0738H08-WTRL06-0061

WATER SAMPLING LOG

Project/No. ORMET / PA0738H088 Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. FIELD BLANK #11 Coded/ Replicate No. _____ Date _____

Weather Hot Humid 99°? Time Sampling Began 13:15 Time Sampling Completed 13:43

EVACUATION DATA

Description of Measuring Point (MP) –

Height of MP Above/Below Land Surface – MP Elevation –

Total Sounded Depth of Well Below MP – Water-Level Elevation –

Held – Depth to Water Below MP – Diameter of Casing –

Wet ✓ Water Column in Well – Gallons Pumped/Bailed Prior to Sampling –

Gallons per Foot –

Gallons in Well – Sampling Pump Intake Setting (feet below land surface) –

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor – Appearance CLEAR Temperature 32 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 9.5 pH 6.80

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab Δ or G&M	Preservative
LONG LIST		

Remarks _____

Sampling Personnel J Campbell, J Maser, J Chepega, K Souza

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

APPENDIX N-2

SAMPLING LOGS FROM THE PHASE II RI GROUND-WATER SAMPLING PROGRAM

ORMET CORPORATION
HANNIBAL, OHIO

K0738H08-WTRLOG-0093

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00 708 Page 9 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-2 Coded/ Replicate No. Date 2/23/90

Weather Rain 40's Time Sampling Began 1190 Time Sampling Completed 1140

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.96 MP Elevation

Total Sounded Depth of Well Below MP 85.23 Water-Level Elevation

Held Depth to Water Below MP 57.46 Diameter of Casing 2"

Wet Water Column in Well 27.77 Gallons Pumped/Bailed Prior to Sampling (13.32)

Gallons per Foot 0.16

Gallons in Well 4.44 Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Brown-Black Odor Appearance V Turbid + Stained Temperature 15 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA-0

water Effervecent

Specific Conductance, umhos/cm 4400 pH 10.34

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
Same as page 1		

Remarks

Sampling Personnel ST, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRLOG-0088

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Environmental Services

WATER SAMPLING LOG

Project/No. PA00708-OTCMWST

Page 4 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-3

Coded/ Replicate No. MW-3D

Date 2/22/90

Weather Overcast 50°

Time Sampling Began 1515

Time Sampling Completed 1600

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 2.11

MP Elevation

Total Sounded Depth of Well Below MP 79.03

Water-Level Elevation

Held

Depth to Water Below MP 29.80

Diameter of Casing 2"

Wet

Water Column in Well 49.23

Gallons Pumped/Bailed Prior to Sampling (23.2) 23.5

Gallons per Foot 0.16

Gallons in Well 7.71

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color none

Odor

Appearance V SL Cloudy

Temperature 17 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA ~~HNU~~ JC -0

Specific Conductance, umhos/cm 680

pH 5.85

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
Same as page 1		

Remarks Duplicated Well

Sampling Personnel ST, JN, JC

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

K0738H08-WTRLOG-0091

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00108-DRMOT

Site Location HANNIBAL, OH

Site/Well No. MW-14

Coded/ Replicate No.

Date 2/23/90

Weather Overcast 40

Time Sampling Began 0845

Time Sampling Completed 0915

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.75

MP Elevation

Total Sounded Depth of Well Below MP 86.90

Water-Level Elevation

Held

Depth to Water Below MP 37.60

Diameter of Casing 2"

Wet

Water Column in Well 49.30

Gallons Pumped/Bailed Prior to Sampling (23.7) 24.5

Gallons per Foot 0.16

Gallons in Well 7.88

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color none Odor Appearance Clear Temperature 15 °F/°C

Other (specific ion; OVA; HNU; etc.) ~~HNU~~ OVA JC -0 Ambient ~~HNU~~ OVA JC -5.5 at well head

Specific Conductance, umhos/cm 560 pH 7.36

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
Same as page 1		

Remarks

Sampling Personnel SF, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

K0738H08-WTRLOG-0089

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Environmental Services

WATER SAMPLING LOG

Project/No. PA 00708 Page 5 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-17 Coded/ Replicate No. _____ Date 2/22/90

Weather overcast 50° Time Sampling Began 1645 Time Sampling Completed 1715

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.18 MP Elevation _____

Total Sounded Depth of Well Below MP 77.91 Water-Level Elevation _____

Held _____ Depth to Water Below MP 37.11 Diameter of Casing 2"

Wet _____ Water Column in Well 40.80 Gallons Pumped/Bailed Prior to Sampling (19.6)

Gallons per Foot 0.16

Gallons in Well 6.52 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Coffee-Brown Odor _____ Appearance Stained + Turbid Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) Sheen on water OVA-0

Sample filtered hard (colloidal)

Specific Conductance, umhos/cm 680 pH 7.55

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab ✓ or G&M ___	Preservative
Same as page 1		

Remarks Performed GW-Field Blank #1 Prior to MW-17

Sampling Personnel ST, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

K0738H08-W7KL06-0044

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA0708-02MET

Site Location HANNIBAL, OH

Site/Well No. MW-18

Coded/ Replicate No.

Date 2/23/90

Weather Overcast

Time Sampling Began 1335

Time Sampling Completed 1410

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.97

MP Elevation

Total Sounded Depth of Well Below MP 60.94

Water-Level Elevation

Held

Depth to Water Below MP 39.46

Diameter of Casing 2"

Wet

Water Column in Well 21.48

Gallons Pumped/Bailed Prior to Sampling (10.3) 10.5

Gallons per Foot 0.16

Gallons in Well 3.4

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Brown Black (Prune Juice) Odor Appearance Stained + V Turbid Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA-0 Sheen on water

Specific Conductance, umhos/cm 11,400 pH 10.10

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
Same as page 1		

Remarks

Sampling Personnel S.T., J.C., J.N.

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

KU138H08-WTRLOG-0085

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Environmental Services

WATER SAMPLING LOG

Project/No. PA00708 Page 1 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-19 Coded/ Replicate No. _____ Date 2/22/90

Weather OVERCAST 40's Windy Time Sampling Began 1115 Time Sampling Completed 1205

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.60 MP Elevation _____

Total Sounded Depth of Well Below MP 65.20 Water-Level Elevation _____

Held _____ Depth to Water Below MP 41.15 Diameter of Casing 2"

Wet _____ Water Column in Well 24.05 Gallons Pumped/Bailed Prior to Sampling (11.5) 12

Gallons per Foot 0.16

Gallons in Well 3.8 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Dark Brown Odor _____ Appearance V Turbid Temperature 12.5 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA-0

Specific Conductance, umhos/cm 560 pH 7.27

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Gen Chem	1 Liter Plastic	Ice
TOC	40 mL Glass	H_2SO_4
Metals	250 mL Plastic	HNO_3 - field filtered
Cn - Total	1 Liter Plastic	NAOH (Prefilter on)
Cn - Anemable	1 Liter Plastic	NAOH

Remarks _____

Sampling Personnel ST, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

KUT50H00-W7KL06-0006

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Environmental Services

WATER SAMPLING LOG

Project/No. PA00708 Page 2 of 13

Site Location Annibal, OH

Site/Well No. MW-23S Coded/ Replicate No. _____ Date 2/22/90

Weather Overcast 40's Slight Rain Time Sampling Began 1355 Time Sampling Completed 1415

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.71 MP Elevation _____

Total Sounded Depth of Well Below MP 70.10 Water-Level Elevation _____

Held _____ Depth to Water Below MP 63.91 Diameter of Casing 2"

Wet _____ Water Column in Well 6.19 Gallons Pumped/Bailed Prior to Sampling (3) 3+

Gallons per Foot 0.16

Gallons in Well .99 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor _____ Appearance V Turbid Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA ~~HNU~~ JC -0

Specific Conductance, umhos/cm 590 pH 7.53

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Same as page 1		

Remarks _____

Sampling Personnel ST. JC. JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRLOG-0087

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Environmental Services

WATER SAMPLING LOG

Project/No. PA00708-ORM-ET

Page 3 of 13

Site Location ~~BA~~ HANNIBAL, OH

Site/Well No. MW-23d

Coded/ Replicate No.

Date 2/20/90

Weather Overcast 40's Light Rain

Time Sampling Began 1425

Time Sampling Completed 1450

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 2.26

MP Elevation

Total Sounded Depth of Well Below MP 85.24

Water-Level Elevation

Held

Depth to Water Below MP 64.55

Diameter of Casing 2"

Wet

Water Column in Well 20.69

Gallons Pumped/Bailed Prior to Sampling (10)

Gallons per Foot 0.16

Gallons in Well 3.31

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor Appearance V Turbid Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA - 0

Specific Conductance, umhos/cm 580 pH 7.33

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
Same as page 1		

Remarks

Sampling Personnel ST, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

RUT38408-W7KL06-0045

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Environmental Services

WATER SAMPLING LOG

Project/No. PA00708-ORMOT

Page 11 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-31

Coded/ Replicate No.

Date 2/23/90

Weather Overcast 40° Rain

Time Sampling Began 1425

Time Sampling Completed 1443

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.94

MP Elevation

Total Sounded Depth of Well Below MP 67.51

Water-Level Elevation

Held ____ Depth to Water Below MP 46.16

Diameter of Casing 2"

Wet ____ Water Column in Well 21.35

Gallons Pumped/Bailed Prior to Sampling (10.3) 10.5

Gallons per Foot 0.16

Gallons in Well 3.41

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Brown-Black (Apple Juice) Odor ____ Appearance V Turbid + Stained Temperature 13 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA -0 Slight Sheen

Specific Conductance, umhos/cm 2,700 pH 9.95

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Same as page 1		

Remarks

Sampling Personnel JC, JN, ST

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRLOG-0092

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00708 - ORIGST

Page 8 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-34S

Coded/ Replicate No. MW-34R

Date 2/23/90

Weather Overcast Sl. Wind 40's

Time Sampling Began 0935

Time Sampling Completed 1003

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.49

MP Elevation

Total Sounded Depth of Well Below MP 49.35

Water-Level Elevation

Held ____ Depth to Water Below MP 36.38

Diameter of Casing 2"

Wet ____ Water Column in Well 12.97

Gallons Pumped/Bailed Prior to Sampling (6.2) 6.5

Gallons per Foot 0.16

Gallons in Well 2.07

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Brown-Black Odor ____ Appearance Stained + Turbid Temperature 13 °F/°C

Other (specific ion; OVA; HNU; etc.) ~~HNU~~ JC OVA -0

3 filters used

Specific Conductance, umhos/cm 740 pH 6.93

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab ☒ or G&M ____	Preservative
Same as page 1		

Remarks

Sampling Personnel S.T. JC. JW

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

G&M Form 12 6-86

Southprint 89-1473

KOT38H08-WTRL06-0046

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00708-02M05T

Page 12 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-35

Coded/ Replicate No.

Date 2/23/90

Weather Rain 48

Time Sampling Began 1500

Time Sampling Completed 1578

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.75

MP Elevation

Total Sounded Depth of Well Below MP 46.76

Water-Level Elevation

Held

Depth to Water Below MP 36.30

Diameter of Casing 2"

Wet

Water Column in Well 10.40

Gallons Pumped/Bailed Prior to Sampling (5) 5

Gallons per Foot 0.16

Gallons in Well 1.66

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor Appearance V Turbid Temperature 15 °F/°C

Other (specific ion; OVA; HNU; etc.) OVA-0

Specific Conductance, umhos/cm 1540 pH 9.70

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M	Preservative
Same as page 1		

Remarks

Sampling Personnel ST, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRL06-0097

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00708-0RM05 Page 13 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-37 Coded/ Replicate No. _____ Date 2/23/90

Weather Rain 40° Time Sampling Began 1540 Time Sampling Completed 1555

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.89 MP Elevation _____

Total Sounded Depth of Well Below MP 36.98 Water-Level Elevation _____

Held _____ Depth to Water Below MP 17.04 Diameter of Casing 2"

Wet _____ Water Column in Well 19.94 Gallons Pumped/Bailed Prior to Sampling (9.6) 10

Gallons per Foot 0.16

Gallons in Well 3.19 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color Black-Brown Odor _____ Appearance V Turbid Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 3100 pH 9.65

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Same as page 1		

Remarks Took GW field Blank #2 after Sampling

Sampling Personnel SR, JC, JW

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

K0738H08-WTRLOG-0090

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00708-ORMET

Page 6 of 13

Site Location HANNIBAL, OH

Site/Well No. MW-42S

Coded/ Replicate No.

Date 2/23/90

Weather Overcast 40°

Time Sampling Began 0802

Time Sampling Completed 0819

EVACUATION DATA

Description of Measuring Point (MP) Top of PVC

Height of MP Above/Below Land Surface 1.33

MP Elevation

Total Sounded Depth of Well Below MP 52.30

Water-Level Elevation

Held

Depth to Water Below MP 39.48

Diameter of Casing 2"

Wet

Water Column in Well 12.82

Gallons Pumped/Bailed Prior to Sampling (6.2) 6.5

Gallons per Foot 0.16

Gallons in Well 2.05

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method TEFLON BAILER

SAMPLING DATA/FIELD PARAMETERS

Color LT Brown Odor Appearance SL. Cloudy Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) ~~HNU~~ OVA 0

Specific Conductance, umhos/cm 2400 pH 8.25

Sampling Method and Material TEFLON BAILER

Constituents Sampled	Container Description From Lab X or G&M	Preservative
Same as page 1		

Remarks

Sampling Personnel Dr. JC, JW

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

G&M Form 12 6-86

Southprint 89-1473

APPENDIX N-3

SAMPLING LOGS FROM THE PHASE II RI CAL AND ORMET RANNEY WELL SAMPLING

ORMET CORPORATION
HANNIBAL, OHIO

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. Ormet PA007208 Page 1 of 2

Site Location Hannibal Ohio

Site/Well No. CAC Ranney Well Coded/ Replicate No. CAC-DUP Date 6-22-90

Weather Rain 80 Time Sampling Began 1200 Time Sampling Completed 1250

EVACUATION DATA

Description of Measuring Point (MP) NA

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method _____

SAMPLING DATA/FIELD PARAMETERS

Color none Odor _____ Appearance Clear Temperature 16 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 440 pH 6.89/6.90/6.90/6.91

Sampling Method and Material Teflon bailer

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative

Remarks Took CAC-FB After Sampling

Sampling Personnel J Campbell B Fargo

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. Ormet PA007708 Page 2 of 2

Site Location Hannibal Ohio

Drinking water Standard

Site/Well No. CAC Ramey Well Coded/ Replicate No. CAC-DUP Date 6-22-90

Weather Rain Time Sampling Began 1315 Time Sampling Completed 1323

EVACUATION DATA

Description of Measuring Point (MP) NA

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method hose from value after Treatment processes

SAMPLING DATA/FIELD PARAMETERS

Color none Odor _____ Appearance Clear Temperature 16 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 470 pH 6.75/6.76/6.78/6.78

Sampling Method and Material hose from value after Treatment processes

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative

1330

Remarks Took CAC-FB After Sampling

Sampling Personnel J Campbell R Fargo

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

K0T58H08-WTKLOG-0101

GERAGHTY & MILLER, INC.
Ground-Water Services

WATER SAMPLING LOG

Project/No. Ormet / PA00708 Page 1 of 1

Site Location Hannibal Ohio

Site/Well No. CAC Coded/ Replicate No. CAC-DUP Date 7-20-90

Weather Sunny 80's Time Sampling Began 1046 Time Sampling Completed 1130

EVACUATION DATA

Description of Measuring Point (MP) NA

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method Dedicated Teflon bailer

SAMPLING DATA/FIELD PARAMETERS

Color none Odor _____ Appearance Clear Temperature NS °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 500 pH 7.37

Sampling Method and Material Dedicated Teflon bailer

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
See Attached Sheet		

Remarks Took CAC-FB after Sampling

Sampling Personnel J Campbell K Lengauer

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Ground-Water Services

WATER SAMPLING LOG

Project/No. Ormet / PA00708 Page 1 of 1

Site Location Hannibal, Ohio

Site/Well No. CAC Coded/ Replicate No. CAC-DUP Date 7-20-90

Weather Overcast 90 Time Sampling Began 1152 Time Sampling Completed 1158

EVACUATION DATA

Description of Measuring Point (MP) NA

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method purged faucet + hose for 40 min

SAMPLING DATA/FIELD PARAMETERS

Color none Odor _____ Appearance Clear Temperature 16.5 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 500 pH 7.27

Sampling Method and Material directly from hose to Sample Containers

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
See Attached Sheet		

Remarks Took CAC FB after Sampling

Sampling Personnel J Campbell K Lengauer

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRLOG-0098

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00708 - ORMET

Page 1 of 1

Site Location HANNIBAL, OH

Site/Well No. ORMET RANNEY WELL

Coded/Replicate No. Ranney Well 1

Date 2/27/90

Weather overcast 40

Time Sampling Began 1212

Time Sampling Completed 1220

EVACUATION DATA

Description of Measuring Point (MP) RANNEY WELL

Height of MP Above/Below Land Surface _____

MP Elevation _____

Total Sounded Depth of Well Below MP _____

Water-Level Elevation _____

Held _____ Depth to Water Below MP _____

Diameter of Casing _____

Wet _____ Water Column in Well _____

Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____

Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method Open Valve on Ranney well

SAMPLING DATA/FIELD PARAMETERS

Color none Odor _____ Appearance clear Temperature 17 °F/°C

Other (specific ion; OVA; HNU; etc.) Pump Rate 1640 gpm

Specific Conductance, umhos/cm 590 pH 7.22

Sampling Method and Material Hose/valve into sample containers

Constituents Sampled	Container Description From Lab ✓ or G&M ____	Preservative
TOC / Gen Chem	40mL Glass / 1 Liter Plastic	H_2SO_4 / ice
metals	250mL Plastic	HNO_3 (.45 micron filter)
CN-Total / CN Amenable	1 Liter Plastic / 1 Liter Plastic	NAOH / NAOH

Remarks Dup. Well

Sampling Personnel S.J.C.W

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

APPENDIX N-4

SAMPLING LOGS FROM THE PHASE II RI
OHIO RIVER SURFACE-WATER SAMPLING PROGRAM

ORMET CORPORATION
HANNIBAL, OHIO

R0738H08-WTRL06-0080

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00708 - OPWEF

Page 3 of 5

Site Location HANNIBAL, OH

Site/Well No. SW-1

Coded/ Replicate No. SW-11

Date 2/21/90

Weather Sunny 40's

Time Sampling Began 1030

Time Sampling Completed 1125

EVACUATION DATA

Description of Measuring Point (MP) SURFACE WATER SAMPLE

Height of MP Above/Below Land Surface _____

MP Elevation _____

Total Sounded Depth of Well Below MP _____

Water-Level Elevation _____

Held _____ Depth to Water Below MP _____

Diameter of Casing _____

Wet _____ Water Column in Well _____

Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____

Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method N/A

SAMPLING DATA/FIELD PARAMETERS

Color V Lt Tan Odor _____ Appearance V Sl. Cloudy Temperature 7 °F (°C)

Other (specific ion; OVA; HNU; etc.) Trouble with Sediment in bailer

Specific Conductance, umhos/cm 260 pH 7.43

Sampling Method and Material TEFLON Bailer

Constituents Sampled	Container Description From Lab ✓ or G&M ____	Preservative
CN-Amenable	1000 ml plastic	NAOH
CN-TOTAL	1000 ml plastic	NAOH
METALS-unfiltered	1000 ml plastic	HNO3
METALS-Filtered	1000 ml plastic	HNO3
NH3	1000 ml plastic	H2SO4
VOCs	40 ml glass vial	HCl
TOC	40 ml glass vial	H2SO4
PHL	40 ml glass vial	4°C
GEN CHEM	1000 ml plastic	4°C
BNA	1000 ml brown glass	4°C
CLP PEST./PCB	1000 ml brown glass	4°C

Remarks Duplicated Well

Sampling Personnel ST, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRLOG-0081

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PACO 708 - ORMET

Page 1 of 5

Site Location HANNIBAL, OH

Site/Well No. SW-4

Coded/ Replicate No.

Date 2/21/90

Weather Sunny 30°

Time Sampling Began 0837

Time Sampling Completed 0902

EVACUATION DATA

Description of Measuring Point (MP) SURFACE WATER SAMPLE (Ohio River)

Height of MP Above/Below Land Surface

MP Elevation

Total Sounded Depth of Well Below MP

Water-Level Elevation

Held

Depth to Water Below MP

Diameter of Casing

Wet

Water Column in Well

Gallons Pumped/Bailed Prior to Sampling

Gallons per Foot

Gallons in Well

Sampling Pump Intake Setting (feet below land surface)

Evacuation Method N/A

SAMPLING DATA/FIELD PARAMETERS

Color V LT Brown Odor Appearance Floating Debris Temperature 5 °F (°C)

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm 280 pH 7.43

Sampling Method and Material TEFLON BAILER with polypropelene Rope

Constituents Sampled	Container Description From Lab ✓ or G&M	Preservative
Same as page 3		

Remarks Sheen (film) on River at Sampling Location

Sampling Personnel ST, JC, VN, RF

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRLOG-0082

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA007008 Page 2 of 5

Site Location Hannibal, OH

Site/Well No. SW-5 Coded/ Replicate No. _____ Date 8/21/90

Weather Sunny 30° Time Sampling Began 09:30 Time Sampling Completed 10:00

EVACUATION DATA

Description of Measuring Point (MP) SURFACE WATER SAMPLE (outflow meets River)

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method N/A

SAMPLING DATA/FIELD PARAMETERS

Color LT Coffee Odor _____ Appearance Stained Temperature 17 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

2 filters used To filter Sol. Metals Color does not filter out

Specific Conductance, umhos/cm 1100 pH 8.56

Sampling Method and Material ~~[illegible]~~ Beaker

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
Same as page 3		

Remarks Sheen on Water at sampling Location

Sampling Personnel ST, JC, JN, RF

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

R0738H08-WTRL06-0083

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. PA00708-QRMET

Page 4 of 5

Site Location HANNIBAL, OH

Site/Well No. SW-9

Coded/ Replicate No. _____

Date 2/21/90

Weather Sunny 40's

Time Sampling Began 1220

Time Sampling Completed 1240

EVACUATION DATA

Description of Measuring Point (MP) SURFACE WATER SAMPLE (Ohio River)

Height of MP Above/Below Land Surface _____

MP Elevation _____

Total Sounded Depth of Well Below MP _____

Water-Level Elevation _____

Held _____ Depth to Water Below MP _____

Diameter of Casing _____

Wet _____ Water Column in Well _____

Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____

Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method N/A

SAMPLING DATA/FIELD PARAMETERS

Color Lt. Brown Odor _____ Appearance Cloudy + Stained Temperature 11 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 490 pH 8.04

Sampling Method and Material [redacted] Beaker directly to Sample Contain

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
Same as page 3		

Remarks Color doesn't filter out : Sheen, Scum + Floating Garbage At Sampling Location

Sampling Personnel ST, JC, JN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

APPENDIX O

AIR MONITORING PROGRAM REPORT
AND SUBSEQUENT ADDENDA
PREPARED BY ENERGY AND ENVIRONMENTAL MANAGEMENT, INC.

ORMET CORPORATION
HANNIBAL, OHIO

APPENDIX O-1	**April 1989 Air Monitoring Program Report**
APPENDIX O-2	**October 1989 Addendum to the April 1989 Monitoring Report**
APPENDIX O-3	**December 1989 Addendum to the April 1989 Air Monitoring Report**

APPENDIX O-1

APRIL 1989 AIR MONITORING PROGRAM REPORT

ORMET CORPORATION
HANNIBAL, OHIO

PHASE II
OF
SITE INVESTIGATION DESCRIPTION
SECTION 2.8 AIR MONITORING
(SOW TASK 3-H)

FOR

ORMET CORPORATION
HANNIBAL, OHIO

April, 1989

Energy & Environmental Management, Inc.
Post Office Box 71, Murrysville, PA 15668

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APPENDIX A CALIBRATION AND AUDIT REPORTS FOR ORMET PM-10 NETWORK

APPENDIX A.1 INITIAL CALIBRATION OF ORMET PM-10 MONITORS

APPENDIX A.2 FIRST QUARTERLY AUDIT OF ORMET PM-10 MONITORING NETWORK

APPENDIX A.3 SECOND QUARTERLY AUDIT OF ORMET PM-10 MONITORING NETWORK

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APPENDIX A.5 FINAL CALIBRATION OF ORMET PM-10 MONITORS

APPENDIX B QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES FOR ORMET PM-10 MONITORING NETWORK

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APPENDIX D HOURLY METEOROLOGICAL DATA DURING SAMPLING PERIODS

APPENDIX E DAILY RAINFALL, MORNING AND AFTERNOON AIR TEMPERATURE RECORDED AT HANNIBAL LOCK BY THE U.S. ARMY CORPS OF ENGINEERS

1.0 INTRODUCTION

Ormet Corporation contracted Energy & Environmental Management, Inc. (E^2M) to conduct an Air Monitoring Program in accordance with Section 2.8 of the Phase I Work Plan Remedial Investigation for their Hannibal, Ohio facility. The Program was designed to measure the amount of respirable dust being emitted from the suspected source areas. In accordance with Section 3.6.7, particulate matter less than 10 microns in aerometric diameter is considered "respirable dust" for purposes of this study. It was agreed with EPA that respirable dust will be defined as particulate matter with an aerometric diameter less than 10 microns (PM_{10}). This report presents results of the 10-month monitoring program.

The Ormet facility is located in Hannibal, Ohio, across the Ohio River from New Martinsville, West Virginia. An area map is shown as Figure 1. The area listed as "settling pond" on Figure 1 is the approximate location of the suspected source areas.

2.0 STUDY PLAN

This section presents background data on the study plan. Site selection is discussed related to meteorological data.

As identified in the Site Investigation Description prepared by Geraghty & Miller, Inc., the prevailing wind direction is from the southwest. From a review of Figure 1, it is apparent that the prevailing wind passes over a major portion of the Ormet facility before reaching the suspected source areas. Any ducted emissions, process fugitive emissions and open dust fugitive emissions from the manufacturing portions of the plant will be carried into this area. Because of this factor, the particulate monitors were located in an attempt to differentiate the plant generated particulate from the wind erosion particulates from the suspected source areas.

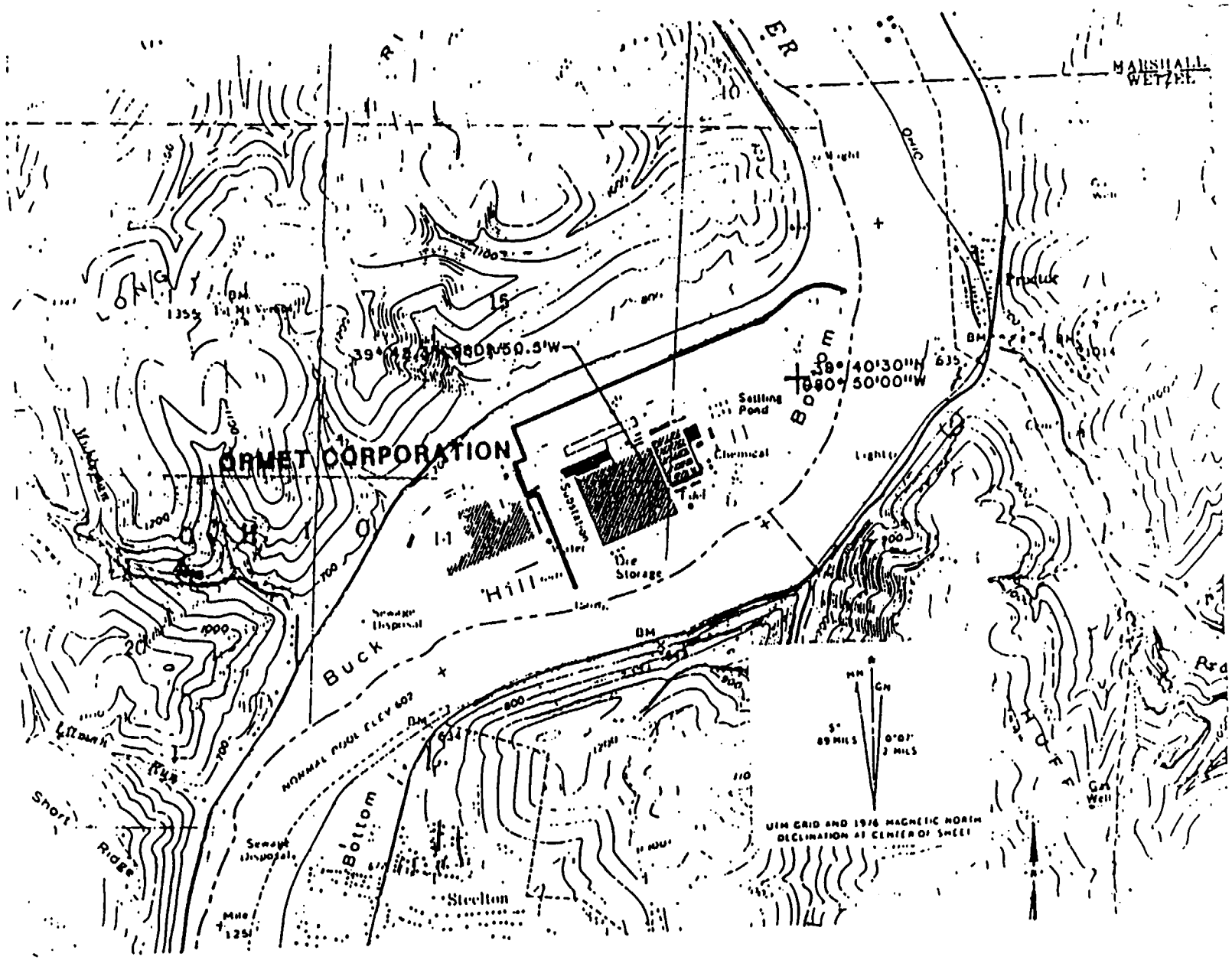


Figure 1. Location of Ormet Facility

2.1 REVIEW OF METEOROLOGICAL DATA

Ormet maintains a wind speed and direction recording system at their facility. The wind sensor is located in the "substation" section shown in Figure 1. A declination value of 5 degrees West is shown in Figure 1 for magnetic north from true north. The U.S. Geological Survey estimates the current declination at 6 degrees 44 minutes west.

Strip chart records for a 12 month period (May, 1986 through April, 1987) were analyzed for average hourly wind speed and direction. That data was sorted into ranges of wind direction and speed to present the distributional pattern of the wind vector. Results of that analysis are tabulated in Table 1. A visual inspection of Table 1 reveals the dominance of the southwest winds at the site from May, 1986 through December, 1986. A noticeable shift occurs, beginning in January, 1987, where winds from the northeast become the dominant wind direction. The frequency distribution for the entire 12 month data set is presented in Table 2.

The dominance of southwest and northeast winds near the facility indicates the winds follow the river for a majority of the time. A seasonal pattern is noticeable:

- summer winds tend to originate from the southwest, and

- winter winds normally originate from the northwest, but because of the orientation of the river at this site, follow the river valley and impact the site from the northeast.

The winds from the west, southwest and northeast directions comprised a total of approximately 73% of the year. Air quality monitors aligned on a southwest to northeast line through the old disposal ponds and former pot liner storage area would measure emissions from these suspected source areas for almost

TABLE 1

WIND ROSE BY MONTH AS PERCENT BY DIRECTION AND SPEED FOR MAY 1986 THROUGH APRIL 1987 AT ORMET FACILITY*

	May 1986						June 1986						July 1986					
	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20
North	0.6	3.9	0.1	-	-	-	1.7	2.0	-	-	-	-	0.8	2.3	0.3	-	-	-
Northeast	5.7	8.1	0.9	0.4	-	-	6.4	7.2	-	-	-	-	1.8	4.3	0.3	-	-	-
East	0.7	-	-	-	-	-	0.9	-	-	-	-	-	1.8	1.5	-	-	-	-
Southeast	0.4	0.9	-	-	-	-	0.1	-	-	-	-	-	0.8	0.1	-	-	-	-
South	6.4	3.1	0.1	-	-	-	2.3	2.3	1.4	-	-	-	1.8	1.8	0.6	0.1	-	-
Southwest	18.6	11.8	4.3	1.9	-	-	19.4	15.9	6.4	-	-	-	5.8	28.1	4.4	0.1	-	-
West	12.7	10.6	0.9	0.1	-	-	21.1	4.2	-	-	-	-	9.0	15.8	2.9	0.3	-	-
Northwest	2.5	3.0	1.6	0.1	-	-	4.5	4.0	-	-	-	-	6.6	6.6	1.7	-	-	-

	August 1986						September 1986						October 1986					
	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20
North	1.8	4.5	0.3	-	-	-	1.3	3.6	0.7	-	-	-	1.3	2.3	-	-	-	-
Northeast	5.5	11.8	3.1	-	-	-	1.6	5.9	1.3	-	-	-	3.0	8.4	1.0	-	-	-
East	3.9	4.9	0.1	-	-	-	0.9	1.7	0.3	-	-	-	1.1	0.4	-	-	-	-
Southeast	2.5	2.1	0.1	-	-	-	1.4	1.7	-	-	-	-	0.9	-	-	-	-	-
South	2.1	1.3	0.6	-	-	-	1.4	2.3	0.1	-	-	-	1.4	3.5	2.0	0.4	-	-
Southwest	4.0	14.5	6.3	1.5	-	-	3.9	19.1	13.3	5.0	1.0	-	10.1	22.2	7.7	1.1	0.1	-
West	6.7	7.8	1.5	0.1	-	-	8.3	14.6	0.3	0.7	-	-	8.7	11.6	2.2	0.7	-	-
Northwest	4.9	6.0	0.9	0.1	-	-	4.0	4.4	1.3	0.7	-	-	4.2	4.8	0.6	-	-	-

* Values in each table are percent of time within each month. Wind speed ranges are in miles per hour.

TABLE 1 (Continued)*

	November 1986						December 1986						January 1987					
	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20
North	1.5	4.6	0.6	-	-	-	0.7	0.3	-	-	-	-	1.4	4.6	0.8	-	-	-
Northeast	2.2	9.1	1.8	-	-	-	3.0	5.5	0.9	-	-	-	2.4	9.9	2.4	0.1	-	-
East	2.2	1.1	-	-	-	-	1.9	0.3	-	-	-	-	0.7	0.8	-	-	-	-
Southeast	1.8	-	-	-	-	-	0.7	-	-	-	-	-	0.4	0.4	-	-	-	-
South	1.3	2.8	0.4	-	-	-	2.3	1.6	2.1	-	-	-	1.6	5.2	2.9	0.3	-	-
Southwest	12.8	13.2	4.2	0.4	-	-	14.9	12.8	6.2	0.9	-	-	7.5	23.9	10.5	3.5	0.3	-
West	12.4	10.7	2.6	0.1	-	-	18.3	8.5	3.6	0.1	-	-	5.0	9.6	1.8	0.3	-	-
Northwest	4.9	7.5	1.7	-	-	-	11.0	3.6	0.7	-	-	-	1.9	2.2	1.0	-	-	-

	February 1987						March 1987						April 1987					
	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	>20
North	0.9	3.5	1.5	-	-	-	0.1	10.7	2.1	-	-	-	0.8	9.2	0.8	-	-	-
Northeast	1.1	19.6	12.0	0.1	-	-	1.3	16.0	6.7	0.4	-	-	1.3	17.4	9.5	0.1	-	-
East	1.1	2.1	0.2	-	-	-	1.3	1.7	-	-	-	-	0.7	2.3	-	-	-	-
Southeast	0.3	0.9	-	-	-	-	0.3	1.5	0.1	-	-	-	0.6	1.1	-	-	-	-
South	0.4	2.6	-	-	-	-	2.2	2.5	0.6	-	-	-	2.3	2.3	0.1	-	-	-
Southwest	5.5	8.5	4.1	1.1	-	-	10.7	11.7	2.6	1.7	0.7	-	6.4	11.9	4.5	2.1	1.0	0.1
West	6.8	12.2	1.9	0.8	-	-	5.6	3.8	1.9	1.5	0.3	-	5.5	6.8	2.1	0.4	-	-
Northwest	1.1	8.4	2.9	0.4	-	-	0.4	7.9	2.4	0.3	-	-	2.0	7.8	2.0	0.1	-	-

* Values in each table are percent of time within each month. Wind speed ranges are in miles per hour.

TABLE 2

FREQUENCY DISTRIBUTION OF WIND SPEED BY WIND DIRECTION
AT ORMET FACILITY FROM MAY 1986 THROUGH APRIL 1987

	% Occurrence by Wind Speed (MPH)						
Direction*	0-4	5-8	9-12	13-16	17-20	>20	Total
North	1.2	4.4	0.6	-	-	-	6.2
Northeast	2.9	10.2	3.4	0.1	-	-	16.6
East	1.4	1.4	<0.1	-	-	-	2.8
Southeast	0.9	0.7	<0.1	-	-	-	1.6
South	2.1	2.5	0.9	0.1	-	-	5.6
Southwest	9.9	16.1	6.2	1.7	0.3	<0.1	34.2
West	9.9	9.7	1.8	0.4	<0.1	-	21.8
Northwest	4.0	5.5	1.4	0.1	<0.1	-	11.0
Total	32.3	50.5	14.3	2.4	0.3	<0.1	100.0

* Direction from which the wind is blowing

three-quarters of the study. Monitors to the northeast would measure effects when winds were from the southwest. Monitors to the southwest would measure effects when winds were from the northeast. For most of the ten month study, if a monitor did not measure background concentrations, it monitored the influence of the suspect source areas.

2.2 SITE SELECTION

A total of four sites was recommended. The location of the four sites is presented in Figure 2. Site AM-1 (Air Monitor No. 1) was located near the northwest corner of the tennis courts which are near the northeast extent of the suspect source areas. Site AM-2 was located on the levee near the eastern extent of pond No. 5. Site AM-3 was located approximately 150 feet south of the fenceline corner south of pond No. 1. Site AM-4 was located on the southeast corner of the roof of the construction material storage shed located north of pond No. 2.

Site AM-3 and AM-4 acted as background in a majority of the cases due to the southwest winds. AM-4 was expected to be impacted by process fugitive and open dust fugitive emissions to a greater extent than AM-3. Site AM-2 was positioned to also pick up westerly and southwesterly effects.

3.0 RESULTS OF THE MONITORING PROGRAM

E^2M conducted the 10 month program resulting in a total of 49 samples from each site. Calibration and audit reports are presented in Appendix A. Our operations and quality assurance program used during this program is presented in Appendix B. A listing of the filter data is presented in Appendix C. A listing of the hourly meteorological data is provided in Appendix D. Daily rainfall, morning air temperature and afternoon air temperature as recorded at the Hannibal Lock is presented in Appendix E.

TABLE 5

PM_{10} ARITHMETIC MEAN DIFFERENCE AT EACH SITE BASED ON WIND DIRECTION

Site		Wind Direction Arc (Deg)		All Data					Persistence ≥70%				
				PM-10 (μg/m³)				PM-10* AMD	PM-10 (μg/m³)				PM-10* AMD
Measurement	Background	Beginning	End	AM-1	AM-2	AM-3	AM-4	(μg/m³)	AM-1	AM-2	AM-3	AM-4	(μg/m³)
AM-1	AM-2	143	180	--	--	--	--	--	--	--	--	--	--
	AM-3	180	210	60.5	59.7	63.1	67.0	-2.6	--	--	--	--	--
	AM-4	210	242	46.6	50.6	55.5	107.4	-60.8	48.9	54.7	56.9	119.6	-70.7
AM-2	AM-3	210	243	45.9	50.0	55.3	105.8	-5.3	47.8	53.7	56.5	116.9	-2.8
	AM-4	243	262	45.9	44.4	62.8	68.8	-18.4	46.6	45.9	65.4	72.0	-26.1
	AM-1	262	290	18.7	19.3	34.5	40.2	0.6	12.7	13.6	34.5	40.9	0.9
AM-3	AM-4	347	7	--	--	--	--	--	--	--	--	--	--
	AM-1	7	40	31.9	28.8	37.3	38.8	5.4	30.5	29.4	37.1	36.5	6.6
	AM-2	40	68	45.1	41.8	43.2	54.7	1.4	47.4	43.8	45.2	58.8	1.4
AM-4	AM-1	14	56	40.6	37.3	43.0	48.4	7.8	43.3	38.9	46.9	52.8	9.5
	AM-2	56	110	49.2	48.9	30.0	62.7	13.8	49.2	48.9	30.0	62.7	13.8
	AM-3	110	195	60.5	59.7	63.1	67.0	3.9	--	--	--	--	--

* AMD is Arithmetic Mean Difference and is determined by subtracting background site from measurement site within wind direction arcs.

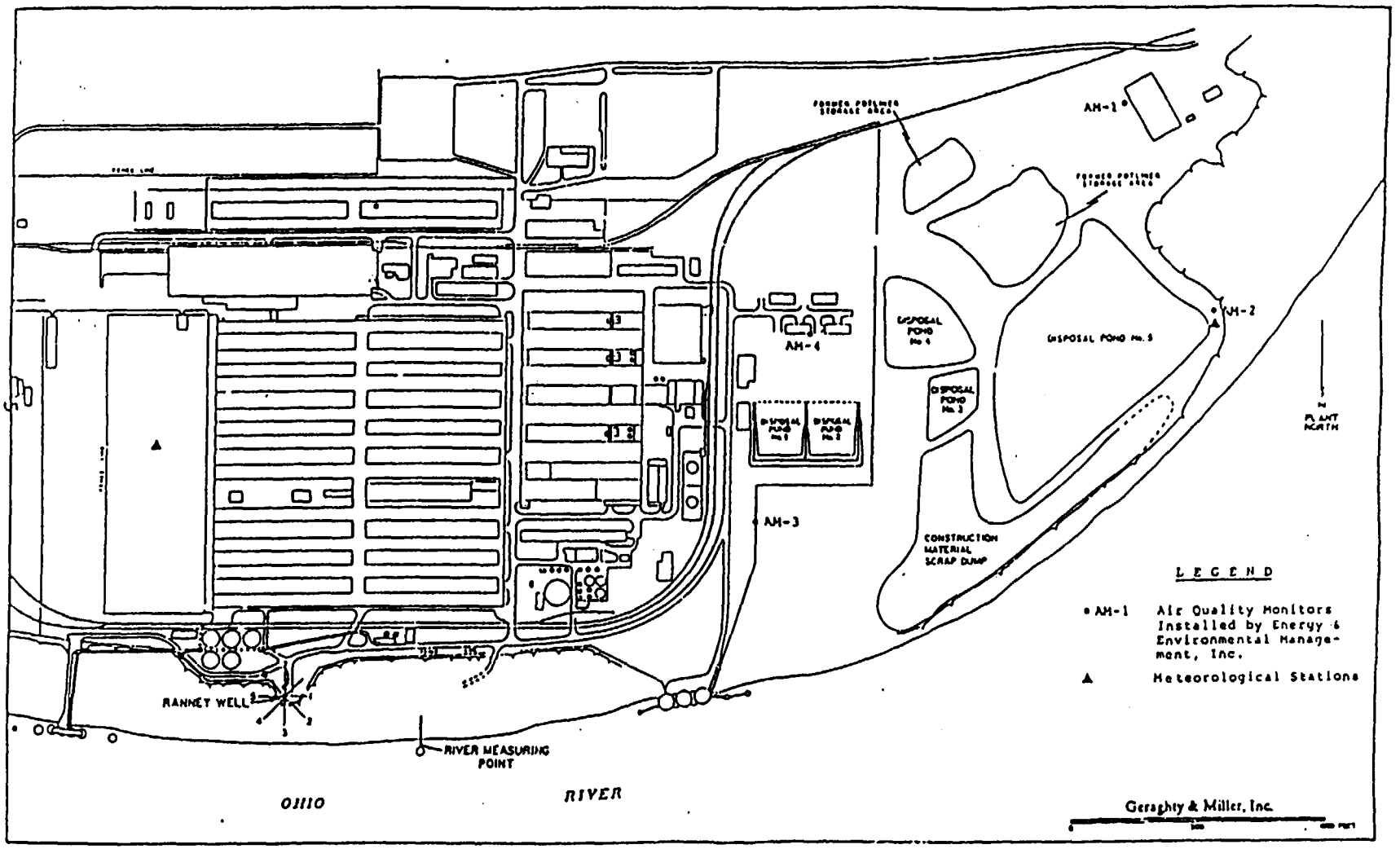


Figure 2. Recommended Locations of Air Quality Monitors at Ormet Facility.

E^2M trained Ormet personnel to replace the filters from the Hi-Vol samplers every six days. These filters were folded and placed in a pre-addressed and stamped envelope and shipped to Hazen Research in Golden, Colorado for weighing.

E^2M installed a wind speed and direction recorder at Site AM-2 at an elevation of approximately 3 meters. This data served as a backup to the Ormet equipment.

Data collected during the program are listed in Table 3. For the days that the monitors were running, daily average wind speed and direction data are also listed in Table 3. Wind speed is presented as a scalar average and as a vector average. Persistence measures how consistent the wind was blowing in a single direction; at higher persistence values, the wind is blowing in one general direction all day. Wind direction is developed from vector addition. Rainfall measured at the Hannibal Lock by the U.S. Army Corps of Engineers is also listed in Table 3.

4.0 DISCUSSION OF THE RESULTS

Summary statistics of PM_{10} data are presented in Table 4. Mean PM_{10} values were highest at AM-4. This finding was expected since AM-4 is located near several emission points within the facility. Measured mean values were significantly different at AM-4 from those values at AM-1 through AM-3.

The arithmetic mean difference of emissions of respirable dust from the suspected source areas can be estimated by using the data in Table 3. The influence of the suspected source area at each site was determined by comparing the mean values under various wind directions. For example, effects from the suspected source areas at site AM-1 are determined by subtracting AM-3 values from AM-1 values when the wind direction that day fell between 180 and 210 degrees. Each site can be treated jointly

TABLE 3

LISTING OF PM_{10} DATA FROM ORMET MONITORING PROGRAM

Sample Date	PM_10 (ug/m³) AM-1	AM-2	AM-3	AM-4	Wind Speed (mph) Scalar	Vector	Direction (Deg)	Persist (%)	Rain (in)
03/05/88	36.0	void	34.6	44.9	4.68	3.19	34.48	68.31	--
03/11/88	23.2	20.8	29.4	38.3	4.16	2.18	235.68	52.49	--
03/17/88	13.5	14.1	58.2	35.2	4.64	3.47	274.47	74.84	0.02
03/23/88	76.0	142.0	77.5	207.4	7.03	6.69	234.36	95.17	--
04/10/88	30.5	29.4	37.1	36.5	6.80	6.55	39.57	96.34	--
04/16/88	21.1	29.4	57.1	72.1	7.30	6.47	252.62	88.63	--
04/22/88	22.2	20.0	22.0	27.1	5.77	5.14	51.34	89.00	--
04/28/88	30.3	31.8	void	104.3	8.00	7.42	240.40	92.77	0.15
05/04/88	30.3	27.8	void	69.4	5.72	4.37	48.52	76.39	0.16
05/10/88	30.4	38.3	49.9	71.0	6.19	5.29	242.01	85.50	0.10
05/15/88	60.5	59.7	63.1	67.0	4.96	1.50	180.49	30.19	0.11
05/21/88	34.0	35.3	37.7	39.1	4.47	3.40	229.15	75.90	--
05/27/88	30.6	32.2	36.9	41.2	3.53	3.16	236.27	89.42	--
06/02/88	29.3	28.2	40.3	35.1	4.27	1.19	7.39	27.95	0.21
06/08/88	62.4	57.4	69.7	63.1	4.28	0.70	315.57	16.34	--
06/14/88	52.5	51.4	53.9	65.6	3.31	2.88	250.97	87.01	--
06/20/88	74.9	75.5	86.3	104.7	4.84	4.49	241.47	92.64	--
06/26/88	34.4	30.7	60.4	38.4	5.71	3.72	2.71	65.18	--
07/02/88	42.2	37.2	52.2	52.8	3.23	1.53	253.76	47.25	--
07/08/88	100.3	98.9	108.2	107.3	5.14	4.20	53.78	81.73	--
07/14/88	60.3	57.5	59.2	162.6	6.02	5.69	216.66	94.40	--
07/20/88	30.0	21.0	42.1	38.3	4.47	2.55	212.15	56.99	1.27
07/26/88	47.1	44.6	52.5	63.6	3.79	2.30	220.88	60.76	--
08/02/88	59.5	59.5	78.1	66.4	3.67	1.69	240.60	45.97	--
08/07/88	29.8	30.2	46.5	38.2	3.73	2.85	257.73	76.24	--
08/13/88	98.7	98.6	104.2	115.1	3.29	2.70	251.92	81.95	--
08/19/88	31.3	29.3	35.6	29.9	4.68	2.73	50.45	58.32	0.88
08/25/88	59.4	42.7	42.5	140.4	6.50	6.10	227.27	93.92	--
08/31/88	31.3	29.8	30.0	37.1	5.22	4.88	60.77	93.48	--
09/06/88	23.1	20.0	55.2	31.0	3.53	2.09	308.48	59.37	--
09/12/88	36.9	44.4	53.7	122.5	3.56	2.32	231.98	65.15	0.12
09/18/88	40.3	37.2	37.0	50.6	3.62	3.38	214.31	93.34	--
09/24/88	33.3	18.6	20.4	23.8	4.84	4.36	54.06	90.01	0.18
09/30/88	43.5	40.1	64.3	69.9	4.06	3.70	233.04	91.30	--
10/06/88	30.8	30.8	void	38.9	3.18	1.48	289.62	46.62	--
10/12/88	11.8	13.0	10.7	46.5	5.10	4.35	278.37	85.39	--
10/18/88	30.7	19.8	void	69.0	6.88	5.09	252.40	73.99	1.10
10/24/88	133.2	168.1	49.3	58.5	7.87	7.20	233.60	91.40	0.30
10/30/88	23.7	24.4	39.8	49.8	4.03	2.54	346.46	63.06	--
11/05/88	41.4	25.4	109.9	184.8	7.11	6.00	210.76	84.37	1.07
11/11/88	18.7	19.5	51.3	33.8	3.95	2.49	290.98	63.12	--
11/17/88	27.6	36.1	78.4	134.8	6.88	6.57	238.67	95.46	--
11/23/88	67.1	67.9	void	88.2	4.80	3.78	60.10	78.65	--
11/29/88	26.7	25.3	34.5	106.7	5.73	5.30	225.65	92.46	--
12/05/88	void	47.9	42.1	308.0	6.19	5.75	224.19	92.76	--
12/11/88	22.0	18.8	53.9	23.4	4.10	3.47	307.39	84.55	--
12/17/88	29.6	23.9	68.4	98.1	5.79	5.13	237.30	88.52	--
12/23/88	42.6	void	48.0	174.8	6.82	6.52	230.86	95.68	0.48
12/29/88	31.7	void	38.3	47.1	4.45	3.93	235.35	88.30	--

TABLE 4

SUMMARY STATISTICS OF PM_{10} DATA
FROM ORMET MONITORING NETWORK

	PM_10 (ug/m^3)			
Parameter	AM-1	AM-2	AM-3	AM-4
Mean	41.598	42.489	52.736	76.986
Std Dev	23.855	31.222	21.917	56.106
Kurtosis	4.221	6.761	.971	5.190
Skewness	1.892	2.447	.897	2.034
Range	121.400	155.100	99.200	284.600
Variance	569.053	974.831	480.363	3147.915
Standard Error				
Mean	3.443	4.603	3.304	8.015
Kurt	.674	.688	.702	.668
Skew	.343	.350	.357	.340
Sum	1996.700	1954.500	2320.400	3772.300
Number	48	46	44	49
Frequency(%)				
0.00	11.8	13.0	10.7	23.4
5.00	15.8	15.7	20.8	25.5
10.00	21.9	19.3	29.7	31.0
15.00	23.1	20.0	34.6	35.2
20.00	26.1	20.9	36.9	37.1
25.00	29.4	24.3	37.3	38.3
30.00	29.9	25.6	39.1	38.9
35.00	30.3	28.7	41.7	43.1
40.00	30.6	29.4	42.5	47.1
45.00	30.8	30.3	48.3	51.7
50.00	31.5	31.3	50.6	63.1
55.00	34.0	34.8	52.4	66.0
60.00	36.4	37.2	53.9	69.0
65.00	41.2	39.3	55.7	70.5
70.00	42.9	44.2	58.7	88.2
75.00	51.2	48.8	62.4	104.5
80.00	59.7	57.5	68.4	107.3
85.00	61.7	59.7	77.7	128.7
90.00	75.0	82.4	82.4	162.6
95.00	99.6	126.9	107.2	196.1
100.00	133.2	168.1	109.9	308.0

with each other site as a function of wind speed. Results of that analysis are presented in Table 5 for each monitoring site. Table 5 presents the wind direction arc for each set of affected and background sites. The analysis processed all data and then selected data for wind persistence at or above 70%. The influence of the suspected source areas at each site is listed as PM_{10}. Effect is determined by subtracting Site Background from Site Effect. The process and fugitive emissions from the main plant are clearly seen to affect the analysis by yielding very high background values at AM-4. If we ignore all cases where AM-4 is used as a background site, then we find the following arithmetic mean differences:

	PM_{10} Arithmetic Mean Difference ($\mu g/m^3$)	
	All Data	Persistence ≥70%
AM-1	-2.6	--
AM-2	-2.4	-1.0
AM-3	3.4	4.0
AM-4	8.5	11.7
Average	1.7	4.9

Arithmetic mean difference listed as "All Data" represents the effect attributable to the suspected source areas.

5.0 CONCLUSION

Respirable dust emissions from the suspected source areas result in an estimated average increase in the arithmetic mean PM_{10} of 1.7 $\mu g/m^3$. Daily values can go higher.

APPENDIX A

CALIBRATION AND AUDIT REPORTS FOR ORMET PM-10 NETWORK

APPENDIX A.1

INITIAL CALIBRATION OF ORMET PM-10 MONITORS

"-VOL CALIBRATION / AUDIT FORM

STATION NAME ORMET
STATION NO. TSP / PM-10
MOTOR NO.
I.D. NO. EEM-4
Technician
ORFICE NO. E-38

DATE 2-23-80 Time
BAROMETRIC PRESS. 774 mm Hg
AMBIENT TEMP. 8 °C+273= 281 °K
CORRECTION FACTOR (CF) = 1.081
where
$CF = \frac{\text{baro. press.}}{760} \times \frac{298}{\text{amb. temp.}\ ^{\circ}K}$

% DEV. @ Setpoint ± %
Operating Setpoint 35.4 FOR 40CFM
Adjustment Made ? YES / NO
$y = 0.405x + 19.23$
WHERE: $y = Q_{MEAS}$, $x = Q_{STD}$
CORR. COEF. = 0.9990

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.0	1.05	2.05	1.49	32.73	33.78	32.5	
45/55	1.4	1.5	2.9	1.77	38.82	36.37	35.0	
35/40	1.65	1.75	3.4	1.91	41.87	37.41	36.0	
ADJ.	2.0	2.1	4.1	2.10	46.0	39.49	38.0	
50/60	2.35	2.5	4.85	2.29	50.14	41.05	39.5	
45/50								
40/45								
35/40								

-VOL CALIBRATION / AUDIT FORM

STAT NAME ORMET

STATION NO. TSP / PM-10

MOTOR NO.

I.D. NO. EEM-3

Technician KS

ORFICE NO. F-38

DATE 2-23-8 Time

BAROMETRIC PRESS. 774 mm Hg

AMBIENT TEMP. 8 °C+273=281 °K

CORRECTION FACTOR (CF) = 1.081

where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}^{\circ}K}$

% DEV. @ Setpoint ±

Operating Setpoint 31.5 FOR 40CFM

Adjustment Made ? YES / NO

$y = 0.741 x + 1.84$

WHERE $y = Q_{MEAS}$, $X = Q_{STD}$.

CORR. COEF. = 0.9976

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.6	1.45	3.05	1.82	39.91	33.26	32.0	
45/55	1.2	1.3	2.5	1.64	35.99	29.62	28.5	
35/40	1.0	1.1	2.1	1.51	33.16	27.02	26.0	
ADJ.	2.0	2.1	4.1	2.10	46.0	37.41	36.0	
50/60	2.5	2.7	5.2	2.37	51.88	41.57	40.0	
45/50								
40/45								
35/40								

"-VOL CALIBRATION / AUDIT FORM

STATION NAME ORMET
STATION NO. TSP / PM-10
MOTOR NO.
I.D. NO. EEVM-2
Technician
ORFICE NO. E-38

DATE 2-23-2 Time
BAROMETRIC PRESS. 774 mm Hg
AMBIENT TEMP. 8 °C+273= 281 °K
CORRECTION FACTOR (CF) = 1.081
where $CF = \frac{\text{baro. press.}}{760} \times \frac{298}{\text{amb. temp. °K}}$

% DEV. @ Setpoint ±
Operating Setpoint 28.3 FOR 40CFM
Adjustment Made ? YES / NO
$y = 0.497x + 8.38$
WHERE $y = Q_{MEAS.}$, $X = SCFM$
CORR. COEF. = 0.9935

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	0.9	0.9	1.8	1.39	30.64	24.4	23.5	
45/55	1.4	1.45	2.85	1.75	38.39	29.10	28.0	
35/40	1.6	1.6	3.2	1.86	40.78	29.62	28.5	
ADJ.	2.0	2.0	4.0	2.08	45.57	32.94	30.5	
50/60	2.4	2.4	4.8	2.28	49.92	34.81	33.5	
45/50								
40/45								
35/40								

(VOL CALIBRATION ~~/ AUDIT FORM~~ (

STATE NAME ORMET

STATION NO. TSP (PM-10)

MOTOR NO.

I.D. NO. EEM-1

Technician KB

ORFICE NO. E-38

DATE 2-23-81 Time

BAROMETRIC PRESS. 774 mm Hg

AMBIENT TEMP. 8 °C+273= 281 °K

CORRECTION FACTOR (CF) = 1.081

where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}^{\circ}K}$

% DEV. @ Setpoint ± %

Operating Setpoint 37.3 (CFM)

CORR. COEF. = .9978

$y = 0.888x + 1.79$

WHERE: y = Q_{MEAS}, x = SCFM

SET AT 37.3 FOR 40 SCFM

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	(B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.0	1.0	2.0	1.47	32.27	31.18	30.0	
45/55	1.3	1.35	2.65	1.69	37.08	36.37	35.0	
35/40	1.55	1.55	3.10	1.83	40.13	39.49	38.0	
ADJ.	2.0	2.0	4.0	2.08	45.57	43.65	42.0	
50/60	2.4	2.4	4.8	2.28	49.92	47.81	46.0	
45/50								
40/45								
35/40								

APPENDIX A-2

FIRST QUARTERLY AUDIT OF ORMET PM-10 MONITORING NETWORK

HI-VOL ~~CALIBRATION~~ / AUDIT FOR

STATION NAME ORMET
STATION NO. AM-1 TSP / PM-10
MOTOR NO. ANDERSEN 1200
I.D. NO. 368-87
Technician [illegible]
ORFICE NO. 12A

DATE 5-6-[illegible] Time
BAROMETRIC PRESS. 748 mm Hg
AMBIENT TEMP. 20 °C+273= 293 °K
CORRECTION FACTOR (CF) = 1.001
where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}^{\circ}K}$

% DEV. @ Setpoint ±6.[illegible] %
Operating Setpoint 38 FOR 40CFM
Adjustment Made ? YES / NO
Weather :
Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.5	1.55	3.05	1.75	37.25		36.0	
45/55	1.7	1.8	3.5	1.88	39.91		38.0	
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

1-VOL CALIBRATION / AUDIT FORM

STAT. NAME ORMET

STATION NO. AM-2 TSP / PM-10

MOTOR NO. ANDERSEN 1200

I.D. NO.

Technician

ORFICE NO. 124

DATE 5-6-8_ Time

BAROMETRIC PRESS. 748 mm Hg

AMBIENT TEMP. 20 °C+273= 293 °K

CORRECTION FACTOR (CF) = 1.001

where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}\ ^{\circ}K}$

% DEV. @ Setpoint ±3.3

Operating Setpoint 28.5 (CFM) CHART

Adjustment Made ? YES / NO

Weather :

Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.6	1.7	3.3	1.82	38.68		28.0	
45/55	1.7	1.8	3.5	1.88	39.91		28.5	
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

I-VOL ~~CALIBRATION /~~ AUDIT FORM

STATION NAME ORMET
STATION NO. AM-3 TSP / PM-10
MOTOR NO. ANDERSEN 1200
I.D. NO. 365-87
Technician JS
ORFICE NO. 124

DATE 5-6-86 Time
BAROMETRIC PRESS. 748 mm Hg
AMBIENT TEMP. 17.2°C+273= 290°K
CORRECTION FACTOR (CF) = 1.011
where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}^{\circ}K}$

% DEV. @ Setpoint ±2.8 %
Operating Setpoint 36.0 (CFM) ON CHART
Adjustment Made ? YES / NO
Weather :
Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.6	1.7	3.3	1.83	38.88		35.0	
45/55	1.8	1.7	3.5	1.88	39.91		36.0	
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

HI-VOL CALIBRATION / AUDIT FORM

STATE NAME ORMET
STATION NO. A211-4 TSP / PM-10
MOTOR NO. ANDERSEN 1200
I.D. NO. 376-87
Technician KS
ORIFICE NO. 124

DATE 5-6-92 Time
BAROMETRIC PRESS. 748 mm Hg
AMBIENT TEMP. 17.2 °C+273= 290.2 °K
CORRECTION FACTOR (CF) = 1.011
where $CF = \frac{\text{baro. press.}}{760} \times \frac{298}{\text{amb. temp.}\ ^{\circ}K}$

% DEV. @ Setpoint ±2.0
Operating Setpoint 35.0 (CFM) CHART
Adjustment Made ? YES / NO
Weather :
Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.3	1.4	2.7	1.65	35.22		32.0	
45/55	1.7	1.8	3.5	1.88	39.91		35.0	
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

APPENDIX A-3

SECOND QUARTERLY AUDIT OR ORMET PM-10 MONITORING NETWORK

...-VOL CALIB ON / AUDIT FORM

STATION NAME Am-1
STATION NO. ORMET TSP PM-10
MOTOR NO. EEM-5
I.D. NO. 368-87
Technician K. Schmidt
ORIFICE NO. E-39

DATE 8-30-88 Time
BAROMETRIC PRESS. 757 mm Hg
AMBIENT TEMP. 23 °C+273= 296 °K
CORRECTION FACTOR (CF) = 1.003
where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}\ ^{\circ}K}$

% DEV. @ Setpoint ± %
Operating Setpoint 38 (CFM)
Adjustment Made ? YES / NO
Weather :
Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.65	1.7	3.35	1.83	40.08		37.5	
45/55								
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

Hi-VOL CALIBRATION / AUDIT FORM

STATION NAME AM-2

STATION NO. ORMET TSP / PM-10

MOTOR NO. FEM-6

I.D. NO. 366-87

Technician K. Schmidt

ORIFICE NO. E-39

DATE 8-30-88 Time

BAROMETRIC PRESS. 747 mm Hg

AMBIENT TEMP. 23 °C+273= 296 °K

CORRECTION FACTOR (CF) = 1.003

where $CF = \frac{\text{baro. press.}}{760} \times \frac{298}{\text{amb. temp.}\ ^{\circ}K}$

% DEV. @ Setpoint ± %

Operating Setpoint (CFM)

Adjustment Made ? YES / NO

Weather :

Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.7	1.8	3.5	1.87	40.94		28.5	
45/55								
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

HI-VOL CALIBRATION AUDIT FORM

STATION NAME ANI-3
STATION NO. CRMET TSP / PM-10
MOTOR NO. EEM-2
I.D. NO. 365-87
Technician K. Schmidt
OFFICE NO. E-39

DATE 8-30-88 Time _____
BAROMETRIC PRESS. 757 mm Hg
AMBIENT TEMP. 27 °C+273= 296 °K
CORRECTION FACTOR (CF) = 1.003
where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}^{\circ}K}$

% DEV. @ Setpoint ± %
Operating Setpoint (CFM)
Adjustment Made ? YES / NO
Weather :
Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.7	1.8	3.5	1.87	40.94		36.0	
45/55								
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

VOL CALIBRATION / AUDIT FORM

STATION NAME AM-4

STATION NO. ORNET TSP / PM-10

MOTOR NO. EDM-3

I.D. NO. 367-87

Technician KSchmidt

ORIFICE NO. E-39

DATE 3-30-Ex Time

BAROMETRIC PRESS. 757 mm Hg

AMBIENT TEMP. 23 °C+273=296 °K

CORRECTION FACTOR (CF) = 1.003

where $CF = \frac{\text{baro. press.}}{760} \times \frac{298}{\text{amb. temp.}}$ °K

% DEV. @ Setpoint ± %

Operating Setpoint (CFM)

Adjustment Made ? YES NO

Weather :

Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	% DEV. $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
Oper. Set-Point	1.7	1.7	3.4	1.85	40.51		35.0	
45/55								
35/40								
ADJ.								
50/60								
45/50								
40/45								
35/40								

APPENDIX A-4

THIRD QUARTERLY AUDIT OF ORMET PM-10 MONITORING NETWORK

Energy & Environmental Management, Inc.
Post Office Box 71, Murrysville, PA 15668 (412) 247-5124

PROFILER CALIBRATION WORKSHEET

Site Name: CRMST Barometer Type: _____ S/N: _____

Site Location: AM 1

Technician: DMT Thermometer Type: _____ S/N: _____

Date: 12/4/78 Transfer Standard Type: ORIFICE / PLATES S/N: 25-A

Temperature (T_2): 40 / 277.4 Barometric Pressure (P_2): 24.78 IN / 756.4

SAMPLER DATA

Sampler Type: _____ Sampler I.D. No.: _____

Flow controller S/N: _____ Pressure Recorder S/N: _____

Rotameter S/N: _____

CALIBRATION DATA (Flow Controller Connected)

	ΔH pressure drop across orifice (in. Water)	$1.034 \sqrt{\Delta H \left(\frac{P_2 \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298 \text{ °K}}{T_2 \text{ °K}}\right)}$	Q standard from orifice certification (std. cfm)	I flow rate indication (cfm)	I flow rate indication (2 filters added)
Initial	5.0	2.27	40.	3.3	38
Final	5.0	2.27	40 40.3	3.3	38

CALIBRATION DATA (Flow Controller Disconnected)

Plate Number	ΔH pressure drop across orifice (in. Water)	$1.034 \sqrt{\Delta H \left(\frac{P_2 \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298 \text{°K}}{T_2 \text{ °K}}\right)}$	(X)* Q standard from orifice certification (std. cfm)	I sampler flow rate indication (cfm)	(Y)* $\sqrt{I \left(\frac{P_2 \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298\text{°K}}{T_2 \text{ °K}}\right)}$
1. C	9.3	3.1	53 54.1	5.8	
2. 18	7.0	2.7	47 47.7	4.8	
3. 13	6.4	2.6	45 45.6	4.2	
4. 10	5.2	2.3	40.5 41.2	3.8	
5. 7	3.6	1.9	33.5 34.3	2.4	
6. 5	2.4	1.6	27.5 28.0	1.8	

* Plot X versus Y on reverse side of this form.

Comments: _____

Equations: °C = 5/9(°F − 32); °K = °C + 273; m³ = Ft³/35.31

Energy & Environmental Management, Inc.
Post Office Box 71, Murrysville, PA 15668 (412) 247-5124

PROFILER CALIBRATION WORKSHEET

Site Name: ORMET Barometer Type: _____ S/N: _____

Site Location: AM 2

Technician: DMH Thermometer Type: _____ S/N: _____

Date: 12/4/88 Transfer Standard Type: ORIFICE PLATES S/N: 25A

Temperature (T_a): 40/ 277.4 Barometric Pressure (P_a): 29.78in/ 752.4

SAMPLER DATA

Sampler Type: _____ Sampler I.D. No.: _____

Flow controller S/N: _____ Pressure Recorder S/N: _____

Rotameter S/N: _____

CALIBRATION DATA (Flow Controller Connected)

	ΔH pressure drop across orifice (in. Water)	$\sqrt{\Delta H\left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298\ °K}{T_a\ °K}\right)}$	Q standard from orifice certification (std. cfm)	I flow rate indication (cfm)	I flow rate indication (2 filters added)
Initial	5.2	2.3	41.2		29
Final	5.0	2.27	40.2		29

CALIBRATION DATA (Flow Controller Disconnected)

Plate Number	ΔH pressure drop across orifice (in. Water)	$\sqrt{\Delta H\left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298°K}{T_a\ °K}\right)}$	(X)* Q standard from orifice certification (std. cfm)	I sampler flow rate indication (cfm)	(Y)* $\sqrt{I\left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298°K}{T_a\ °K}\right)}$
1. 0	9.0	3.1	53 54.1	5.0	
2. 18	6.6	2.6	45.5 46.5	4.4	
3. 13	5.8	2.4	42.5 42.7	3.9	
4. 10	4.6	2.2	39 38.7	3.2	
5. 7	3.4	1.9	32.5 33.3	2.2	
6. 5	2.2	1.5	26.5 26.9	1.4	

* Plot X versus Y on reverse side of this form.

Comments: _____

Equations: °C = 5/9(°F − 32); °K = °C + 273; m^3 = Ft^3/35.31

Energy & Environmental Management, Inc.
Post Office Box 71, Murrysville, PA 15668 (412) 247-5124

PROFILER CALIBRATION WORKSHEET

Site Name: ORMET Barometer Type: _____ S/N: _____

Site Location: AM3

Technician: DMH Thermometer Type: _____ S/N: _____

Date: 12/4/88 Transfer Standard Type: ORIFICE / PLATES S/N: 25A

Temperature (T_a): 40 / 277.4 Barometric Pressure (P_a): 29.78 in / 756.4

SAMPLER DATA

Sampler Type: _____ Sampler I.D. No.: _____

Flow controller S/N: _____ Pressure Recorder S/N: _____

Rotameter S/N: _____

CALIBRATION DATA (Flow Controller Connected)

	ΔH pressure drop across orifice (in. Water)	$1.034 \sqrt{\Delta H \left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298\ ^\circ K}{T_a\ ^\circ K}\right)}$	Q standard from orifice certification (std. cfm)	I flow rate indication (cfm)	I flow rate indication (2 filters added)
Initial	5.2	2.32	40.5 41.2	3.4	36
Final	5.0	2.27	40. 40.3	3.8	36

CALIBRATION DATA (Flow Controller Disconnected)

Plate Number	ΔH pressure drop across orifice (in. Water)	$1.034 \sqrt{\Delta H \left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298^\circ K}{T_a\ ^\circ K}\right)}$	(X)* Q standard from orifice certification (std. cfm)	I sampler flow rate indication (cfm)	(Y)* $\sqrt{I \left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298^\circ K}{T_a\ ^\circ K}\right)}$
1. 0	9.4	3.1	54 55.3	6.6	
2. 18	7.6	2.8	49 49.7	5.4	
3. 13	6.6	2.6	45.5 46.3	4.6	
4. 10	5.6	2.4	42 42.7	4.0	
5. 7	4.0	2.0	35 36.1	2.8	
6. 5	2.6	1.6	28.5 29.2	2.0	

* Plot X versus Y on reverse side of this form.

Comments: _____

Equations: °C = 5/9(°F − 32); °K = °C + 273; m³ = Ft³/35.31

Energy & Environmental Management, Inc.
Post Office Box 71, Murrysville, PA 15668 (412) 247 5124

PROFILER CALIBRATION WORKSHEET

Site Name: ORMET Barometer Type: _____ S/N: _____

Site Location: AM 4

Technician: DMA Thermometer Type: _____ S/N: _____

Date: 12/4/80 Transfer Standard Type: ORIFICE / PLATES S/N: 25A

Temperature (T_a): 40° / 277.4 Barometric Pressure (P_a): 29.78 in / 756.4

SAMPLER DATA

Sampler Type: _____ Sampler I.D. No.: _____

Flow controller S/N: _____ Pressure Recorder S/N: _____

Rotameter S/N: _____

CALIBRATION DATA (Flow Controller Connected)

	ΔH pressure drop across orifice (in. Water)	$1.034 \sqrt{\Delta H \left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298\ °K}{T_a\ °K}\right)}$	Q standard from orifice certification (std. cfm)	I flow rate indication (cfm)	I flow rate indication (2 filters added)
Initial	3.8	1.98	35 35.2	2.6	32.5
Final	5.0	2.27	40 40.3	3.6	36

CALIBRATION DATA (Flow Controller Disconnected)

Plate Number	ΔH pressure drop across orifice (in. Water)	$1.034 \sqrt{\Delta H \left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298°K}{T_a\ °K}\right)}$	(X)* Q standard from orifice certification (std. cfm)	I sampler flow rate indication (cfm)	(Y)* $\sqrt{I \left(\frac{P_a \text{ mmHg}}{760 \text{ mmHg}}\right)\left(\frac{298°K}{T_a\ °K}\right)}$
1. 0	7.9	2.8	49.5 50.3	5.2	
2. 18	6.4	2.6	45 45.6	4.6	
3. 13	5.8	2.4	42.5 43.5	4.0	
4. 10	4.8	2.2	39 39.6	3.4	
5. 7	3.4	1.9	33.5 33.3	2.4	
6. 5	2.2	1.5	26.5 26.9	1.6	

* Plot X versus Y on reverse side of this form.

Comments: _____

Equations: °C = 5/9(°F − 32); °K = °C + 273; m³ = Ft³/35.31

APPENDIX A-5

FINAL CALIBRATION OF ORMET PM-10 MONITORS

-VOL CALIBRATION / AUDIT FORM

STATION NAME ORMET

STATION NO. AM-1 TSP / PM-10

EGM-5

I.D. NO. 1200 368-87

Technician [illegible]

ORIFICE NO. E38

DATE 1-19-5, Time

BAROMETRIC PRESS. 747 mm Hg

AMBIENT TEMP. 7 °C+273=280 °K

CORRECTION FACTOR (CF) = 1.046

where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}^{\circ}K}$

% DEV. @ Setpoint ±

Operating Setpoint 40 (CFM)

Adjustment Made ? YES / NO

Weather :

Comments:

NEAR TENNIS COURTS

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	[redacted]
Oper. Set-Point	2.3	2.4	4.7	2.22	49.07	48.07	47.0	
45/55	1.95	2.1	4.05	2.06	45.50	44.50	43.5	
35/40	1.55	1.75	3.3	1.86	41.03	40.91	40.0	
ADJ.	1.15	1.4	2.55	1.63	35.89	36.82	36.0	
50/60	0.8	1.0	1.8	1.37	30.13	31.20	30.5	
45/50								
40/45								
35/40								

HI VOL CALIBRATION / AUDIT FORM

STATION NAME ORMET

STATION NO. AM-2 TSP (PM-10)

EDM-6

I.D. NO.

Technician

ORIFICE NO. 638

DATE 1-10-5 Time

BAROMETRIC PRESS. 747 mm Hg

AMBIENT TEMP. 7 °C+273= 280 °K

CORRECTION FACTOR (CF) = 1.046

where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}\ ^{\circ}K}$

% DEV. @ Setpoint ±

Operating Setpoint 40 (CFM)

Adjustment Made ? YES (NO)

Weather :

Comments: MOTOR BRUSHES BURNT/REPLACED BEFORE CAL.

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	[redacted]
Oper. Set-Point	2.55	2.55	5.1	2.31	51.08	34.26	33.5	
45/55	2.3	2.3	4.6	2.19	48.40	32.73	32.0	
35/40	2.0	2.0	4.0	2.05	45.27	30.68	30.0	
ADJ.	1.6	1.65	3.25	1.94	40.58	28.64	28.0	
50/60	1.35	1.4	2.75	1.70	37.45	26.08	25.5	
45/50	1.0	1.05	2.05	1.46	32.09	24.04	23.5	
40/45								
35/40								

-VOL CALIBRATION / AUDIT FORM

STATION NAME ORMET

STATION NO. 411-3 TSP / PM-10

EDM 2

I.D. NO.

Technician 18

ORIFICE NO. E-38

DATE 1-19-81 Time

BAROMETRIC PRESS. 747 mm Hg

AMBIENT TEMP. 7 °C+273= 280 °K

CORRECTION FACTOR (CF) = 1.046

where $CF = \frac{\text{baro. press.}}{760} \times \frac{298}{\text{amb. temp.}^{\circ}K}$

% DEV. @ Setpoint ±

Operating Setpoint 40 (CFM)

Adjustment Made ? YES / NO

Weather :

Comments:

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	[redacted]
Oper. Set-Point	2.7	2.6	5.3	2.36	52.20	49.09	48.0	
45/55	2.1	2.3	4.4	2.15	47.51	48.07	47.0	
35/40	1.6	1.8	3.4	1.89	41.70	45.51	44.5	
ADJ.	1.0	1.15	2.15	1.50	32.99	41.42	40.5	
50/60	1.25	1.4	2.65	1.67	36.78	42.96	42.0	
45/50								
40/45								
35/40								

F VOL CALIBRATION / AUDIT FORM

STATION NAME CRMET

STATION NO. 4111-4 TSP / PM-10

1-E111-3

I.D. NO. 1200 367-87

Technician [illegible]

ORFICE NO. E-38

DATE 1-19-89 Time _____

BAROMETRIC PRESS. 747 mm Hg

AMBIENT TEMP. 7 °C+273= 280 °K

CORRECTION FACTOR (CF) = 1.046

where $CF = \frac{\text{baro. press.}}{760} \times \frac{298}{\text{amb. temp.}^{\circ}K}$

% DEV. @ Setpoint ±

Operating Setpoint 40 (CFM)

Adjustment Made ? YES / (NO)

Weather :

Comments:

ON SHED ROOF

CAL. POINT PM-10 TSP	MANOMETER (A) RIGHT LEG (in.)	MANOMETER (B) LEFT LEG (in.)	ΔH (A+B) (in.)	ΔH_{cor} $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} from calibration curve (X) (SCFM)	Q_{cor} $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} from Dickson chart (CFM)	[redacted]
Oper. Set-Point	2.5	2.6	5.1	2.31	51.08	51.14	50.0	
45/55	2.1	2.0	4.1	2.07	45.72	46.03	45.0	
35/40	1.65	1.8	3.45	1.90	41.92	42.45	41.5	
ADJ.	1.5	1.35	2.85	1.73	38.12	38.87	38.0	
50/60	1.1	1.3	2.4	1.58	34.77	35.80	35.0	
45/50								
40/45								
35/40								

APPENDIX B

QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES FOR ORMET PM-10 MONITORING NETWORK

1.0 INTRODUCTION

This document presents the quality assurance/quality control procedures used by Energy & Environmental Management, Inc. (E^2M), for high volume samplers (also PM_{10} monitors).

2.0 PM_{10} MONITOR SITING AND INSTALLATION

The Hi-Vols are located from 2 to 15 meters above ground level. The lower level limit is to avoid reentrainment from dusty surfaces. The upper limit represents a compromise between the desire to have measurements which are representative of population exposure and the other considerations listed below.

2.1 SPACING FROM OBSTRUCTIONS

2.1.1

Whenever a sampler is located on a roof, it is located at least two meters from walls, parapets, penthouses, etc. If a furnace or incineration flue is located on the roof, the distance between it and the sampler is dependent on: 1) the height of the flue; 2) type of waste or fuel burned; and, 3) the ash content of the emission. If the emission from the chimney is the result of natural gas combustion, no special precautions are necessary beyond the two meter separation distance. If fuel oil, coal or solid wastes is burned and the chimney is sufficiently short to allow a plume to impact on the sample intake, the site is not selected as a NAMS or SLAMS.

2.1.2

Trees provide surfaces for particulate deposition and restrict air flow. For this reason the samplers are usually located 20 meters or more from the nearest tree.

2.1.3

Every attempt has been made to locate samplers away from nearby obstacles such as buildings so that the distance between an obstacle and a sampler is at least twice the height that the obstacle protrudes above the sampler.

2.1.4

There must also be unrestricted air flow in an arc of at least 270 around the sampler. The predominant wind direction must be included in the 270 arc.

2.2 SPACING FROM ROADS

2.2.1

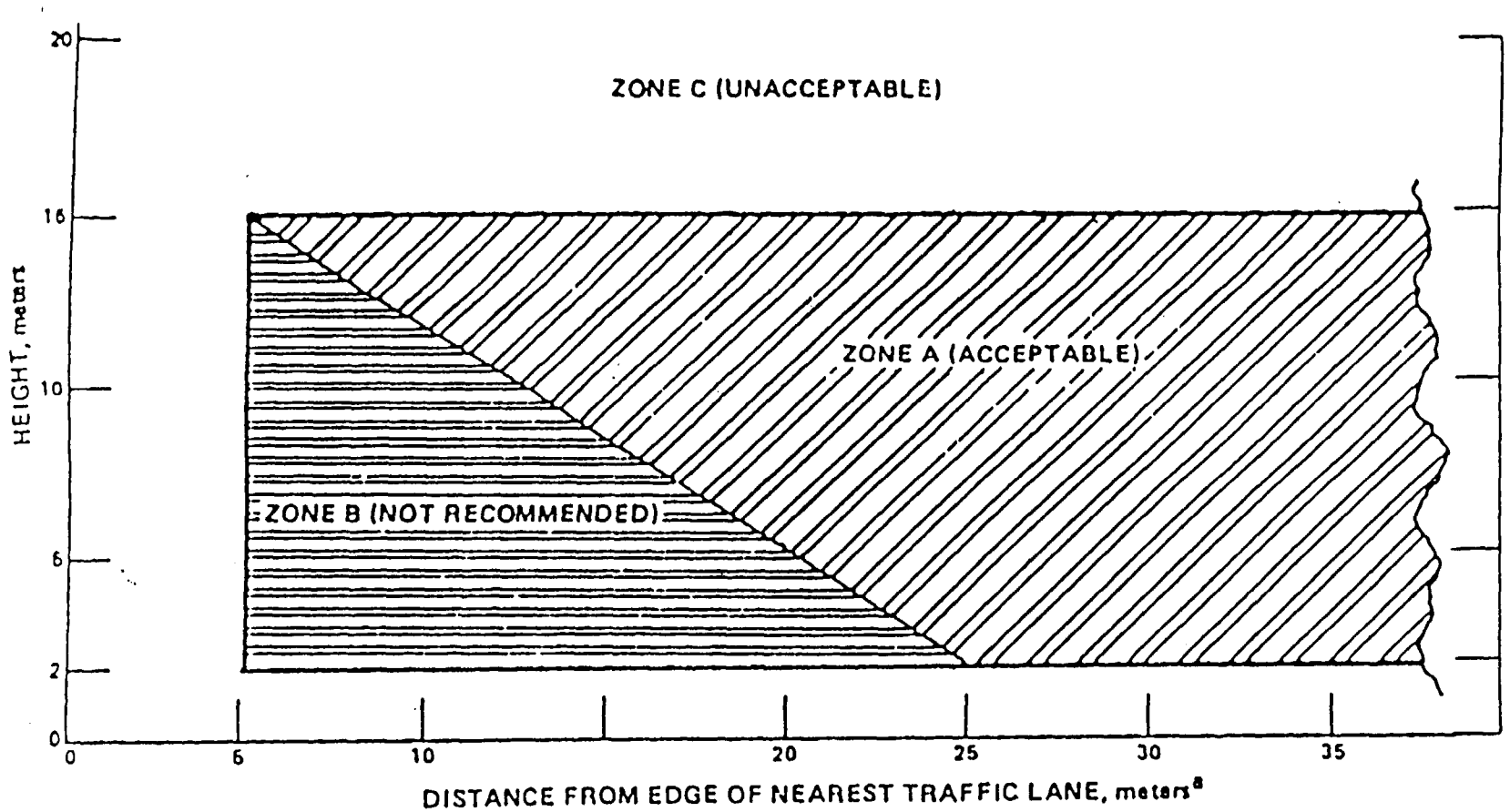
TSP concentration decreases with increasing height of the sampler and its distance from the road (1). Therefore, samplers are not located close to the street where there is a concentrated plume of particulate matter generated and emitted by vehicle traffic.

2.2.2

Analysis shows that a linear relationship between sampler height and distance from the road defines a zone where the plume (generated by traffic greater than 3,000 vehicle per day) is diminished. Figure 1 illustrates this. Zone A represents locations which are recommended for neighborhood, urban and regional scales and also for most middle scale locations. Zone B is avoided in order to minimize roadway influences. Any SLAM located in Zone B is classified as having a middle scale of representativeness.

2.2.3

Since roads with traffic less than 3,000 vehicles per day do not generate a concentrated particulate plume, a sampler can be located in either Zone A or B.



[a]APPLIES WHERE ADT >3 000

Figure 1. Acceptable Zone for Siting PM_{10} Monitors.

3.0 QUALITY CONTROL

Certain quality control checks exist to ascertain the precision and accuracy of the air monitoring system. First, the instrument is calibrated over its entire sampling range. Then, after the instrument has been operating for some time, steps are taken to make sure it stays in calibration.

3.1 CALIBRATION OF HIGH VOLUME SAMPLERS

E^2M uses Hi-Vols equipped with a seven day timer, recording pressure transducers, flow controllers and sample savers. Samplers are calibrated when first purchased, quarterly, after major maintenance on the samplers, anytime the pressure transducer has been replaced or repaired, or when a one-point precision check deviates more than $\pm$ 6 percent from the calibration curve. E^2M uses on orifice calibration unit with five different resistance plates. This unit is calibrated quarterly against a positive displacement primary standard.

3.2 CALIBRATION PROCEDURES INTRODUCTION

This section describes the step by step instructions for the calibration of each Hi-Vol air monitoring instrument used by E^2M.

It is important that all information pertaining to the calibration be recorded. Proper recordkeeping will reduce the confusion later if data validity is questioned. The technician should <u>clearly</u> record enough information so that <u>any</u> person can understand exactly what happened during that calibration. Therefore, we provide AT LEAST the following information in the calibration book:

- o Station name
- o Type of check (Calibration, Precision Check, etc.)
- o Date
- o Your name (and anyone with you)
- o Time of day you start and finish
- o Monitor type and Serial Number
- o Calibration device
- o Temperature, Barometric Pressure and the Flow Correction Factor
- o Rotameter and/or Pressure settings on Calibration device
- o Comment on anything that may affect the calibration
- o Comment on any action(s) taken to alleviate a problem

3.3 FIELD CALIBRATION

3.3.1 APARATUS LIST

- o Manometer and Tygon Tubing
- o Calibration Orifice (and Plates if applicable)
- o Thermometer and Barometer
- o Calculator (LCD)
- o Calibration Curve (Chart or Equation)
- o Extra Dickson Charts and Filters
- o Notebook and Calibration/Audit Forms

3.3.2 SET-UP FOR CALIBRATION

3.3.2.1

Remove filter cassette from the Hi-Vol motor by loosening the 4 "wing nuts." Set it aside where it will not get damaged, dirty or affect the sample. Place a new chart on the Dickson Chart recorder.

3.3.2.2

Disconnect the Hi-Vol motor power at A (Figure 2) from the Sample Saver and Flow Controller. Unplug the Flow Controller at B. Plug in the Hi-Vol motor at B. Now the motor will operate without the Sample Saver or flow controller.

3.3.2.3

Place the orifice base on the top of the Hi-Vol motor (with no filter) and tighten down the 4 hold-down wing nuts to insure no leakage. Hang the Manometer on the Hi-Vol so that it is both level and easily read while making adjustments. Fill out the top of the Calibration/Audit sheet (Table 1) and calculate the correction factor as described.

3.3.3

Zero the Chart Recorder and Manometer. Check the "Zero" on the Chart Recorder. The pen should rest on the chart's zero when the Hi-Vol is off. If not, tap the chart recorder and, if necessary, adjust the "Zero Adjust" screw in the lower right corner. Next, check the Manometer's Zero. If both legs of the Manometer do not indicate a zero, adjust the scale so they will.

3.3.4 CALIBRATE THE HI-VOL MOTOR AND CHART RECORDER

3.3.4.1 ADJUSTABLE ORIFICE WITH NO PLATES

Turn on the Hi-Vol motor (at 1, Figure 2) and allow it to warm-up for 10 to 15 minutes. Adjust the knob on the top of the orifice to get a flow of approximately 50 scfm on the chart recorder. Make No adjustments to the Hi-Vol motor at this point. Record the following on the Calibration/Audit form (Table 1):

1. Manometer, Right and Left leg values
2. Q_{meas} from Dickson Chart Recorder

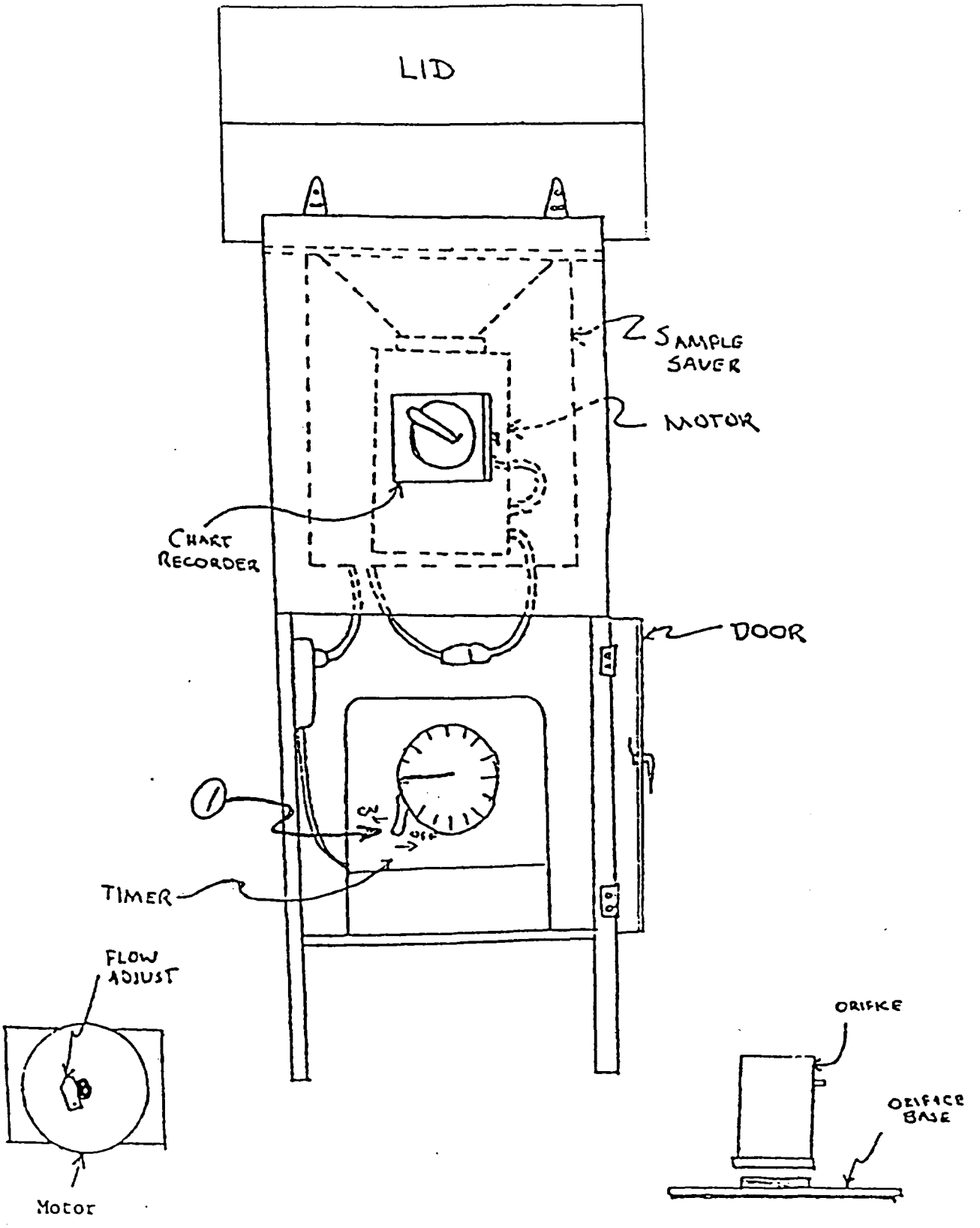


Figure 2. High Volume Air Sampler.

TABLE 1

HI-VOL CALIBRATION/AUDIT FORM

STATION NAME _____ DATE _____ TECHNICIAN _____

STATION NO. _____ BAROMETRIC PRESS. _____ mm Hg COMMENTS: _____

MOTOR NO. _____ AMBIENT TEMP. _____ °C+273= _____ °K

COUNTY I.D. NO. _____ CORRECTION FACTOR (CF) = _____

FLOW CONTROLLER yes no

where $CF = \frac{\text{baro.press.}}{760} \times \frac{298}{\text{amb.temp.}^{\circ}K}$

SLOPE: INTCPT:

ORFICE NO. _____

CORR. COEF:

PLATE NO. (88) FLOW CONT. (filter)	MANOMETER (1) (A) RIGHT LEG (in.)	(B) LEFT LEG (in.)	ΔH (A+B) (3) (in.)	ΔH_{cor} (4) $\Delta H_{cor} = \sqrt{\Delta H \times CF}$	Q_{std} (6) from calibration curve (X) (SCFM)	Q_{cor} (5) $Q_{meas} \times \sqrt{CF}$ (Y) (SCFM)	Q_{meas} (2) from Dickson chart (CFM)	% DEV (7) $\frac{Q_{cor} - Q_{std}}{Q_{std}} \times 100$
NO ADJ. 13								
ADJ 13								
ADJ 13								
18								
10								
7								
5								
88								

Calculate and record the following:

3. ΔH = Right plus Left legs
4. $\Delta H = \sqrt{\Delta H \times CF}$
5. $Qcor = Q_{meas} \times \sqrt{CF}$
6. Qstd = from calibration curve of orifice
7. $\% \text{ Dev} = \frac{Qcor - Qstd}{Qstd} \times 100$

3.3.4.2

If the % Dev exceeds ± 2.0%, adjust the Motor Flow Adjust (Figure 2). Calculate and record the values (as described above). Check the % Dev and repeat this procedure until the % Dev drops below 2.0% and then make no further adjustments. Adjust the orifice knob to generate 3 additional flows (open wide, 40 cfm and 30 cfm) on the chart recorder. Calculate and Record the values as described above.

3.3.4.3 ORIFICE USING PLATES

Put plate #13 (13 holes) on the base of the orifice. Install the top half of the orifice and tighten enough to eliminate leakage. Turn on the Hi-Vol motor (at 1, Figure 2) and allow it to warm for 10 to 15 minutes. Record the following on the Calibration/Audit Form (Table 1):

1. Manometer, Right and Left leg values
2. Q_{meas} from Dickson Chart Recorder

Calculate and record the following:

3. ΔH = Right plus left legs
4. $\Delta H = \sqrt{\Delta H \times CF}$
5. $Qcor = Q_{meas} \times \sqrt{CF}$
6. Qstd = from calibration curve of orifice
7. $\% \text{ Dev} = \frac{Qcor - Qstd}{Qstd} \times 100$

3.3.4.4

If the % Dev exceeds ± 2.0%, adjust the Motor Flow Adjust (Figure 2). Calculate and Record these new values (as described above). Check the % Dev. Repeat this procedure until the % Dev drops below 2% and then make no further adjustment to the motor. Turn off the motor and install the 18 hole plate and calculate the above values. Follow the same procedure for the 10, 7 and 5 hole plates.

3.3.5

The calibration is completed. Remove all calibration equipment. Reinstall the filter cassette and remove the chart from the recorder used for the calibration. Reconnect the Flow Controller and the Sample Saver. Check the Hi-Vol timer and set, if necessary. The Hi-Vol should be set-up for the next run.

3.3.6 ADJUST THE FLOW CONTROLLER

Turn on the PM_{10} and allow it to warm-up for 10 to 15 minutes. Check the flow on the Chart recorder. If the flow falls between 38 and 42 scfm, make no adjustments. If the flow is not within this range, adjust the Flow Controller at the flow adjust potentiometer until it does fall between 38 and 42 scfm.

3.3.7

Close the Hi-Vol lid and doors. Make notes in your notebook about the calibration (weather conditions, orifice used, any problems, etc.). Turn over your notebook to your Supervisor at E^2M.

4.0 PROCESSING FIELD SAMPLES

Filters removed from the PM_{10} monitor are folded and placed in a pre-addressed and stamped envelope and sent to Hazen Research in Golden, Colorado for weighing. Hazen Research provides pre-weights on all of E^2M's numbered filters. Post-weights are provided from Hazen Research and listed by E^2M number.

5.0 NETWORK OPERATION

Routine data collection, as well as preventive maintenance procedures, is conducted to assure collection of high quality data.

Field sampling of PM_{10} at the ORMET Site will involve specific collection and analysis procedures described below. (Field technicians carefully follow these collection procedures to provide samples for analysis by E^2M's subcontractors).

Field technicians are furnished with pre-conditioned, numbered Hi-Vol filters prepared by Hazen Research, Inc., Golden, Colorado. They visually inspect the Hi-Vol filter holder gasket and the filter holder itself before placing the unexposed filter under the gasket. The technicians then install the new filter and set the automatic timer to start the Hi-Vol. The EPA sixth-day schedule is followed. All pertinent information is noted on the Daily Hi-Vol Data Record form (Figure 3). This information includes site location, site name, sampler serial number, filter number, date and starting time of the Hi-Vol run. Any unusual conditions which may affect the sample are noted on the form.

Once the filter has been exposed, the field technician completes the Daily Hi-Vol Data Record form with the stop date and time and the summary of any unusual conditions which may have affected the sample. The technician carefully removes the filter and inspects it for signs of leaks, improper installation or damage. The filter is folded and inserted into the data folder for transport to the Hazen Research, Inc. laboratories. The form is constructed of heavy gauge paper which serves to protect the filter during transport. The flow rate chart is also removed. The filter folder is marked void by the technician and held subject to quality assurance review if any problems are noted that would invalidate the sample.

Laboratory analysis for PM_{10} is performed at the laboratories of Hazen Research, Inc., Golden, Colorado. High-volume filters are analyzed by

EPA-approved methods. PM_{10} is determined gravimetrically by weighing the filters before and after exposure. Prior to weighing, both exposed and unexposed filters are conditioned in a constant low relative humidity environment (R.H. <50%) and ambient temperature (15° to 35°C) for 24 hours. This procedure is detailed on page B-16.

Hi-Vol filter analyses reports are prepared by Hazen Research, Inc. PM_{10} is reported in grams. The following calculations are made to determine the respective concentrations in $\mu g/m^3$ that these weights represent:

<u>Method for Calculation of PM_{10} Concentrations</u>

based on

weight of PM_{10} on Hi-Vol filter - reported in <u>grams</u>,
flow rate of air through filter - reported in <u>CFM</u>
duration of sample - reported in <u>minutes</u>
ft^3 converted to m^3 - 0.028317 X ft^3 - m^3

concentration in $\mu g(PM_{10})/m^3$

$$\frac{g \times 10^6}{CFM \times 0.02817 \times minutes} = \mu g\ PM_{10}/m^3$$

APPENDIX C

FILTER DATA FROM ORMET PM-10 MONITORING NETWORK

Sample Date	Site	Filter Number	Filter Wt (gram) Pre-	Post-	P-Chart	Flow Rate (SCFM)	Sample Time (minute)	PM_10 (ug/m^3)
03/05/88	AM-1	EEM-209	3.76690	3.82300	35.83	38.32	1434.8	36.0
	AM-2	EEM-206	3.77490	3.79570	void	void	98.0	void
	AM-3	EEM-208	3.74350	3.79880	34.63	38.50	1465.2	34.6
	AM-4	EEM-207	3.74710	3.79620	30.25	27.21	1419.4	44.9
03/11/88	AM-1	PR-107	4.00850	4.04620	36.50	39.08	1470.5	23.2
	AM-2	PR-105	3.99190	4.01590	28.67	40.82	997.8	20.8
	AM-3	PR-106	4.00650	4.05410	35.25	39.14	1463.2	29.4
	AM-4	PR-108	4.03210	4.07880	31.13	29.38	1465.5	38.3
03/17/88	AM-1	PR-112	3.96600	3.98720	36.00	38.52	1440.9	13.5
	AM-2	PR-113	3.99430	4.01740	28.50	40.48	1432.8	14.1
	AM-3	PR-110	4.00440	4.09720	35.25	39.14	1438.4	58.2
	AM-4	PR-111	4.00570	4.04410	30.00	26.59	1448.3	35.2
03/23/88	AM-1	PR-117	4.00420	4.12560	36.50	39.08	1443.1	76.0
	AM-2	PR-116	4.00130	4.24710	29.25	41.99	1455.7	142.0
	AM-3	PR-115	3.99480	4.12150	35.63	39.53	1460.2	77.5
	AM-4	PR-114	3.98220	4.24570	31.88	31.23	1437.1	207.4
04/10/88	AM-1	PR-129	4.00560	4.05440	36.25	38.80	1456.2	30.5
	AM-2	PR-130	4.01120	4.06620	31.17	45.86	1439.7	29.4
	AM-3	PR-128	4.00300	4.06230	35.38	39.27	1435.9	37.1
	AM-4	PR-127	3.98620	4.03350	31.88	31.23	1464.1	36.5
04/16/88	AM-1	PR-132	4.00610	4.03920	35.88	38.38	1440.8	21.1
	AM-2	PR-131	4.00050	4.05160	29.50	42.49	1442.5	29.4
	AM-3	PR-133	4.04080	4.13170	35.25	39.14	1436.7	57.1
	AM-4	PR-134	4.03150	4.11180	30.63	28.15	1397.3	72.1
04/22/88	AM-1	PR-135	4.00470	4.04050	36.13	38.66	1472.6	22.2
	AM-2	PR-136	3.97770	4.01200	29.25	41.99	1440.8	20.0
	AM-3	PR-137	4.00150	4.03760	35.50	39.39	1469.5	22.0
	AM-4	PR-138	4.00980	4.04450	31.75	30.91	1465.8	27.1
04/28/88	AM-1	PR-142	4.00140	4.04420	32.63	34.72	1435.6	30.3
	AM-2	PR-141	4.00020	4.05360	28.75	40.99	1446.8	31.8
	AM-3	PR-140	4.00970	void	26.75	30.38	1468.1	void
	AM-4	PR-139	4.00080	4.12110	30.50	27.83	1463.3	104.3
05/04/88	AM-1	PR-146	3.98950	4.03540	34.83	37.20	1440.5	30.3
	AM-2	PR-145	3.98770	4.03210	28.50	40.48	1392.7	27.8
	AM-3	PR-143	3.99600	void	26.75	30.38	1470.5	void
	AM-4	PR-144	4.00850	4.09350	31.50	30.30	1428.6	69.4
05/10/88	AM-1	PR-151	4.02000	4.06800	37.38	40.07	1392.9	30.4
	AM-2	PR-148	3.99190	4.05500	29.00	41.49	1402.1	38.3
	AM-3	PR-149	3.98730	4.08480	43.88	48.03	1437.1	49.9
	AM-4	PR-150	3.99280	4.09690	33.88	36.17	1432.7	71.0

Sample Date	Site	Filter Number	Filter Wt (gram) Pre-	Post-	P-Chart	Flow Rate (SCFM)	Sample Time (minute)	PM_10 (ug/m^3)
05/15/88	AM-1	PR-153	3.99180	4.09000	36.75	39.36	1455.7	60.5
	AM-2	PR-152	4.02540	4.12340	28.25	39.98	1449.4	59.7
	AM-3	PR-154	4.01310	4.11900	36.88	40.82	1452.8	63.1
	AM-4	PR-155	3.99430	4.10050	34.75	38.32	1461.7	67.0
05/21/88	AM-1	PR-157	4.00230	4.05660	36.75	39.36	1435.0	34.0
	AM-2	PR-156	4.00840	4.06430	28.00	39.48	1418.5	35.3
	AM-3	PR-160	4.02090	4.08370	36.63	40.56	1449.2	37.7
	AM-4	PR-159	3.99050	4.05120	34.38	37.41	1467.1	39.1
05/27/88	AM-1	PR-161	4.00420	4.05490	37.25	39.92	1466.3	30.6
	AM-2	PR-162	4.00310	4.05490	28.33	40.14	1413.9	32.2
	AM-3	PR-163	3.98350	4.04600	36.75	40.68	1469.1	36.9
	AM-4	PR-164	3.99630	4.06150	34.50	37.70	1482.2	41.2
06/02/88	AM-1	PR-169	3.99330	4.03990	36.63	39.22	1431.7	29.3
	AM-2	PR-168	3.98070	4.02610	28.38	40.24	1415.1	28.2
	AM-3	PR-166	3.98440	4.05110	36.75	40.68	1436.8	40.3
	AM-4	PR-165	3.98740	4.04050	34.38	37.41	1427.2	35.1
06/08/88	AM-1	PR-171	4.00040	4.10010	37.25	39.92	1413.7	62.4
	AM-2	PR-170	3.99230	4.08770	28.50	40.48	1450.9	57.4
	AM-3	PR-172	3.98900	4.10250	36.75	40.68	1413.8	69.7
	AM-4	PR-173	3.95280	4.05290	35.13	39.26	1428.2	63.1
06/14/88	AM-1	PR-175	3.95760	4.04300	36.75	39.36	1459.5	52.5
	AM-2	PR-174	3.97790	4.06320	28.13	39.74	1474.2	51.4
	AM-3	PR-177	3.99450	4.08350	36.63	40.56	1438.0	53.9
	AM-4	PR-176	3.96400	4.06870	34.88	38.64	1458.6	65.6
06/20/88	AM-1	PR-181	4.00230	4.12370	36.88	39.51	1448.8	74.9
	AM-2	PR-180	3.99750	4.12090	28.13	39.74	1452.5	75.5
	AM-3	PR-179	3.99180	4.13290	36.75	40.68	1419.6	86.3
	AM-4	PR-178	3.97920	4.14450	35.00	38.94	1431.7	104.7
06/26/88	AM-1	PR-184	3.99950	4.05630	38.00	40.77	1428.8	34.4
	AM-2	PR-185	3.97510	4.02600	29.25	41.99	1396.0	30.7
	AM-3	PR-183	4.00450	4.10630	36.63	40.56	1466.7	60.4
	AM-4	PR-182	3.99480	4.05130	34.00	36.47	1426.8	38.4
07/02/88	AM-1	PR-187	3.98030	4.04910	37.50	40.20	1431.3	42.2
	AM-2	PR-188	3.99420	4.05920	29.00	41.49	1486.1	37.2
	AM-3	PR-189	3.98360	4.07020	36.75	40.68	1439.6	52.2
	AM-4	PR-186	3.94630	4.02090	33.25	34.62	1440.2	52.8
07/08/88	AM-1	PR-193	3.98660	4.15350	37.75	40.49	1452.2	100.3
	AM-2	PR-192	3.98700	4.15190	28.75	40.99	1436.6	98.9
	AM-3	PR-190	3.98280	4.16210	36.75	40.68	1439.1	108.2
	AM-4	PR-191	3.98010	4.14390	34.13	36.79	1466.0	107.3

Sample Date	Site	Filter Number	Filter Wt (gram) Pre-	Post-	P-Chart	Flow Rate (SCFM)	Sample Time (minute)	PM_10 (ug/m^3)
07/14/88	AM-1	PR-194	3.98930	4.08900	37.75	40.49	1442.8	60.3
	AM-2	PR-195	4.01540	4.10840	28.38	40.24	1419.0	57.5
	AM-3	PR-196	4.03910	4.13610	36.38	40.30	1436.6	59.2
	AM-4	PR-197	4.01000	4.25190	34.00	36.47	1440.4	162.6
07/20/88	AM-1	PR-198	4.00300	4.05020	36.88	39.51	1406.4	30.0
	AM-2	PR-199	3.59710	3.63120	28.38	40.24	1425.8	21.0
	AM-3	8075401	4.55220	4.62150	36.00	39.91	1457.0	42.1
	AM-4	PR-200	3.60040	3.65490	33.38	34.94	1440.3	38.3
07/26/88	AM-1	8075404	4.61590	4.69310	37.75	40.49	1430.1	47.1
	AM-2	8075405	4.60400	4.67780	28.75	40.99	1426.1	44.6
	AM-3	8075403	4.64190	4.72820	36.50	40.42	1435.9	52.5
	AM-4	8075402	4.63140	4.72360	33.88	36.17	1415.6	63.6
08/02/88	AM-1	EEM-210	3.79290	3.89090	37.38	40.07	1452.4	59.5
	AM-2	EEM-213	3.80970	3.90520	28.50	40.48	1400.0	59.5
	AM-3	EEM-211	3.81710	3.94160	36.17	40.09	1404.8	78.1
	AM-4	EEM-212	3.79780	3.89470	33.88	36.17	1425.4	66.4
08/07/88	AM-1	EEM-214	3.81780	3.86660	37.25	39.92	1447.1	29.8
	AM-2	EEM-215	3.81590	3.86540	28.38	40.24	1439.4	30.2
	AM-3	EEM-217	3.77660	3.85320	36.38	40.30	1444.0	46.5
	AM-4	EEM-218	3.77310	3.82810	33.63	35.56	1430.9	38.2
08/13/88	AM-1	EEM-219	3.77980	3.93530	37.00	39.64	1403.8	98.7
	AM-2	EEM-220	3.77020	3.93340	28.25	39.98	1462.8	98.6
	AM-3	EEM-221	3.79220	3.96790	36.25	40.17	1482.1	104.2
	AM-4	EEM-222	3.77580	3.93990	33.63	35.56	1416.7	115.1
08/19/88	AM-1	EEM-226	3.75670	3.80760	37.13	39.79	1445.8	31.3
	AM-2	EEM-225	3.76770	3.81590	28.25	39.98	1454.6	29.3
	AM-3	EEM-224	3.75450	3.81080	36.00	39.91	1399.8	35.6
	AM-4	EEM-223	3.76860	3.81310	33.75	35.85	1465.3	29.9
08/25/88	AM-1	EEM-229	3.77080	3.86870	37.25	39.92	1458.5	59.4
	AM-2	EEM-230	3.78980	3.85820	28.50	40.48	1397.8	42.7
	AM-3	EEM-227	3.77760	3.84610	36.13	40.04	1423.0	42.5
	AM-4	EEM-228	3.78510	3.98580	33.50	35.23	1433.0	140.4
08/31/88	AM-1	EEM-233	3.78690	3.83770	36.88	39.51	1435.5	31.6
	AM-2	EEM-234	3.76210	3.81030	28.25	39.98	1430.9	29.8
	AM-3	EEM-231	3.79620	3.84480	36.13	40.04	1429.0	30.0
	AM-4	EEM-232	3.80230	3.85590	33.38	34.94	1458.9	37.1
09/06/88	AM-1	EEM-237	3.76790	3.80410	36.00	38.52	1436.2	23.1
	AM-2	EEM-238	3.76090	3.79200	28.38	40.24	1364.5	20.0
	AM-3	EEM-235	3.74110	3.81100	27.13	30.77	1454.6	55.2
	AM-4	EEM-236	3.76060	3.80430	33.25	34.62	1437.3	31.0

Sample Date	Site	Filter Number	Filter Wt (gram) Pre-	Filter Wt (gram) Post-	P-Chart	Flow Rate (SCFM)	Sample Time (minute)	PM_10 (ug/m^3)
09/12/88	AM-1	EEM-239	3.78980	3.84840	37.00	39.64	1413.6	36.9
	AM-2	EEM-242	3.74850	3.82010	28.13	39.74	1432.7	44.4
	AM-3	EEM-241	3.77450	3.85860	35.13	39.01	1418.2	53.7
	AM-4	EEM-240	3.76870	3.93790	33.13	34.32	1420.9	122.5
09/18/88	AM-1	EEM-245	3.78610	3.85070	36.88	39.51	1434.0	40.3
	AM-2	EEM-246	3.78970	3.84870	28.25	39.98	1402.6	37.2
	AM-3	EEM-243	3.74990	3.80760	35.13	39.01	1413.7	37.0
	AM-4	EEM-244	3.79010	3.85930	33.00	34.00	1421.8	50.6
09/24/88	AM-1	EEM-249	3.81140	3.86450	36.50	39.08	1439.8	33.3
	AM-2	EEM-250	3.77280	3.80360	28.25	39.98	1460.4	18.6
	AM-3	EEM-248	3.81270	3.84580	35.75	39.65	1448.8	20.4
	AM-4	EEM-247	3.79030	3.82240	32.75	33.38	1430.0	23.8
09/30/88	AM-1	EEM-252	3.79150	3.86060	36.75	39.36	1427.0	43.5
	AM-2	EEM-251	3.76700	3.83170	28.13	39.74	1433.4	40.1
	AM-3	EEM-254	3.82870	3.93250	35.50	39.39	1446.5	64.3
	AM-4	EEM-253	3.81760	3.91740	33.25	34.62	1456.5	69.9
10/06/88	AM-1	EEM-257	3.81340	3.86180	36.13	38.66	1434.3	30.8
	AM-2	EEM-258	3.77540	3.82480	28.38	40.24	1409.8	30.8
	AM-3	EEM-255	3.81710	3.88980	void	void	1426.9	void
	AM-4	EEM-256	3.79390	3.84290	31.88	31.23	1424.6	38.9
10/12/88	AM-1	EEM-261	3.81120	3.83030	36.50	39.08	1458.3	11.8
	AM-2	EEM-262	3.79700	3.81800	28.38	40.24	1418.2	13.0
	AM-3	EEM-259	3.78850	3.80180	26.33	29.95	1460.9	10.7
	AM-4	EEM-260	3.79900	3.85810	31.88	31.23	1436.8	46.5
10/18/88	AM-1	EEM-264	3.80350	3.85330	36.88	39.51	1452.2	30.7
	AM-2	EEM-265	3.78320	3.81540	28.75	40.99	1404.6	19.8
	AM-3	EEM-266	3.79070	void	26.00	29.61	1424.1	void
	AM-4	EEM-263	3.80080	3.89980	33.63	35.56	1425.8	69.0
10/24/88	AM-1	EEM-268	3.79590	4.00910	37.00	39.64	1426.3	133.2
	AM-2	EEM-269	3.79640	4.07520	28.75	40.99	1429.4	168.1
	AM-3	EEM-271	3.77760	3.85760	36.50	40.42	1418.9	49.3
	AM-4	EEM-270	3.79000	3.86820	32.63	33.09	1425.8	58.5
10/30/88	AM-1	EEM-274	3.75850	3.79590	36.25	38.80	1437.2	23.7
	AM-2	EEM-273	3.76360	3.80390	28.50	40.48	1438.4	24.4
	AM-3	EEM-272	3.76310	3.82770	35.63	39.53	1449.3	39.8
	AM-4	EEM-275	3.75200	3.81550	31.75	30.91	1456.8	49.8
11/05/88	AM-1	EEM-277	3.77510	3.84180	37.50	40.20	1416.7	41.4
	AM-2	EEM-276	3.75790	3.80140	28.88	41.25	1465.0	25.4
	AM-3	EEM-278	3.78330	3.96020	35.25	39.14	1452.7	109.9
	AM-4	EEM-279	3.78080	4.04880	33.75	35.85	1428.4	184.8

Sample Date	Site	Filter Number	Filter Wt (gram) Pre-	Post-	P-Chart	Flow Rate (SCFM)	Sample Time (minute)	PM_10 (ug/m^3)
11/11/88	AM-1	EEM-282	3.79030	3.81970	36.13	38.66	1438.6	18.7
	AM-2	EEM-283	3.77470	3.80780	28.25	39.98	1499.2	19.5
	AM-3	EEM-281	3.79730	3.88110	36.00	39.91	1446.0	51.3
	AM-4	EEM-280	3.74720	3.79260	32.25	32.15	1477.6	33.8
11/17/88	AM-1	EEM-285	3.76840	3.81340	37.38	40.07	1438.3	27.6
	AM-2	EEM-284	3.76560	3.82410	28.25	39.98	1429.7	36.1
	AM-3	EEM-287	3.74240	3.85440	31.00	34.76	1450.9	78.4
	AM-4	EEM-286	3.77840	3.96150	32.63	33.09	1449.8	134.8
11/23/88	AM-1	EEM-290	3.80610	3.91560	36.88	39.51	1458.2	67.1
	AM-2	EEM-291	3.78560	3.89470	28.13	39.74	1428.1	67.9
	AM-3	EEM-288	3.75040	3.88920	void	void	1454.8	void
	AM-4	EEM-289	3.77570	3.89170	32.25	32.15	1444.2	88.2
11/29/88	AM-1	EEM-294	3.78090	3.82390	37.00	39.64	1433.3	26.7
	AM-2	EEM-295	3.79980	3.84210	28.38	40.24	1467.7	25.3
	AM-3	EEM-292	3.79570	3.85140	36.00	39.91	1427.3	34.5
	AM-4	EEM-293	3.82420	3.96030	32.25	32.15	1401.8	106.7
12/05/88	AM-1	EEM-296	3.82170	3.90780	void	void	1435.3	void
	AM-2	EEM-297	3.76180	3.84230	28.63	40.74	1455.8	47.9
	AM-3	EEM-299	4.03150	4.09890	35.75	39.65	1426.4	42.1
	AM-4	EEM-298	3.75400	4.28610	36.50	42.64	1431.0	308.0
12/11/88	AM-1	EEM-308	3.96210	3.99700	36.25	38.80	1444.4	22.0
	AM-2	EEM-305	3.98130	4.01120	28.00	39.48	1422.5	18.8
	AM-3	EEM-300	4.02670	4.11400	36.25	40.17	1424.9	53.9
	AM-4	EEM-306	3.97040	4.00960	35.75	40.79	1451.3	23.4
12/17/88	AM-1	EEM-311	3.96070	4.00820	36.50	39.08	1450.9	29.6
	AM-2	EEM-312	3.97790	4.01650	28.38	40.24	1415.6	23.9
	AM-3	EEM-309	3.96600	4.08300	38.25	42.23	1431.5	68.4
	AM-4	EEM-310	3.97110	4.13810	36.38	42.35	1419.5	98.1
12/23/88	AM-1	EEM-315	3.96890	4.04030	37.63	40.35	1465.8	42.6
	AM-2	EEM-316	3.97700	3.97700	void	void	1497.5	void
	AM-3	EEM-313	3.95330	4.03320	38.00	41.97	1402.2	48.0
	AM-4	EEM-314	3.96850	4.30050	37.50	45.11	1487.3	174.8
12/29/88	AM-1	EEM-317	3.98640	4.03720	36.75	39.36	1440.3	31 7
	AM-2	EEM-318	3.95880	3.95880	void	void	1440.8	void
	AM-3	EEM-319	3.96290	4.02840	38.00	41.97	1440.9	38.3
	AM-4	EEM-320	3.98630	4.06920	36.38	42.35	1466.5	47.1

APPENDIX D

HOURLY METEOROLOGICAL DATA DURING SAMPLING PERIODS

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
03/05/88	1	5.51	3.72	26.80
	2	4.28	2.91	46.71
	3	3.54	3.02	58.24
	4	3.51	2.96	59.94
	5	4.80	4.31	62.75
	6	2.60	2.01	56.42
	7	2.91	0.97	87.05
	8	2.36	1.44	249.26
	9	4.23	3.69	65.04
	10	3.43	2.66	60.03
	11	5.90	5.39	56.20
	12	6.91	6.49	54.35
	13	5.44	4.80	45.15
	14	4.73	3.82	19.78
	15	4.68	3.38	337.10
	16	4.95	4.19	7.17
	17	8.23	7.96	340.80
	18	7.43	7.21	331.18
	19	6.30	5.06	31.95
	20	6.05	5.64	61.30
	21	5.03	4.71	57.07
	22	4.18	4.02	42.57
	23	2.10	1.15	58.15
	24	3.15	1.54	33.53
03/11/88	1	3.83	2.31	68.49
	2	4.52	4.20	47.52
	3	3.25	2.39	214.81
	4	2.96	2.76	200.30
	5	3.15	2.76	220.95
	6	3.59	3.37	225.40
	7	2.37	1.03	250.08
	8	3.43	2.42	24.11
	9	3.38	2.76	22.17
	10	4.11	3.69	208.12
	11	6.24	6.11	241.41
	12	6.42	6.33	245.47
	13	5.34	4.90	245.54
	14	5.55	5.35	245.06
	15	5.64	5.56	245.14
	16	6.27	6.21	246.54
	17	5.00	4.76	239.73
	18	4.33	4.24	238.57
	19	2.80	2.61	223.15
	20	4.64	2.64	72.03
	21	3.83	1.42	145.97
	22	3.29	3.22	214.69
	23	3.04	2.85	230.88
	24	2.89	0.58	10.45

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
03/17/88	1	6.12	5.78	258.69
	2	5.35	4.43	276.72
	3	3.11	2.53	279.88
	4	3.87	3.46	232.47
	5	3.21	2.87	266.30
	6	4.07	3.66	263.58
	7	3.89	3.30	302.62
	8	4.58	4.44	322.80
	9	5.47	5.22	304.81
	10	6.09	5.84	306.32
	11	5.15	4.18	307.83
	12	5.66	5.03	314.11
	13	5.44	4.86	306.81
	14	4.04	3.69	230.16
	15	4.89	3.59	244.92
	16	5.48	4.15	233.87
	17	5.26	4.69	246.52
	18	5.33	5.22	240.99
	19	3.41	2.79	290.78
	20	4.72	4.69	326.37
	21	3.69	3.11	285.13
	22	4.03	3.54	258.22
	23	4.19	4.10	229.37
	24	4.29	4.13	224.78
03/23/88	1	3.71	3.54	251.72
	2	5.01	4.97	238.54
	3	5.30	5.19	237.38
	4	6.81	6.55	234.38
	5	8.42	8.29	217.71
	6	11.48	11.31	214.61
	7	11.19	11.09	217.79
	8	14.51	14.33	218.92
	9	13.31	13.00	230.38
	10	11.74	11.45	230.00
	11	13.15	12.81	228.53
	12	9.01	8.88	237.47
	13	6.12	5.99	233.72
	14	3.40	3.27	252.27
	15	3.06	2.77	265.63
	16	4.81	4.76	243.24
	17	4.24	4.14	236.66
	18	4.15	4.06	246.03
	19	5.12	5.06	251.14
	20	4.77	4.66	256.82
	21	4.51	4.41	257.10
	22	4.27	4.21	252.41
	23	5.48	5.47	255.66
	24	5.22	5.19	254.03

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
04/10/88	1	5.36	5.19	38.28
	2	5.69	5.59	47.88
	3	5.39	5.31	52.55
	4	5.63	5.59	47.02
	5	5.43	5.32	43.82
	6	6.07	6.01	45.91
	7	6.42	6.33	47.02
	8	6.49	6.43	46.92
	9	5.96	5.75	40.94
	10	7.13	6.91	28.94
	11	6.55	6.10	33.31
	12	7.58	7.35	29.82
	13	9.37	8.90	40.98
	14	7.93	7.67	32.18
	15	7.83	7.42	33.48
	16	7.52	7.29	30.18
	17	8.60	8.44	34.93
	18	7.87	7.09	32.15
	19	9.05	8.83	42.11
	20	7.82	7.70	34.16
	21	6.42	6.26	39.21
	22	5.70	5.63	41.31
	23	6.21	6.15	49.70
	24	5.31	5.26	52.82
04/16/88	1	7.48	7.12	322.12
	2	8.23	7.71	319.90
	3	5.71	5.30	262.36
	4	5.67	5.45	254.79
	5	5.32	5.13	254.32
	6	5.24	5.14	249.85
	7	5.28	5.19	246.91
	8	6.04	5.75	237.35
	9	7.24	6.93	242.90
	10	7.15	6.85	241.67
	11	8.99	8.66	248.96
	12	8.60	8.15	256.69
	13	8.82	8.54	262.50
	14	9.49	9.18	253.11
	15	10.55	10.21	247.99
	16	9.32	8.56	262.09
	17	8.72	8.08	257.02
	18	7.65	7.44	237.29
	19	8.15	8.09	226.66
	20	8.06	7.94	222.06
	21	7.13	7.09	221.56
	22	5.07	5.00	243.14
	23	4.89	4.87	259.47
	24	6.55	6.54	256.08

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
04/22/88	1	6.02	5.94	42.87
	2	5.04	4.40	51.55
	3	5.90	5.55	45.28
	4	7.04	6.82	37.69
	5	7.60	7.25	65.93
	6	4.97	4.18	51.48
	7	4.50	4.32	46.11
	8	6.61	6.50	45.51
	9	5.31	5.17	53.59
	10	6.40	6.26	53.72
	11	5.73	4.99	68.15
	12	5.94	5.75	58.61
	13	5.44	5.12	51.59
	14	4.20	2.42	86.93
	15	3.81	1.08	48.46
	16	4.78	3.65	59.28
	17	5.89	5.29	36.71
	18	8.65	8.56	52.99
	19	8.09	7.85	51.41
	20	6.63	6.41	52.65
	21	7.06	6.99	48.82
	22	4.25	4.06	44.58
	23	4.40	4.13	47.14
	24	4.28	2.18	45.13
04/28/88	1	5.05	4.85	243.50
	2	9.85	9.31	242.11
	3	9.82	8.76	263.13
	4	7.38	7.08	223.28
	5	7.43	7.36	217.58
	6	8.34	8.25	220.64
	7	8.13	8.05	217.97
	8	8.47	8.37	221.13
	9	9.53	9.28	235.94
	10	8.90	8.66	238.24
	11	9.80	9.69	231.05
	12	9.25	9.09	235.42
	13	9.18	9.01	240.97
	14	8.54	8.33	248.13
	15	7.36	7.23	267.26
	16	9.07	8.78	243.70
	17	9.05	8.75	242.48
	18	9.40	9.26	229.20
	19	9.07	8.70	234.83
	20	6.24	5.99	257.50
	21	5.74	5.54	255.69
	22	5.51	4.62	284.07
	23	4.70	4.34	271.75
	24	6.20	5.85	257.38

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
05/04/88	1	5.27	4.42	50.80
	2	6.56	6.16	50.46
	3	7.66	7.63	46.95
	4	7.78	7.73	44.63
	5	7.58	7.52	47.02
	6	7.79	7.73	45.55
	7	7.24	7.17	47.39
	8	7.22	7.16	47.24
	9	6.79	6.72	49.00
	10	4.47	3.95	31.58
	11	2.92	1.21	14.37
	12	3.31	2.56	221.45
	13	5.38	5.23	233.22
	14	3.88	0.61	109.53
	15	6.55	6.37	48.69
	16	4.65	3.60	63.38
	17	6.12	5.90	41.55
	18	5.08	4.83	45.88
	19	4.72	4.18	47.87
	20	5.39	5.27	49.49
	21	7.39	7.20	44.25
	22	5.75	4.03	61.71
	23	4.29	3.96	61.96
	24	3.43	1.30	122.47
05/10/88	1	3.96	3.49	242.15
	2	5.36	5.31	250.55
	3	4.94	4.91	251.91
	4	5.11	5.08	254.82
	5	5.27	5.17	246.35
	6	5.23	5.21	247.08
	7	5.10	5.08	255.87
	8	5.09	5.06	255.67
	9	5.83	5.51	228.83
	10	7.28	7.14	210.32
	11	7.91	7.64	211.82
	12	12.17	11.98	216.41
	13	12.08	11.86	227.51
	14	13.97	13.83	218.90
	15	8.70	6.86	239.22
	16	2.41	1.83	236.19
	17	2.18	1.69	226.14
	18	7.31	6.58	279.12
	19	6.65	6.47	263.76
	20	2.95	2.76	264.07
	21	6.51	5.58	297.02
	22	4.81	4.37	300.63
	23	3.94	3.50	287.44
	24	3.72	3.22	227.08

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
05/15/88	1	5.70	5.63	46.16
	2	6.78	6.71	41.03
	3	6.96	6.87	41.93
	4	7.31	7.20	46.64
	5	7.61	7.50	46.20
	6	5.69	5.59	44.40
	7	2.43	1.99	196.07
	8	2.25	2.10	217.67
	9	3.47	3.27	209.56
	10	2.71	2.59	172.71
	11	4.20	3.98	211.00
	12	6.61	6.53	187.74
	13	6.82	6.50	188.28
	14	6.15	5.98	194.25
	15	5.83	5.18	189.13
	16	4.30	3.95	198.12
	17	4.50	4.28	205.18
	18	4.86	4.59	194.83
	19	5.35	5.17	196.31
	20	3.37	3.24	214.05
	21	2.70	2.50	267.38
	22	4.17	4.09	225.14
	23	5.57	4.49	217.96
	24	3.61	3.41	241.35
05/21/88	1	2.92	2.81	263.37
	2	3.95	3.78	282.86
	3	4.10	4.00	290.86
	4	3.44	3.28	260.42
	5	2.78	2.22	240.48
	6	4.83	4.79	213.74
	7	4.69	4.66	219.98
	8	5.61	5.56	227.25
	9	5.19	5.15	222.85
	10	5.20	5.13	227.66
	11	5.11	4.87	216.20
	12	5.52	5.12	205.17
	13	4.33	3.31	189.23
	14	5.88	4.68	231.60
	15	5.48	2.62	344.61
	16	4.07	3.25	205.88
	17	4.84	0.79	157.46
	18	4.39	3.05	192.11
	19	4.08	3.93	211.33
	20	3.99	3.90	219.76
	21	3.71	3.63	232.98
	22	3.68	3.46	236.38
	23	4.53	4.44	231.21
	24	5.05	4.78	231.75

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
05/27/88	1	3.25	3.19	251.29
	2	2.18	2.16	253.51
	3	2.22	2.20	248.89
	4	3.42	3.25	255.04
	5	3.95	3.92	248.05
	6	3.43	3.41	248.01
	7	3.38	3.34	245.15
	8	4.47	4.45	244.85
	9	4.39	4.29	240.03
	10	3.96	3.78	244.47
	11	4.21	4.15	240.78
	12	5.02	4.78	208.33
	13	2.74	2.26	215.75
	14	4.52	4.34	223.94
	15	4.75	4.46	236.51
	16	3.79	3.58	226.81
	17	4.00	3.73	218.28
	18	3.43	3.13	217.41
	19	2.86	2.72	223.25
	20	2.05	1.76	263.37
	21	2.85	2.49	249.39
	22	3.73	2.02	239.83
	23	3.08	2.66	216.89
	24	3.04	2.12	233.21
06/02/88	1	4.04	2.93	52.80
	2	5.81	5.56	55.05
	3	3.87	3.69	58.02
	4	4.87	4.69	55.78
	5	1.44	0.79	60.74
	6	3.72	1.97	4.63
	7	4.66	3.67	15.31
	8	6.37	5.45	5.67
	9	5.15	4.48	13.98
	10	5.57	5.15	61.91
	11	4.97	4.20	23.10
	12	4.77	4.46	67.62
	13	5.06	4.04	12.23
	14	4.20	3.23	342.00
	15	4.30	3.38	20.95
	16	4.18	2.86	295.41
	17	4.02	3.89	227.14
	18	5.38	5.33	214.58
	19	4.46	4.37	228.21
	20	2.97	2.88	221.87
	21	2.78	2.66	249.19
	22	3.67	3.46	252.42
	23	3.25	3.14	250.38
	24	3.05	2.87	248.45

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
06/08/88	1	3.55	3.50	246.92
	2	3.15	3.10	250.43
	3	3.14	3.08	250.21
	4	3.57	3.49	248.30
	5	4.04	4.01	252.02
	6	2.71	2.62	235.72
	7	3.86	3.82	241.47
	8	3.02	2.84	229.41
	9	2.05	1.99	193.98
	10	2.56	2.27	183.92
	11	2.52	0.96	207.66
	12	3.28	1.28	147.60
	13	3.99	2.78	156.45
	14	3.53	1.93	170.85
	15	2.81	1.63	245.36
	16	4.55	2.40	272.75
	17	4.50	3.40	310.63
	18	6.10	5.30	328.34
	19	5.26	4.52	352.94
	20	5.08	4.56	43.80
	21	5.41	4.65	52.83
	22	7.66	7.32	34.18
	23	8.37	7.87	48.31
	24	8.09	6.89	34.92
06/14/88	1	1.94	1.89	273.05
	2	3.67	3.61	275.63
	3	4.11	4.01	285.59
	4	1.86	1.75	256.51
	5	1.42	1.33	264.48
	6	1.29	1.13	287.56
	7	1.05	0.99	276.85
	8	2.38	2.08	265.66
	9	3.89	3.86	231.75
	10	4.29	4.24	245.76
	11	4.42	4.34	247.13
	12	4.03	3.95	224.79
	13	2.66	2.58	218.93
	14	3.43	3.17	233.42
	15	4.18	4.11	223.85
	16	5.67	5.50	240.00
	17	5.18	5.12	237.20
	18	3.85	3.77	223.76
	19	3.81	3.27	246.52
	20	2.23	2.18	299.43
	21	3.42	3.37	289.96
	22	3.38	2.68	257.63
	23	3.75	2.66	246.19
	24	3.44	3.37	280.85

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
06/20/88	1	3.33	2.99	276.75
	2	3.27	3.09	258.47
	3	3.17	3.10	254.05
	4	4.07	4.00	255.49
	5	2.94	2.87	257.63
	6	3.04	2.97	257.56
	7	4.88	4.83	250.16
	8	3.94	3.85	248.58
	9	4.65	4.61	246.52
	10	2.80	2.67	246.71
	11	4.30	4.19	216.73
	12	5.17	5.02	213.98
	13	8.37	7.39	235.60
	14	7.57	7.22	243.53
	15	7.22	6.33	245.63
	16	7.82	7.24	231.73
	17	6.96	6.65	239.24
	18	6.53	6.37	230.19
	19	5.82	5.59	212.40
	20	4.72	4.59	236.31
	21	3.34	3.31	247.09
	22	3.83	3.75	253.47
	23	4.38	4.37	245.80
	24	4.08	4.04	252.76
06/26/88	1	5.63	5.58	249.50
	2	5.04	4.93	261.29
	3	3.71	3.06	279.99
	4	1.52	1.21	260.95
	5	5.08	3.83	338.59
	6	5.96	5.16	2.02
	7	7.23	6.66	27.63
	8	5.06	4.03	19.03
	9	5.83	4.18	12.00
	10	4.88	3.65	16.45
	11	8.02	6.58	356.64
	12	6.80	5.17	34.33
	13	8.51	6.60	12.57
	14	5.43	4.46	20.30
	15	6.46	5.30	11.21
	16	8.01	7.24	27.09
	17	7.62	6.97	342.94
	18	4.58	3.48	2.28
	19	7.04	5.21	49.60
	20	5.94	4.89	30.02
	21	4.77	4.63	329.04
	22	6.03	5.87	333.07
	23	3.98	3.50	31.78
	24	3.99	3.43	41.84

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
07/02/88	1	1.96	0.57	233.59
	2	3.22	2.51	55.96
	3	1.18	0.12	184.29
	4	0.53	0.49	255.58
	5	3.45	2.50	61.17
	6	3.63	2.78	59.15
	7	0.92	0.47	278.73
	8	1.32	0.40	207.17
	9	2.88	2.69	209.26
	10	4.27	4.17	232.88
	11	3.40	3.33	220.05
	12	3.89	3.69	219.16
	13	3.41	3.14	204.71
	14	5.58	3.54	263.73
	15	4.33	4.12	326.49
	16	4.12	2.04	284.74
	17	4.90	3.01	238.66
	18	2.94	2.46	311.37
	19	4.90	4.77	222.66
	20	4.64	4.53	230.79
	21	3.09	2.60	277.17
	22	3.82	3.72	290.97
	23	1.91	1.85	290.89
	24	3.35	3.14	272.21
07/08/88	1	5.67	5.55	59.73
	2	5.47	5.34	63.81
	3	6.88	6.79	60.61
	4	5.93	5.88	64.43
	5	6.55	6.50	60.46
	6	5.97	5.80	70.34
	7	7.78	7.75	62.96
	8	7.09	6.97	62.31
	9	5.94	5.82	62.27
	10	3.72	3.55	53.43
	11	3.64	3.49	68.36
	12	4.57	3.87	35.66
	13	8.04	7.01	48.75
	14	6.93	5.96	53.83
	15	6.83	5.05	26.95
	16	3.65	2.07	348.31
	17	6.15	5.14	19.37
	18	7.68	6.81	48.79
	19	3.38	2.75	13.81
	20	2.53	1.26	7.46
	21	2.16	1.41	179.46
	22	1.98	0.54	140.45
	23	3.07	2.04	81.54
	24	1.67	1.23	40.47

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
07/14/88	1	5.59	5.49	208.42
	2	5.77	5.56	209.94
	3	5.23	4.96	214.24
	4	4.01	3.89	236.19
	5	3.90	3.82	209.92
	6	4.63	4.55	206.55
	7	5.03	4.98	210.06
	8	4.12	3.93	210.68
	9	6.17	6.02	202.78
	10	5.89	5.68	204.08
	11	6.03	5.95	198.00
	12	6.72	6.65	208.10
	13	6.74	6.56	206.76
	14	8.30	8.11	206.26
	15	9.39	9.22	208.81
	16	9.83	8.99	233.88
	17	7.04	6.82	234.69
	18	8.12	7.98	243.08
	19	7.30	7.09	227.97
	20	5.93	5.70	216.39
	21	4.77	4.69	216.56
	22	5.08	4.97	224.15
	23	3.88	3.79	239.31
	24	5.13	4.63	219.19
07/20/88	1	2.18	2.10	228.30
	2	2.68	2.66	235.67
	3	1.63	1.58	227.73
	4	3.03	2.85	210.31
	5	3.84	3.70	219.65
	6	5.47	5.29	220.07
	7	4.06	3.99	220.86
	8	4.36	4.08	207.70
	9	4.93	4.83	203.83
	10	7.06	6.93	211.29
	11	7.66	7.29	210.50
	12	8.43	8.26	211.36
	13	3.82	3.71	217.31
	14	7.18	6.96	212.53
	15	7.43	7.26	213.49
	16	6.23	4.21	19.11
	17	4.77	4.20	51.06
	18	4.32	4.00	51.22
	19	2.89	0.31	135.90
	20	1.98	1.12	194.47
	21	2.04	1.56	54.51
	22	4.61	3.71	71.07
	23	3.22	2.55	239.94
	24	3.50	3.24	233.81

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
07/26/88	1	3.62	3.47	58.55
	2	2.30	1.12	88.69
	3	3.28	2.97	49.04
	4	3.52	3.46	49.05
	5	2.17	1.23	57.31
	6	1.92	1.58	194.09
	7	2.67	0.57	119.13
	8	2.35	2.16	243.92
	9	5.28	5.22	244.82
	10	6.73	6.54	215.19
	11	5.55	5.37	207.71
	12	4.63	4.49	205.51
	13	4.48	4.37	204.70
	14	5.40	5.07	226.17
	15	3.67	3.37	229.95
	16	5.73	5.50	231.14
	17	3.71	3.59	224.47
	18	4.07	3.87	218.88
	19	3.73	3.62	205.53
	20	4.69	4.61	216.52
	21	3.46	3.32	230.65
	22	2.42	2.15	261.91
	23	3.27	3.21	248.28
	24	2.28	2.09	267.49
08/02/88	1	2.54	2.52	255.71
	2	3.19	3.15	243.19
	3	3.18	3.15	245.10
	4	2.89	2.77	242.86
	5	1.94	1.87	249.01
	6	3.72	3.67	242.86
	7	4.47	4.42	241.51
	8	3.25	3.22	237.44
	9	4.10	4.09	237.13
	10	4.60	4.46	250.08
	11	4.18	4.02	229.35
	12	3.65	3.52	216.70
	13	3.56	3.43	215.00
	14	3.28	3.15	219.27
	15	3.39	3.31	227.26
	16	3.03	2.92	218.24
	17	3.13	2.73	226.55
	18	2.53	2.34	212.30
	19	3.57	2.43	299.12
	20	4.93	3.85	29.15
	21	5.60	4.98	42.34
	22	5.68	5.25	49.88
	23	4.33	3.21	62.87
	24	3.42	1.31	58.78

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
08/07/88	1	3.17	3.04	241.75
	2	3.79	3.74	217.11
	3	3.17	3.07	225.62
	4	4.19	3.72	254.48
	5	4.01	3.88	225.06
	6	3.68	3.24	235.45
	7	2.31	2.25	233.91
	8	3.65	3.60	234.30
	9	3.28	3.21	217.12
	10	4.20	4.12	219.69
	11	3.81	3.72	215.42
	12	3.78	3.62	213.19
	13	4.38	3.37	271.67
	14	4.77	4.15	298.96
	15	5.63	4.13	271.25
	16	5.49	4.85	316.36
	17	7.76	7.37	296.72
	18	4.80	4.49	283.23
	19	3.55	2.83	291.58
	20	2.01	1.82	292.46
	21	2.66	2.49	284.96
	22	2.68	2.53	288.43
	23	1.12	1.06	273.04
	24	1.67	1.61	253.99
08/13/88	1	3.42	3.05	278.77
	2	4.03	3.94	295.00
	3	2.56	2.41	281.34
	4	2.80	2.67	253.67
	5	2.30	2.22	237.22
	6	1.99	1.92	259.62
	7	3.42	3.36	245.83
	8	3.57	3.34	237.85
	9	3.83	3.77	248.23
	10	3.88	3.84	251.44
	11	4.07	3.97	234.66
	12	4.07	3.98	230.21
	13	3.09	2.93	206.78
	14	3.22	2.76	219.26
	15	3.97	3.76	214.27
	16	3.91	3.53	232.06
	17	4.50	3.73	223.38
	18	4.82	3.87	284.29
	19	4.06	4.03	301.78
	20	2.19	1.90	292.31
	21	3.28	2.50	266.67
	22	1.64	1.43	229.76
	23	2.00	1.85	270.20
	24	2.35	2.04	276.86

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
08/19/88	1	6.05	5.70	64.82
	2	6.51	4.68	26.10
	3	6.91	5.91	52.27
	4	5.96	5.37	58.69
	5	2.55	0.67	229.71
	6	4.49	4.22	231.17
	7	2.51	1.96	191.23
	8	2.46	1.68	180.25
	9	2.39	1.62	196.51
	10	2.87	1.86	263.01
	11	2.64	1.94	242.96
	12	4.63	2.84	27.45
	13	6.50	6.34	56.55
	14	7.81	7.50	59.80
	15	6.05	5.58	52.13
	16	4.77	4.19	43.35
	17	5.98	5.51	55.24
	18	5.64	5.05	7.65
	19	4.49	3.43	15.72
	20	5.17	4.13	49.65
	21	3.27	2.92	47.51
	22	3.91	3.55	50.49
	23	5.22	5.12	70.55
	24	3.56	3.38	59.51
08/25/88	1	4.69	4.58	247.82
	2	3.42	3.39	246.00
	3	4.78	4.75	239.30
	4	3.88	3.81	244.25
	5	4.93	4.84	247.81
	6	4.92	4.90	240.57
	7	5.01	4.98	242.68
	8	4.42	4.33	246.79
	9	4.00	3.95	249.12
	10	4.18	3.78	227.03
	11	4.59	4.39	210.44
	12	6.70	6.25	222.38
	13	8.60	8.04	216.31
	14	9.07	8.65	239.76
	15	8.65	7.87	228.21
	16	9.85	9.24	218.16
	17	11.47	11.33	214.25
	18	9.38	8.99	204.42
	19	9.39	9.16	219.96
	20	7.12	6.92	222.75
	21	7.09	6.99	227.91
	22	7.88	7.62	214.95
	23	6.45	6.24	225.98
	24	5.50	5.36	231.41

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
08/31/88	1	4.16	3.81	66.95
	2	5.22	5.04	59.81
	3	5.08	4.76	62.21
	4	4.55	4.44	67.61
	5	4.49	4.36	56.23
	6	4.34	3.89	66.03
	7	4.55	4.10	60.55
	8	5.16	4.89	57.10
	9	5.28	5.20	60.88
	10	4.97	4.35	48.52
	11	6.31	5.83	75.66
	12	6.33	6.10	70.15
	13	5.94	5.46	58.62
	14	5.50	4.86	66.09
	15	5.24	4.80	58.86
	16	7.98	7.64	65.30
	17	6.22	6.03	56.73
	18	5.62	5.37	58.31
	19	6.75	6.34	50.61
	20	6.14	5.98	59.93
	21	2.28	1.81	36.77
	22	3.40	3.29	55.22
	23	4.73	4.61	61.58
	24	5.02	4.97	59.85
09/06/88	1	3.08	2.46	331.47
	2	2.48	1.19	337.63
	3	2.64	2.12	302.76
	4	2.67	0.50	302.24
	5	2.27	1.88	306.70
	6	3.45	3.33	307.26
	7	1.96	1.74	246.57
	8	4.05	3.93	318.58
	9	3.45	1.20	326.83
	10	3.25	2.18	178.52
	11	4.17	3.88	309.15
	12	3.03	2.37	302.35
	13	4.58	4.13	314.54
	14	4.92	3.66	345.06
	15	5.29	4.68	345.02
	16	5.08	4.48	307.34
	17	4.87	3.98	302.26
	18	5.72	3.17	345.11
	19	3.98	3.71	314.87
	20	4.47	4.45	318.24
	21	3.07	1.61	240.32
	22	1.66	1.54	209.17
	23	2.29	2.22	181.04
	24	2.17	2.00	206.85

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
09/12/88	1	2.92	1.78	61.34
	2	2.90	1.67	52.80
	3	2.46	0.52	22.03
	4	2.96	2.73	51.60
	5	2.26	0.61	180.21
	6	3.38	1.42	67.12
	7	0.97	0.84	251.70
	8	2.02	1.93	247.15
	9	3.69	3.66	240.60
	10	3.61	3.59	230.79
	11	4.72	4.53	242.05
	12	4.47	4.37	230.89
	13	5.40	5.13	230.69
	14	6.79	6.45	215.12
	15	6.31	5.81	226.43
	16	4.98	4.25	257.74
	17	3.17	3.08	214.70
	18	3.05	2.94	226.30
	19	2.26	2.11	219.62
	20	1.88	1.74	246.01
	21	3.67	3.61	242.87
	22	1.51	1.45	243.26
	23	3.82	3.51	250.40
	24	6.18	5.82	219.86
09/18/88	1	2.50	2.44	221.42
	2	2.93	2.86	230.18
	3	4.85	4.83	211.76
	4	2.74	2.67	228.75
	5	4.52	4.39	204.21
	6	3.96	3.80	204.27
	7	2.96	2.87	225.62
	8	3.23	3.07	214.04
	9	5.12	5.06	203.39
	10	5.22	5.05	206.77
	11	5.30	5.06	210.71
	12	5.53	5.41	206.74
	13	6.37	6.19	200.29
	14	4.66	4.50	207.94
	15	3.20	3.13	212.90
	16	3.08	2.78	219.33
	17	3.45	3.40	243.20
	18	2.47	2.31	209.42
	19	1.60	1.50	210.70
	20	2.19	1.65	206.20
	21	2.54	2.49	209.66
	22	2.79	2.11	220.80
	23	2.38	2.29	251.88
	24	3.33	3.29	237.20

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
09/24/88	1	4.49	3.99	35.14
	2	4.97	4.56	57.02
	3	4.57	3.88	61.96
	4	4.98	4.68	56.74
	5	4.68	4.35	50.14
	6	4.20	3.88	52.07
	7	5.44	5.31	74.67
	8	4.30	4.04	59.26
	9	1.61	0.98	31.65
	10	4.92	4.54	43.27
	11	5.93	5.53	58.96
	12	4.54	4.11	52.95
	13	5.83	5.27	52.09
	14	5.19	4.98	65.43
	15	2.54	1.67	55.54
	16	5.89	5.58	54.33
	17	6.15	5.91	61.28
	18	6.68	6.62	55.87
	19	4.40	4.05	54.65
	20	4.68	3.96	34.35
	21	5.45	4.72	29.12
	22	4.55	4.26	56.71
	23	5.54	4.96	55.45
	24	4.59	4.36	60.36
09/30/88	1	4.28	4.23	241.57
	2	4.23	4.15	250.57
	3	3.60	3.56	235.87
	4	4.56	4.55	239.85
	5	4.40	4.39	244.46
	6	4.12	4.07	245.93
	7	4.97	4.94	240.84
	8	4.45	4.41	239.93
	9	4.62	4.59	245.07
	10	3.94	3.88	237.43
	11	4.46	4.32	213.36
	12	4.16	3.92	204.63
	13	4.49	4.21	228.42
	14	6.13	5.82	223.63
	15	4.69	4.49	203.09
	16	6.03	5.80	205.43
	17	5.46	5.32	214.76
	18	4.42	4.28	212.83
	19	2.56	2.42	221.80
	20	3.08	3.01	272.41
	21	2.72	2.63	290.89
	22	1.82	1.68	269.68
	23	2.73	2.62	248.84
	24	1.39	1.31	255.03

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
10/06/88	1	3.77	3.75	247.15
	2	1.97	1.69	280.09
	3	2.07	1.97	297.97
	4	2.33	1.79	264.42
	5	1.54	1.26	285.96
	6	3.23	3.20	240.46
	7	2.06	1.79	287.89
	8	2.66	2.38	305.75
	9	2.38	2.16	257.84
	10	5.18	5.05	236.92
	11	3.98	3.75	224.75
	12	3.28	1.88	313.63
	13	3.71	2.87	324.72
	14	5.10	3.50	23.89
	15	3.87	1.03	32.78
	16	4.13	2.09	347.70
	17	5.29	5.13	318.70
	18	4.52	3.85	300.45
	19	3.87	3.48	322.62
	20	1.97	1.78	218.23
	21	2.15	1.12	137.25
	22	1.15	1.01	228.94
	23	3.33	1.41	46.29
	24	2.73	2.42	62.32
10/12/88	1	4.07	3.49	258.97
	2	3.71	3.37	253.84
	3	5.80	5.56	253.57
	4	4.29	3.61	267.98
	5	3.64	3.31	248.20
	6	4.45	4.26	244.59
	7	4.68	4.64	242.16
	8	4.99	4.92	239.48
	9	4.39	4.19	243.79
	10	4.20	3.64	287.31
	11	5.77	5.34	272.45
	12	8.93	8.57	300.32
	13	7.03	6.77	285.65
	14	8.16	7.22	288.61
	15	6.37	5.88	271.03
	16	7.99	7.48	288.14
	17	6.71	6.12	287.45
	18	6.94	6.28	296.73
	19	3.40	3.21	309.61
	20	3.72	3.54	325.20
	21	4.07	3.84	303.72
	22	3.05	2.89	306.00
	23	4.28	4.03	306.11
	24	1.68	1.45	272.78

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
10/18/88	1	9.47	9.35	227.85
	2	9.72	9.41	215.61
	3	13.13	12.92	219.44
	4	6.21	5.61	220.05
	5	7.56	7.16	216.16
	6	12.38	12.07	213.90
	7	12.43	11.88	214.72
	8	6.12	5.58	215.12
	9	5.53	5.07	224.18
	10	6.33	5.06	299.51
	11	7.12	6.87	290.01
	12	5.51	5.14	276.01
	13	8.09	7.68	284.86
	14	8.54	8.07	299.68
	15	8.43	6.60	286.45
	16	8.57	7.81	290.84
	17	7.19	6.24	275.69
	18	5.94	5.53	295.37
	19	3.93	3.70	303.82
	20	3.73	3.45	308.99
	21	3.28	3.14	309.77
	22	2.04	1.36	250.67
	23	2.37	2.04	267.49
	24	1.46	1.05	288.98
10/24/88	1	4.18	4.01	228.36
	2	4.19	3.77	226.90
	3	5.23	4.98	211.19
	4	6.48	6.39	217.08
	5	8.13	7.96	220.88
	6	16.71	13.89	223.98
	7	8.18	7.63	259.74
	8	7.82	7.47	244.24
	9	8.75	8.37	202.72
	10	9.53	9.22	225.38
	11	10.24	9.95	231.38
	12	7.17	6.99	225.92
	13	11.32	11.02	233.17
	14	10.52	10.21	230.32
	15	12.33	11.84	230.82
	16	11.60	11.27	226.96
	17	11.38	10.98	240.53
	18	9.20	8.88	241.06
	19	5.56	5.34	246.48
	20	5.35	5.32	258.50
	21	4.02	3.65	268.52
	22	4.38	3.83	276.24
	23	2.65	2.51	254.73
	24	4.07	3.77	262.61

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
10/30/88	1	1.78	1.59	244.41
	2	2.59	2.47	294.56
	3	3.74	3.50	301.78
	4	2.08	1.92	315.50
	5	2.75	2.08	277.79
	6	2.77	2.68	317.91
	7	3.65	3.61	317.94
	8	5.03	4.88	322.68
	9	4.25	4.08	300.29
	10	3.27	2.72	346.60
	11	4.77	3.39	347.42
	12	3.24	2.30	9.52
	13	5.53	3.76	327.70
	14	4.27	3.30	17.00
	15	3.78	2.69	1.09
	16	2.99	2.50	343.77
	17	6.18	5.95	329.27
	18	5.17	4.92	328.33
	19	6.51	6.43	325.82
	20	3.08	2.56	50.65
	21	3.82	3.67	64.33
	22	5.75	5.66	62.23
	23	4.89	4.69	58.21
	24	4.77	4.70	61.52
11/05/88	1	4.17	3.58	168.26
	2	4.22	3.89	168.33
	3	3.12	1.75	134.74
	4	3.17	2.77	165.06
	5	3.76	3.31	162.43
	6	2.68	1.96	134.57
	7	2.42	1.60	165.55
	8	2.49	1.88	100.12
	9	2.59	2.35	65.44
	10	10.16	9.37	205.74
	11	10.53	10.29	201.46
	12	8.55	8.18	226.16
	13	10.07	9.83	221.55
	14	12.03	11.68	220.40
	15	12.17	11.57	222.07
	16	8.78	8.20	224.67
	17	10.09	9.85	234.10
	18	8.77	8.60	227.21
	19	8.02	7.93	214.00
	20	7.93	7.86	221.52
	21	8.88	8.64	213.02
	22	7.98	7.86	213.06
	23	7.09	6.89	210.16
	24	10.92	10.70	214.78

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
11/11/88	1	5.51	5.43	229.35
	2	4.16	4.08	236.56
	3	4.10	4.05	251.00
	4	2.59	2.54	249.90
	5	2.89	2.59	298.33
	6	4.70	4.45	304.43
	7	5.16	4.64	282.29
	8	3.62	3.06	247.79
	9	4.03	3.70	254.93
	10	2.33	1.73	266.49
	11	4.96	4.66	316.10
	12	5.21	4.92	302.90
	13	5.17	4.83	306.01
	14	5.02	4.89	334.94
	15	4.88	4.59	312.62
	16	4.41	4.21	314.75
	17	4.71	4.58	319.11
	18	4.25	4.16	318.26
	19	3.02	1.90	309.78
	20	2.01	0.89	94.89
	21	2.59	2.37	212.01
	22	2.44	0.21	93.25
	23	2.81	1.70	55.89
	24	4.18	2.37	68.30
11/17/88	1	7.45	6.68	268.07
	2	4.49	3.93	245.05
	3	4.88	4.65	225.10
	4	6.60	6.27	240.76
	5	5.95	5.77	242.57
	6	4.64	4.54	237.02
	7	5.71	5.60	227.75
	8	7.58	7.50	233.92
	9	9.84	9.48	237.27
	10	9.32	9.14	234.26
	11	9.98	9.31	234.02
	12	10.38	9.94	235.28
	13	10.68	10.44	237.41
	14	9.54	9.51	233.73
	15	9.73	9.13	240.32
	16	9.35	9.10	230.33
	17	7.90	7.72	232.38
	18	5.24	5.14	239.06
	19	4.37	4.29	239.01
	20	3.79	3.71	248.17
	21	3.43	3.40	254.08
	22	4.55	4.50	249.03
	23	4.97	4.94	246.12
	24	4.75	4.72	248.02

Date	Hour	Wind Speed (MPH) Scalar	Wind Speed (MPH) Vector	Wind Direction (Deg)
11/23/88	1	6.59	6.54	58.04
	2	5.88	5.82	64.95
	3	6.49	6.41	72.96
	4	6.66	6.54	66.32
	5	5.51	5.44	71.56
	6	5.56	5.24	70.73
	7	6.15	5.89	65.55
	8	4.79	4.54	66.63
	9	5.97	5.87	67.40
	10	6.49	6.32	71.96
	11	5.83	5.39	76.02
	12	3.47	3.11	56.01
	13	3.03	1.70	65.39
	14	2.98	1.02	96.21
	15	3.38	2.27	331.36
	16	4.31	2.92	328.97
	17	4.33	3.27	319.27
	18	2.83	2.14	324.51
	19	2.44	1.70	64.13
	20	3.86	3.56	64.51
	21	5.50	5.29	67.45
	22	5.51	5.46	66.08
	23	3.02	2.26	52.69
	24	4.64	4.56	55.24
11/29/88	1	7.08	6.79	226.57
	2	7.78	7.14	246.92
	3	6.39	6.24	225.86
	4	8.01	7.93	224.00
	5	6.57	6.41	226.30
	6	5.43	5.22	238.06
	7	6.78	6.68	241.75
	8	7.38	7.09	232.50
	9	7.30	7.04	229.72
	10	7.72	7.57	215.60
	11	6.91	6.69	212.72
	12	7.35	7.29	215.12
	13	7.64	7.58	221.92
	14	7.81	7.27	216.09
	15	7.75	7.59	220.17
	16	6.13	5.24	217.15
	17	3.98	3.82	156.27
	18	1.64	1.47	192.28
	19	0.96	0.95	230.47
	20	2.06	2.03	225.22
	21	3.84	3.41	253.69
	22	4.04	4.03	241.63
	23	3.61	3.52	243.45
	24	3.31	3.27	243.64

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
12/05/88	1	3.73	3.50	246.68
	2	2.78	2.60	248.61
	3	3.00	2.95	257.30
	4	3.89	3.75	257.53
	5	4.50	4.22	207.88
	6	5.88	5.74	208.02
	7	5.25	5.07	203.25
	8	5.26	5.13	209.72
	9	6.00	5.90	213.12
	10	8.60	8.28	197.76
	11	9.32	9.20	203.91
	12	9.18	8.98	205.21
	13	9.70	9.37	230.23
	14	8.82	8.49	215.12
	15	9.90	9.46	223.54
	16	8.51	8.30	215.29
	17	6.89	6.72	224.10
	18	4.33	4.30	238.53
	19	4.40	4.33	241.65
	20	5.40	5.36	247.82
	21	5.69	5.66	245.25
	22	6.00	5.97	245.35
	23	5.69	5.68	243.90
	24	5.92	5.91	242.68
12/11/88	1	7.48	6.73	285.74
	2	8.58	8.44	296.10
	3	4.88	4.49	290.40
	4	3.94	3.36	308.12
	5	2.63	2.53	297.18
	6	2.75	2.58	313.11
	7	3.13	3.02	304.84
	8	3.15	3.06	302.94
	9	2.74	2.34	287.19
	10	1.88	1.60	241.56
	11	3.09	2.46	251.11
	12	4.15	3.54	312.87
	13	5.24	4.73	291.27
	14	5.92	5.45	319.46
	15	4.47	4.25	320.85
	16	5.71	5.43	315.08
	17	5.18	4.96	314.29
	18	3.10	3.05	313.53
	19	3.03	3.00	315.10
	20	3.66	3.61	318.86
	21	4.63	4.54	312.23
	22	4.50	4.31	342.25
	23	2.08	1.58	15.59
	24	2.41	2.07	47.84

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
12/17/88	1	5.58	5.45	210.99
	2	5.13	4.95	217.54
	3	5.40	5.34	239.33
	4	4.63	4.51	213.14
	5	4.38	4.34	216.93
	6	6.72	6.61	220.82
	7	5.63	5.48	233.49
	8	3.78	3.69	211.66
	9	5.01	4.93	209.04
	10	5.75	5.53	217.95
	11	6.04	5.60	240.20
	12	6.30	5.92	249.62
	13	5.18	4.96	266.42
	14	6.56	6.08	251.10
	15	7.97	7.47	300.65
	16	6.09	5.68	257.15
	17	6.67	6.28	265.14
	18	5.98	5.46	250.08
	19	5.10	4.94	230.17
	20	5.47	5.01	253.98
	21	6.08	5.77	233.75
	22	4.71	4.53	229.08
	23	8.94	8.69	228.45
	24	5.92	5.76	223.33
12/23/88	1	5.36	5.14	244.64
	2	4.66	4.62	252.70
	3	5.23	4.94	249.71
	4	4.72	4.53	252.12
	5	3.32	3.14	246.64
	6	8.38	8.08	238.83
	7	13.58	13.42	226.35
	8	11.71	11.62	223.67
	9	10.52	10.34	216.01
	10	5.52	5.13	224.03
	11	7.75	7.65	236.46
	12	11.59	11.49	231.84
	13	9.41	9.16	229.07
	14	11.27	10.63	221.62
	15	11.40	11.11	226.00
	16	8.50	8.22	218.43
	17	5.82	5.72	210.92
	18	4.10	4.04	239.07
	19	3.89	3.83	249.90
	20	4.27	4.25	246.79
	21	3.51	3.45	235.63
	22	3.46	3.43	227.06
	23	3.21	3.17	236.01
	24	2.48	2.45	230.95

Date	Hour	Wind Speed(MPH) Scalar	Wind Speed(MPH) Vector	Wind Direction (Deg)
12/29/88	1	6.90	6.60	236.25
	2	5.57	5.41	245.83
	3	6.28	5.63	250.97
	4	6.37	6.13	249.68
	5	4.69	4.20	265.74
	6	5.88	5.58	253.79
	7	3.16	2.63	262.69
	8	3.76	3.58	324.31
	9	4.32	4.07	233.83
	10	5.07	4.97	214.52
	11	5.85	5.75	222.48
	12	6.58	6.40	210.47
	13	6.21	6.13	229.80
	14	4.01	3.84	223.00
	15	5.68	5.54	219.00
	16	4.99	4.90	214.16
	17	4.32	4.24	211.02
	18	3.68	3.62	223.60
	19	2.28	1.78	254.03
	20	2.43	2.37	229.23
	21	1.56	1.31	244.51
	22	2.07	2.02	231.11
	23	2.07	2.02	234.06
	24	3.19	3.16	234.47

APPENDIX E

DAILY RAINFALL, MORNING AND AFTERNOON AIR TEMPERATURE RECORDED AT HANNIBAL LOCK BY THE U.S. ARMY CORPS OF ENGINEERS

Date	Rain (in)	Temp(˚F) AM	Temp(˚F) PM
03/01/88	--	26	48
03/02/88	0.07	23	55
03/03/88	0.61	40	39
03/04/88	1.67	34	34
03/05/88	--	21	41
03/06/88	--	29	55
03/07/88	--	38	48
03/08/88	--	32	65
03/09/88	0.15	52	47
03/10/88	--	37	46
03/11/88	--	25	54
03/12/88	0.50	29	61
03/13/88	0.02	40	34
03/14/88	0.02	26	28
03/15/88	0.03	23	22
03/16/88	0.02	26	33
03/17/88	0.02	30	40
03/18/88	0.11	30	36
03/19/88	--	28	39
03/20/88	0.06	36	35
03/21/88	0.10	24	35
03/22/88	--	26	53
03/23/88	--	29	75
03/24/88	--	45	75
03/25/88	0.74	48	60
03/26/88	0.06	50	53
03/27/88	--	36	39
03/28/88	--	27	63
03/29/88	--	37	76
03/30/88	--	58	63
03/31/88	0.05	45	78
04/01/88	0.04	52	68
04/02/88	--	51	65
04/03/88	0.43	54	68
04/04/88	0.92	58	67
04/05/88	--	43	77
04/06/88	0.31	48	60
04/07/88	0.09	46	44
04/08/88	--	45	50
04/09/88	--	36	57
04/10/88	--	34	62
04/11/88	--	37	64
04/12/88	--	42	57
04/13/88	--	38	62
04/14/88	--	37	66
04/15/88	--	35	47
04/16/88	--	32	42
04/17/88	--	31	64
04/18/88	0.60	55	42
04/19/88	--	33	49
04/20/88	--	28	57
04/21/88	--	47	53
04/22/88	--	44	55
04/23/88	0.42	50	79
04/24/88	--	47	46
04/25/88	--	42	60
04/26/88	--	34	71
04/27/88	--	40	59
04/28/88	0.15	39	43
04/29/88	--	43	53
04/30/88	--	39	60
05/01/88	--	36	65
05/02/88	--	39	63
05/03/88	--	41	62
05/04/88	0.16	41	56
05/05/88	0.28	55	66
05/06/88	--	55	66
05/07/88	--	44	74
05/08/88	--	43	79
05/09/88	0.20	63	66
05/10/88	0.10	52	66
05/11/88	0.06	53	66
05/12/88	--	42	75
05/13/88	0.10	45	81
05/14/88	--	55	68
05/15/88	0.11	51	83
05/16/88	--	59	81
05/17/88	--	56	75
05/18/88	0.22	57	58
05/19/88	0.78	55	59
05/20/88	--	54	65
05/21/88	--	55	75
05/22/88	--	53	80
05/23/88	0.53	56	79
05/24/88	--	61	66
05/25/88	--	46	55
05/26/88	--	40	69
05/27/88	--	44	77
05/28/88	--	48	80
05/29/88	--	49	84
05/30/88	--	54	86
05/31/88	--	59	88
06/01/88	--	58	57
06/02/88	0.21	61	56
06/03/88	--	50	63
06/04/88	--	43	73

Date	Rain (in)	Temp(˚F) AM	Temp(˚F) PM
06/05/88	--	46	78
06/06/88	--	55	44
06/07/88	--	58	87
06/08/88	--	57	56
06/09/88	0.73	51	66
06/10/88	--	41	62
06/11/88	--	43	72
06/12/88	--	49	80
06/13/88	--	52	84
06/14/88	--	56	89
06/15/88	--	56	89
06/16/88	0.05	60	82
06/17/88	--	65	79
06/18/88	--	51	80
06/19/88	--	50	85
06/20/88	--	58	90
06/21/88	0.05	70	89
06/22/88	--	68	92
06/23/88	0.03	69	81
06/24/88	--	60	86
06/25/88	--	58	93
06/26/88	--	79	74
06/27/88	--	50	78
06/28/88	--	49	78
06/29/88	--	64	77
06/30/88	--	45	70
07/01/88	--	44	71
07/02/88	--	46	77
07/03/88	--	50	84
07/04/88	--	54	89
07/05/88	--	59	90
07/06/88	--	60	93
07/07/88	--	62	96
07/08/88	--	66	96
07/09/88	0.07	73	95
07/10/88	--	65	88
07/11/88	--	69	80
07/12/88	--	61	85
07/13/88	--	71	85
07/14/88	--	71	86
07/15/88	--	69	96
07/16/88	--	67	99
07/17/88	--	79	85
07/18/88	1.39	66	95
07/19/88	0.53	72	85
07/20/88	1.27	73	73
07/21/88	0.85	73	74
07/22/88	--	69	85
07/23/88	0.24	67	73
07/24/88	0.11	65	79
07/25/88	--	64	80
07/26/88	--	64	79
07/27/88	--	66	75
07/28/88	--	66	81
07/29/88	--	68	89
07/30/88	0.72	67	71
07/31/88	--	70	82
08/01/88	--	68	90
08/02/88	--	69	92
08/03/88	--	69	91
08/04/88	--	70	91
08/05/88	--	70	87
08/06/88	0.05	75	76
08/07/88	--	73	86
08/08/88	--	64	89
08/09/88	--	65	91
08/10/88	--	69	92
08/11/88	--	67	92
08/12/88	--	70	92
08/13/88	--	72	91
08/14/88	--	72	100
08/15/88	0.07	75	76
08/16/88	--	69	90
08/17/88	--	68	91
08/18/88	--	72	97
08/19/88	0.88	71	90
08/20/88	0.15	71	67
08/21/88	--	56	80
08/22/88	--	56	82
08/23/88	1.13	63	71
08/24/88	--	69	79
08/25/88	--	59	81
08/26/88	--	61	77
08/27/88	--	57	89
08/28/88	--	68	83
08/29/88	0.34	69	69
08/30/88	--	54	73
08/31/88	--	54	75
09/01/88	--	54	79
09/02/88	--	55	82
09/03/88	0.65	60	82
09/04/88	0.60	69	83
09/05/88	--	64	64
09/06/88	--	51	64
09/07/88	--	66	68
09/08/88	--	45	75

Date	Rain (in)	Temp(ˆF) AM	Temp(ˆF) PM
09/09/88	--	48	74
09/10/88	--	55	78
09/11/88	--	56	81
09/12/88	0.12	57	80
09/13/88	--	72	83
09/14/88	--	54	79
09/15/88	--	52	73
09/16/88	--	50	73
09/17/88	0.02	65	70
09/18/88	--	66	73
09/19/88	--	63	63
09/20/88	0.24	70	75
09/21/88	--	55	62
09/22/88	--	58	73
09/23/88	0.32	67	70
09/24/88	0.18	61	59
09/25/88	0.12	57	60
09/26/88	--	53	65
09/27/88	--	50	77
09/28/88	--	51	76
09/29/88	--	56	76
09/30/88	--	58	79
10/01/88	--	59	80
10/02/88	0.25	69	82
10/03/88	--	58	64
10/04/88	--	44	61
10/05/88	--	38	53
10/06/88	--	37	55
10/07/88	--	39	53
10/08/88	--	37	56
10/09/88	--	41	59
10/10/88	0.18	45	45
10/11/88	--	42	51
10/12/88	--	34	44
10/13/88	--	31	50
10/14/88	--	28	61
10/15/88	--	35	64
10/16/88	--	41	69
10/17/88	--	49	66
10/18/88	1.10	61	61
10/19/88	--	46	54
10/20/88	--	37	54
10/21/88	0.48	45	47
10/22/88	0.03	46	44
10/23/88	0.20	47	54
10/24/88	0.30	46	46
10/25/88	--	41	54
10/26/88	--	31	46

Date	Rain (in)	Temp(ˆF) AM	Temp(ˆF) PM
10/27/88	--	25	57
10/28/88	0.03	54	53
10/29/88	--	28	58
10/30/88	--	35	56
10/31/88	--	26	57
11/01/88	--	44	56
11/02/88	--	41	45
11/03/88	--	29	60
11/04/88	0.10	50	73
11/05/88	1.07	57	54
11/06/88	0.27	44	41
11/07/88	--	37	45
11/08/88	--	37	39
11/09/88	--	40	59
11/10/88	0.11	59	52
11/11/88	--	36	45
11/12/88	--	29	55
11/13/88	0.33	46	53
11/14/88	--	32	59
11/15/88	--	32	63
11/16/88	0.04	52	70
11/17/88	--	41	45
11/18/88	--	24	50
11/19/88	0.33	39	45
11/20/88	1.76	50	64
11/21/88	--	42	44
11/22/88	--	38	49
11/23/88	--	50	50
11/24/88	--	26	51
11/25/88	--	27	59
11/26/88	--	34	62
11/27/88	0.24	57	64
11/28/88	0.04	40	33
11/29/88	--	35	43
11/30/88	--	45	28
12/01/88	--	35	38
12/02/88	--	31	37
12/03/88	--	33	55
12/04/88	--	32	40
12/05/88	--	30	45
12/06/88	--	26	53
12/07/88	0.01	28	26
12/08/88	--	31	28
12/09/88	--	28	31
12/10/88	0.02	22	36
12/11/88	--	14	33
12/12/88	--	6	22
12/13/88	0.11	24	32

Date	Rain (in)	Temp(°F) AM	Temp(°F) PM
12/14/88	--	25	44
12/15/88	--	38	34
12/16/88	--	15	26
12/17/88	--	22	24
12/18/88	0.01	19	21
12/19/88	--	21	42
12/20/88	--	28	21
12/21/88	0.26	47	28
12/22/88	0.16	28	28
12/23/88	0.48	40	33
12/24/88	0.81	38	31
12/25/88	--	41	38
12/26/88	--	24	32
12/27/88	--	34	21
12/28/88	0.15	47	27
12/29/88	--	22	28
12/30/88	--	22	38
12/31/88	--	24	42

APPENDIX O-2

OCTOBER 1989 ADDENDUM TO THE APRIL 1989 AIR MONITORING REPORT

ORMET CORPORATION
HANNIBAL, OHIO

Energy & Environmental Management, Inc.
P.O. Box 71, Murrysville, PA 15668 (412) 247-5124, Fax (412) 247-1840

October 26, 1989 E^2M-731-89

Mr. John Reggi
ORMET Corporation
P.O. Box 176
State Route 7
Hannibal, OH 43931

Dear John:

As per our meeting on Friday, we have reviewed the US EPA comments on the Phase II report on Air Monitoring and have conducted additional analyses of the data from that study. The tone of the EPA letter reflects their difficulty in determining an impact value for the suspected source areas based on the data in our report. We were not able in the report to develop an impact relationship for PM_{10} because of problems related to the proximity of manufacturing emission sources. This issue was discussed with the US EPA representative from Metcalf & Eddy at the site review meeting for the Phase II study plan. We stressed, at that time, the difficulty in using a deterministic approach to assessing impact of the suspected source areas.

Our Phase II report estimated a 1.7 $\mu g/m^3$ annual increase in PM_{10} due to the suspected source area. The US EPA letter requested we present the PM_{10} data in a revised format that may lead to a better understanding of the data. Listings of the data are presented in the following tables:

- Table 1 lists the field data;
- Table 2 presents the data as differences from a background value selected as a function of the wind direction; and,
- Table 3 presents Table 2 data for persistence values greater than 70 percent.

Table 2 presents the individual daily PM_{10} values as differences. The differences were determined by using the wind direction arc data from Table 5 of our Phase II report for each day of data. This procedure may best be described by presenting an example. On March 5, 1989, the resultant wind direction was 34.48 degrees. Based on Table 5 of our Phase II report, that wind direction would make the following impact and background determination in $\mu g/m^3$:

TABLE 1

LISTING OF PM_{10} DATA FROM ORMET STUDY

Sample Date	PM_10 (ug/m^3) AM-1	AM-2	AM-3	AM-4	Wind Speed(mph) Scalar	Vector	Wind Direct (Deg)	Wind Persist (%)	Rain (in)
03/05/88	36.0	void	34.6	44.9	4.68	3.19	34.48	68.31	--
03/11/88	23.2	20.8	29.4	38.3	4.16	2.18	235.68	52.49	--
03/17/88	13.5	14.1	58.2	35.2	4.64	3.47	274.47	74.84	0.02
03/23/88	76.0	142.0	77.5	207.4	7.03	6.69	234.36	95.17	--
04/10/88	30.5	29.4	37.1	36.5	6.80	6.55	39.57	96.34	--
04/16/88	21.1	29.4	57.1	72.1	7.30	6.47	252.62	88.63	--
04/22/88	22.2	20.0	22.0	27.1	5.77	5.14	51.34	89.00	--
04/28/88	30.3	31.8	void	104.3	8.00	7.42	240.40	92.77	0.15
05/04/88	30.3	27.8	void	69.4	5.72	4.37	48.52	76.39	0.16
05/10/88	30.4	38.3	49.9	71.0	6.19	5.29	242.01	85.50	0.10
05/15/88	60.5	59.7	63.1	67.0	4.96	1.50	180.49	30.19	0.11
05/21/88	34.0	35.3	37.7	39.1	4.47	3.40	229.15	75.90	--
05/27/88	30.6	32.2	36.9	41.2	3.53	3.16	236.27	89.42	--
06/02/88	29.3	28.2	40.3	35.1	4.27	1.19	7.39	27.95	0.21
06/08/88	62.4	57.4	69.7	63.1	4.28	0.70	315.57	16.34	--
06/14/88	52.5	51.4	53.9	65.6	3.31	2.88	250.97	87.01	--
06/20/88	74.9	75.5	86.3	104.7	4.84	4.49	241.47	92.64	--
06/26/88	34.4	30.7	60.4	38.4	5.71	3.72	2.71	65.18	--
07/02/88	42.2	37.2	52.2	52.8	3.23	1.53	253.76	47.25	--
07/08/88	100.3	98.9	108.2	107.3	5.14	4.20	53.78	81.73	--
07/14/88	60.3	57.5	59.2	162.6	6.02	5.69	216.66	94.40	--
07/20/88	30.0	21.0	42.1	38.3	4.47	2.55	212.15	56.99	1.27
07/26/88	47.1	44.6	52.5	63.6	3.79	2.30	220.88	60.76	--
08/02/88	59.5	59.5	78.1	66.4	3.67	1.69	240.60	45.97	--
08/07/88	29.8	30.2	46.5	38.2	3.73	2.85	257.73	76.24	--
08/13/88	98.7	98.6	104.2	115.1	3.29	2.70	251.92	81.95	--
08/19/88	31.3	29.3	35.6	29.9	4.68	2.73	50.45	58.32	0.88
08/25/88	59.4	42.7	42.5	140.4	6.50	6.10	227.27	93.92	--
08/31/88	31.3	29.8	30.0	37.1	5.22	4.88	60.77	93.48	--
09/06/88	23.1	20.0	55.2	31.0	3.53	2.09	308.48	59.37	--
09/12/88	36.9	44.4	53.7	122.5	3.56	2.32	231.98	65.15	0.12
09/18/88	40.3	37.2	37.0	50.6	3.62	3.38	214.31	93.34	--
09/24/88	33.3	18.6	20.4	23.8	4.84	4.36	54.06	90.01	0.18
09/30/88	43.5	40.1	64.3	69.9	4.06	3.70	233.04	91.30	--
10/06/88	30.8	30.8	void	38.9	3.18	1.48	289.62	46.62	--
10/12/88	11.8	13.0	10.7	46.5	5.10	4.35	278.37	85.39	--
10/18/88	30.7	19.8	void	69.0	6.88	5.09	252.40	73.99	1.10
10/24/88	133.2	168.1	49.3	58.5	7.87	7.20	233.60	91.40	0.30
10/30/88	23.7	24.4	39.8	49.8	4.03	2.54	346.46	63.06	--
11/05/88	41.4	25.4	109.9	184.8	7.11	6.00	210.76	84.37	1.07
11/11/88	18.7	19.5	51.3	33.8	3.95	2.49	290.98	63.12	--
11/17/88	27.6	36.1	78.4	134.8	6.88	6.57	238.67	95.46	--
11/23/88	67.1	67.9	void	88.2	4.80	3.78	60.10	78.65	--
11/29/88	26.7	25.3	34.5	106.7	5.73	5.30	225.65	92.46	--
12/05/88	void	47.9	42.1	308.0	6.19	5.75	224.19	92.76	--
12/11/88	22.0	18.8	53.9	23.4	4.10	3.47	307.39	84.55	--
12/17/88	29.6	23.9	68.4	98.1	5.79	5.13	237.30	88.52	--
12/23/88	42.6	void	48.0	174.8	6.82	6.52	230.86	95.68	0.48
12/29/88	31.7	void	38.3	47.1	4.45	3.93	235.35	88.30	--

TABLE 2

SUSPECTED SOURCE PM_{10} IMPACTS BASED ON UPWIND-DOWNWIND ANALYSIS

Sample Date	PM_10 Impacts (ug/m^3) AM-1	AM-2	AM-3	AM-4	Wind Speed(mph) Scalar	Vector	Wind Direct (Deg)	Wind Persist (%)	Rain (in)
03/05/88	--	--	-1.4	8.9	4.68	3.19	34.48	68.31	--
03/11/88	-15.1	-8.6	--	--	4.16	2.18	235.63	52.49	--
03/17/88	--	.6	--	--	4.64	3.47	274.47	74.84	0.02
03/23/88	-131.4	64.5	--	--	7.03	6.69	234.36	95.17	--
04/10/88	--	--	6.6	6.0	6.80	6.55	39.57	96.34	--
04/16/88	--	-42.7	--	--	7.30	6.47	252.62	88.63	--
04/22/88	--	--	2.0	4.9	5.77	5.14	51.34	89.00	--
04/28/88	-74.0	--	--	--	8.00	7.42	240.40	92.77	0.15
05/04/88	--	--	--	39.1	5.72	4.37	48.52	76.39	0.16
05/10/88	--	-11.6	--	--	6.19	5.29	242.01	85.50	0.10
05/15/88	-2.6	--	--	3.9	4.96	1.50	180.49	30.19	0.11
05/21/88	-5.1	-2.4	--	--	4.47	3.40	229.15	75.90	--
05/27/88	-10.6	-4.7	--	--	3.53	3.16	236.27	89.42	--
06/02/88	--	--	11.0	--	4.27	1.19	7.39	27.95	0.21
06/08/88	--	--	--	--	4.28	0.70	315.57	16.34	--
06/14/88	--	-14.2	--	--	3.31	2.88	250.97	87.01	--
06/20/88	-29.8	-10.8	--	--	4.84	4.49	241.47	92.64	--
06/26/88	--	--	--	--	5.71	3.72	2.71	65.18	--
07/02/88	--	-15.6	--	--	3.23	1.53	253.76	47.25	--
07/08/88	--	--	9.3	7.0	5.14	4.20	53.78	81.73	--
07/14/88	-102.3	-1.7	--	--	6.02	5.69	216.66	94.40	--
07/20/88	-8.3	-21.1	--	--	4.47	2.55	212.15	56.99	1.27
07/26/88	-16.5	-7.9	--	--	3.79	2.30	220.88	60.76	--
08/02/88	-6.9	-18.6	--	--	3.67	1.69	240.60	45.97	--
08/07/88	--	-8.0	--	--	3.73	2.85	257.73	76.24	--
08/13/88	--	-16.5	--	--	3.29	2.70	251.92	81.95	--
08/19/88	--	--	6.3	-1.4	4.68	2.73	50.45	58.32	0.88
08/25/88	-81.0	.2	--	--	6.50	6.10	227.27	93.92	--
08/31/88	--	--	.2	-7.3	5.22	4.88	60.77	93.48	--
09/06/88	--	--	--	--	3.53	2.09	308.48	59.37	--
09/12/88	-85.6	-9.3	--	--	3.56	2.32	231.98	65.15	0.12
09/18/88	-10.3	.2	--	--	3.62	3.38	214.31	93.34	--
09/24/88	--	--	1.8	-9.5	4.84	4.36	54.06	90.01	0.18
09/30/88	-26.4	-24.2	--	--	4.06	3.70	233.04	91.30	--
10/06/88	--	--	--	--	3.18	1.48	289.62	46.62	--
10/12/88	--	1.2	--	--	5.10	4.35	278.37	85.39	--
10/18/88	--	-49.2	--	--	6.88	5.09	252.40	73.99	1.10
10/24/88	74.7	118.8	--	--	7.87	7.20	233.60	91.40	0.30
10/30/88	--	--	--	--	4.03	2.54	346.46	63.06	--
11/05/88	-143.4	-84.5	--	--	7.11	6.00	210.76	84.37	1.07
11/11/88	--	--	--	--	3.95	2.49	290.98	63.12	--
11/17/88	-107.2	-42.3	--	--	6.88	6.57	238.67	95.46	--
11/23/88	--	--	--	20.3	-4.80	3.78	60.10	78.65	--
11/29/88	-80.0	-9.2	--	--	5.73	5.30	225.65	92.46	--
12/05/88	--	5.8	--	--	6.19	5.75	224.19	92.76	--
12/11/88	--	--	--	--	4.10	3.47	307.39	84.55	--
12/17/88	-68.5	-44.5	--	--	5.79	5.13	237.30	88.52	--
12/23/88	-132.2	--	--	--	6.82	6.52	230.86	95.68	0.48
12/29/88	-15.4	--	--	--	4.45	3.93	235.35	88.30	--

TABLE 3

SUSPECTED SOURCE PM_{10} IMPACTS BASED ON UPWIND-DOWNWIND ANALYSIS AND AT WIND SPEED PERSISTENCE GREATER THAN 70 PERCENT

Sample Date	PM_10 Impacts (ug/m^3) AM-1	AM-2	AM-3	AM-4	Wind Speed(mph) Scalar	Vector	Wind Direct (Deg)	Wind Persist (%)	Rain (in)
03/23/88	-131.4	64.5	--	--	7.03	6.69	234.36	95.17	--
04/10/88	--	--	6.6	6.0	6.80	6.55	39.57	96.34	--
04/16/88	--	-42.7	--	--	7.30	6.47	252.62	88.63	--
04/22/88	--	--	2.0	4.9	5.77	5.14	51.34	89.00	--
04/28/88	-74.0	--	--	--	8.00	7.42	240.40	92.77	0.15
05/04/88	--	--	--	39.1	5.72	4.37	48.52	76.39	0.16
05/10/88	--	-11.6	--	--	6.19	5.29	242.01	85.50	0.10
05/21/88	-5.1	-2.4	--	--	4.47	3.40	229.15	75.90	--
05/27/88	-10.6	-4.7	--	--	3.53	3.16	236.27	89.42	--
06/14/88	--	-14.2	--	--	3.31	2.88	250.97	87.01	--
06/20/88	-29.8	-10.8	--	--	4.84	4.49	241.47	92.64	--
07/08/88	--	--	9.3	7.0	5.14	4.20	53.78	81.73	--
07/14/88	-102.3	-1.7	--	--	6.02	5.69	216.66	94.40	--
08/07/88	--	-8.0	--	--	3.73	2.85	257.73	76.24	--
08/13/88	--	-16.5	--	--	3.29	2.70	251.92	81.95	--
08/25/88	-81.0	.2	--	--	6.50	6.10	227.27	93.92	--
08/31/88	--	--	.2	7.3	5.22	4.88	60.77	93.48	--
09/18/88	-10.3	.2	--	--	3.62	3.38	214.31	93.34	--
09/24/88	--	--	1.8	-9.5	4.84	4.36	54.06	90.01	0.18
09/30/88	-26.4	-24.2	--	--	4.06	3.70	233.04	91.30	--
10/12/88	--	1.2	--	--	5.10	4.35	278.37	85.39	--
10/18/88	--	-49.2	--	--	6.88	5.09	252.40	73.99	1.10
10/24/88	74.7	118.8	--	--	7.87	7.20	233.60	91.40	0.30
11/05/88	-143.4	-84.5	--	--	7.11	6.00	210.76	84.37	1.07
11/17/88	-107.2	-42.3	--	--	6.88	6.57	238.67	95.46	--
11/23/88	--	--	--	20.3	4.60	3.78	60.10	78.65	--
11/29/88	-80.0	-9.2	--	--	5.73	5.30	225.65	92.46	--
12/05/88	--	5.8	--	--	6.19	5.75	224.19	92.76	--
12/11/88	--	--	--	--	4.10	3.47	307.39	84.55	--
12/17/88	-68.5	-44.5	--	--	5.79	5.13	237.30	88.52	--
12/23/88	-132.2	--	--	--	6.82	6.52	230.86	95.68	0.48
12/29/88	-15.4	--	--	--	4.45	3.93	235.35	88.30	--
Average	-58.9	-8.4	4.0	10.7					

Site	Impact	Background	Impact
AM-3	34.6	36.0 (from AM-1)	-1.4
AM-4	44.9	36.0 (from AM-1)	8.9

This analysis was done for each day for each site to yield the detailed impact listing in Table 2.

Data from Table 2 were further analyzed by selecting only those values for days on which the wind speed persistence exceeded 70 percent. These days are listed in Table 3. This has the effect of selecting days where winds are unidirectional and may lead to a meaningful upwind-downwind analysis. Results for days with the wind from upriver (northeast) appear to give us the most stable impact data. Impacts from the suspected source area are not confounded by the manufacturing emissions when winds are from the northeast. Under high wind persistence, the mean value at AM-4 was 10.7 $\mu g/m^3$ and at AM-3 was 4.0 $\mu g/m^3$. These values appear to follow a functional relationship where impacts decrease with distance from the suspected source area. Site AM-4 is 780 feet from the center of the suspected source area and Site AM-3 is 1270 feet from the center of the suspected source area. These two values could be used to approximate impacts at greater distances from the suspected source areas, but with a note of caution. Impacts developed by this method would only be appropriate for the major wind axis, southwest to northeast. Any deviation to a minor axis, northwest or southeast would not be appropriate because the data were developed for only the major axis air flows. The major axis air flows constitute approximately 75 percent of the year based on our Phase I studies at Ormet. Winds tend to blow up or down river 75 percent of the time and it is at this time that the above functional relationship can be used. The annual impacts may be 4.0 $\mu g/m^3$ at 1270 feet to the southwest and to the northeast, but this property is owned by Ormet and not part of ambient air for purposes of assessing compliance with the National Ambient Air Quality Standards (NAAQS).

The nearest property line at Ormet where public has unrestricted access is to the northwest approximately 1200 feet from the suspected source area. Minor axis air flow PM_{10} impacts were not determined because we experienced so few days of those types of air flows. If one assumes that the off-axis annual impacts are one half of the major axis impacts, then the annual impacts to the northwest would be 2.0 $\mu g/m^3$. This value compares well to the 1.7 $\mu g/m^3$ value from our Phase II report.

We are preparing a more detailed analysis of the estimated annual impacts by using the wind direction frequency data presented in Table 1 of our Phase II report. This analysis will distribute the

daily impacts over the complete wind rose and allow us to develop a 365-day listing of impacts at all wind directions. The 365-day listing will be averaged to yield annual impacts. This analysis will be extended to the Ormet property line. We should complete the analysis by the middle of next week.

If you have any questions, please give me a call.

Sincerely,

Larry L. Simmons

Larry L. Simmons, P.E.
Principal

LLS/das

cc: C-312

APPENDIX O-3

DECEMBER 1989 ADDENDUM TO THE APRIL 1989 AIR MONITORING REPORT

ORMET CORPORATION
HANNIBAL, OHIO

ORMET CORPORATION

P.O. BOX 176
HANNIBAL, OHIO 43931

December 13, 1989

Ms. Rhonda McBride
Remedial Project Manager (5HS-11)
U. S. Environmental Protection Agency
Region V
230 S. Dearborn Street
Chicago, IL 60604

Dear Ms. McBride:

Enclosed is a report prepared for Ormet by Energy and Environmental Management Inc., detailing additional statistical analysis of the air monitoring data collected at the Ormet site. Please include this report as part of our October 26th response to your letter dated October 2, 1989.

Please note that in our October 26th response, we indicated that the expected annual impacts to the northwest would be 2.0 ug/m^3 based on the statistical analysis you suggested. This annual impact was in agreement with the value of 1.7 ug/m^3 annual impact detailed in our original report. The enclosed more detailed and rigorous statistical analysis of the air monitoring data, based on your suggested approach and using two separate meteorological years, confirms that the expected maximum annual impact is in this range.

If you have any questions, please contact me.

Very truly yours,

John D. Reggi

John D. Reggi
Corporate Engineer-Environmental

eb

Encl.

Energy & Environmental Management, Inc.
P.O. Box 71, Murrysville, PA 15668 (412) 247-5124, Fax (412) 247-1840

November 30, 1989 E^2M-747-89

Mr. John Reggi
ORMET CORPORATION
P.O. Box 176
State Route 7
Hannibal, OH 43931

RECEIVED
DEC 04 1989
J. D. REGGI

Dear John:

Please find attached our assessment of the annual PM_{10} impacts at your facility property line as a result of emissions from the suspected source area. This assessment was described briefly in our October 26 report, E^2M-742-89.

Our Phase II report contained our estimate of 1.7 $\mu g/m^3$ as the annual PM_{10} impact due to the suspected source area. The attached analysis uses a more rigorous approach and yields maximum values for two separate meteorological years. Our findings from the attached report are summarized below:

Annual period	Maximum annual impact ($\mu g/m^3$)
1986	1.4642
June 1988-May 1989	1.5985

These findings are consistent with the 1.7 $\mu g/m^3$ value suggested in our Phase II report.

Sincerely,

Larry L. Simmons

Larry L. Simmons, P.E.
Principal

LLS/das

CC: L.E. Lambert-E^2M
C-312

ASSESSMENT OF ANNUAL PM_{10} IMPACTS AT THE PROPERTY LINE OF THE ORMET FACILITY IN HANNIBAL, OHIO

Prepared for
ORMET CORPORATION

November 30, 1989

Energy & Environmental Management, Inc.
Post Office Box 71, Murrysville, PA 15668

INTRODUCTION

This report is a follow-up to our October 26 report and addresses the expected PM_{10} impacts at the Ormet site property boundary lines. Our analysis presented at that time indicated the following occurs on days with a high wind persistence:

- 24-hour PM_{10} impacts in the downwind direction are 10.7 $\mu g/m^3$ at 780 feet from the center of the suspected source area, and
- 24-hour PM_{10} impacts in the downwind direction are 4.0 $\mu g/m^3$ at 1270 feet from the center of the suspected source area.

With this information and the wind direction patterns at the site, we have constructed an annual impact analysis. This impact assessment was made using the premise that if the winds blew in a single direction for 365 days, then the annual impacts would be the same as the 24-hour impacts at the downwind sites. It follows that if the 24-hour impacts for downwind sites are known, the annual impacts can be constructed using the percent of time that the wind blew in that direction. Wind direction data were presented in our Phase II report for meteorological data collected at the Ormet site in 1986. In addition, data from the Ormet meteorological tower was processed for the period June 1, 1988 through May 31, 1989 to provide a second year of data. Annual impacts were first estimated at 780 feet and 1270 feet for eight cardinal directions. These impacts were then interpolated or extrapolated to the property line using the two years of meteorological data. Specific details are listed in the sections that follow.

RECEPTOR GRID CONSTRUCTION

The centroid of the suspected source emissions area was visually approximated. Then eight receptor radii were drawn from this point based on geographic North (Figure 1). It was found that eight (8)

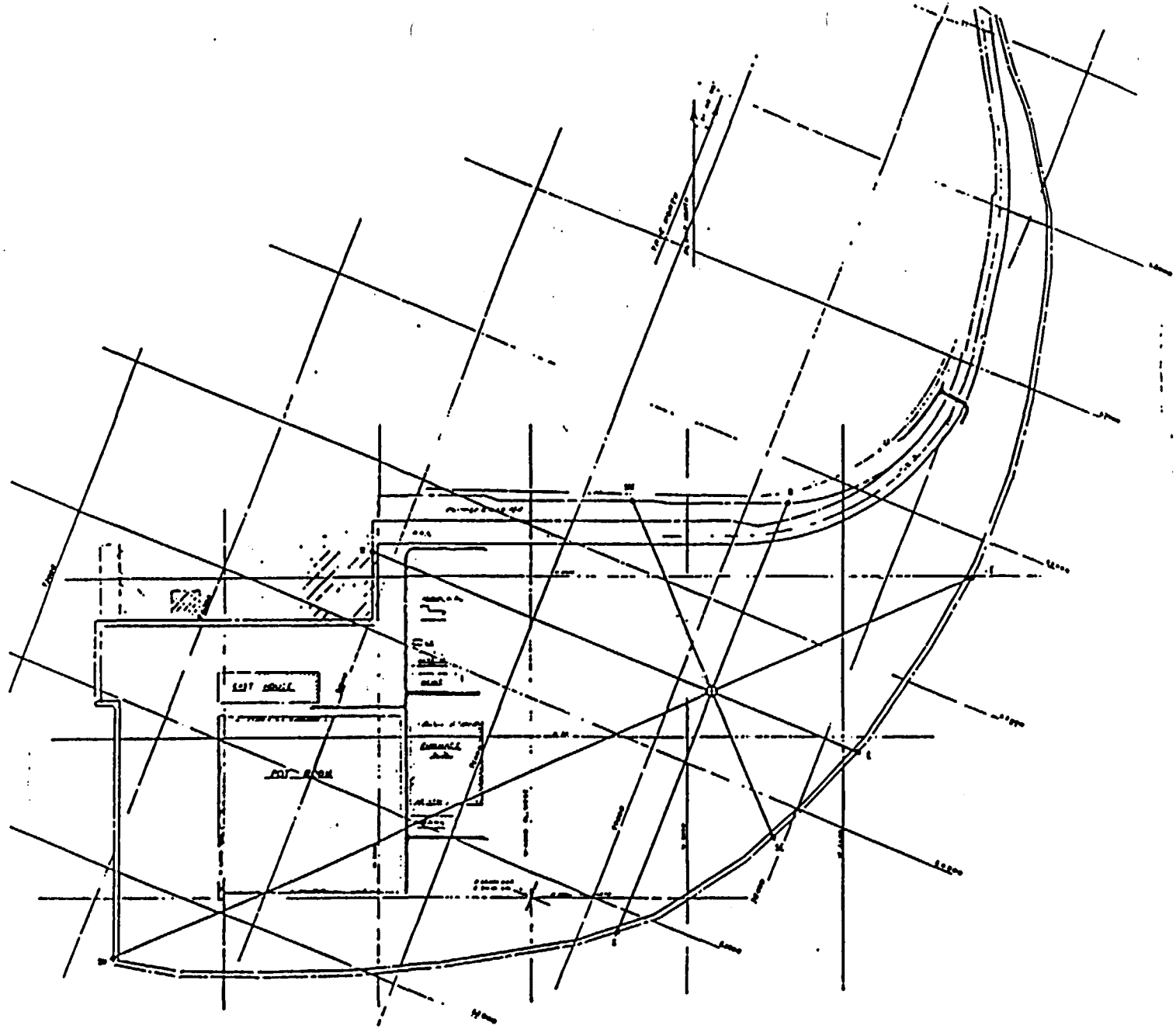


Figure 1. Receptors at Ormet Property Line.

sections of 45 degrees each was appropriate for a site of this scale. A distance in feet to the property line was found for each compass direction. The distances are listed in the fifth column of Table 1.

METEOROLOGICAL DATA

The daily frequency table of wind direction from the E^2M Phase II Report was used to find the percent wind occurrence in each compass direction. This is 1986 on-site meteorological data (Column two of Table 1). Meteorological data from the Ormet tower were analyzed over the period June 1, 1988 through May 31, 1989 to provide a second year of data. This 1988/89 on-site meteorological data is shown in Column two of Table 2.

CALCULATION

Using this information at the two distances in a logarithmic interpolation/extrapolation :

$$\log(C) = \frac{\log(10.7) - \log(4.0)}{780 - 1270} \cdot D + b$$

or

$$C = \mathrm{EXP}\,[-0.0020081 \cdot D + 3.9365305]$$

Where: C = concentration at property line
D = distance to property line

This concentration is multiplied by the fraction of occurrence of wind in that direction according to the meteorological data.

TABLE 1

ANNUAL PM_{10} IMPACTS AT ORMET PROPERTY LINE AS A RESULT OF EMISSIONS FROM THE SUSPECTED SOURCE AREA UTILIZING 1986 ON-SITE METEOROLOGICAL DATA

Direction to Property Line	% Wind Occurrence Toward*	Annual PM_{10} Impact ($\mu g/m^3$) 780	1270	Distance to Property Line (ft)	Annual PM_{10} Impact at Property Line ($\mu g/m^3$)
South	6.2	0.6634	0.2480	1631.0	0.1201
Southwest	16.6	1.7762	0.6640	4250.0	0.0017
West	2.8	0.2996	0.1120	2392.9	0.0117
Northwest	1.6	0.1712	0.0640	1309.5	0.0591
North	5.6	0.5992	0.2240	1273.8	0.2223
Northeast	34.2	3.6594	1.3680	1809.5	0.4630
East	21.8	2.3326	0.8720	1011.9	1.4642
Southeast	11.0	1.1770	0.4400	988.1	0.7750

* From E^2M Phase II Report for 1986 on-site meteorological data and corresponding to the direction the wind is blowing.

TABLE 2

ANNUAL PM_{10} IMPACTS AT ORMET PROPERTY LINE AS A RESULT OF EMISSIONS FROM THE SUSPECTED SOURCE AREA UTILIZING 1988/1989 ON-SITE METEOROLOGICAL DATA

Direction to Property Line	% Wind Occurrence Toward*	Annual PM_{10} Impact ($\mu g/m^3$) 780	1270	Distance to Property Line (ft)	Annual PM_{10} Impact at Property Line ($\mu g/m^3$)
South	4.4	0.4708	0.1760	1631.0	0.0852
Southwest	7.6	0.8100	0.3028	4250.0	0.0008
West	4.8	0.5136	0.1920	2392.9	0.0201
Northwest	1.3	0.1391	0.0520	1309.5	0.0480
North	9.2	0.9844	0.3680	1273.8	0.3652
Northeast	38.0	4.0660	1.5200	1809.5	051440
East	23.8	2.5466	0.9520	1011.9	1.5985
Southeast	10.9	1.1663	0.4360	988.1	0.7680

* From 6/1/88 - 5/31/89 on-site meteorological data and corresponding to the direction the wind is blowing.

RESULTS

The results are given in the last column of Tables 1 and 2. It can be seen that the maximum annual impacts using 1986 data was 1.4642 $\mu g/m^3$ which occurred at the Eastern property line receptor. Maximum annual impact using 1988/1989 data was 1.5985 $\mu g/m^3$, which also occurred at the Eastern property line boundary. These results are shown graphically in Figure 2. Maximum annual impacts occur in the downwind direction with the highest frequency of occurrence.

SUMMARY

Annual PM_{10} impacts were estimated at the property line. These impacts were based on findings from our ten month Phase II study and extrapolation or interpolation of these findings to the property line. Results for 1986 and 1988/1989 were consistent with the maximum impacts occurring at the Eastern property line. Maximum annual PM_{10} impacts were 1.4642 $\mu g/m^3$ and 1.5985 $\mu g/m^3$ for 1986 and 1988/1989, respectively.

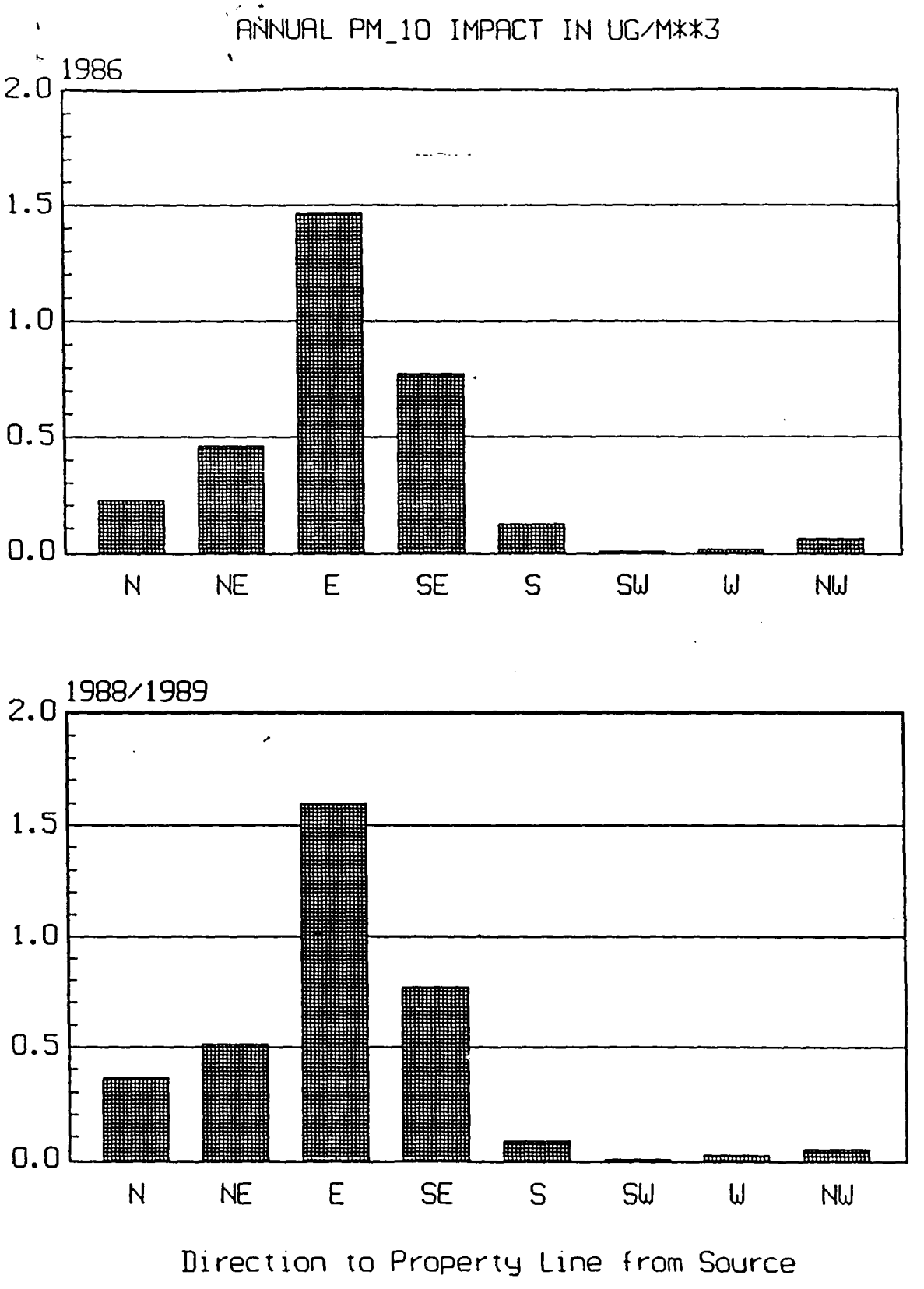


Figure 2. Annual PM_{10} Impacts at Ormet Property Line.

APPENDIX P

PARTICLE SIZE ANALYSES FOR SAMPLES FROM THE SURFACE OF THE FORMER DISPOSAL PONDS AND THE FORMER SPENT POTLINER STORAGE AREA

ORMET CORPORATION
HANNIBAL, OHIO

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 1-A
NUS SAMPLE NO: P0151874
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.8	% Passed
	h. Sieve No. 10	99.1	% Passed
	i. Sieve No. 20	97.1	% Passed
	j. Sieve No. 40	90.8	% Passed
	k. Sieve No. 60	81.3	% Passed
	l. Sieve No. 140	55.9	% Passed
	m. Sieve No. 200	42.6	% Passed
	n. Particle Size .023	9.8	% Passed
	o. Particle Size .006	3.6	% Passed
	p. Particle Size .001	1.5	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083:
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 1-B
NUS SAMPLE NO: P0151875
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.8	% Passed
	h. Sieve No. 10	99.7	% Passed
	i. Sieve No. 20	99.3	% Passed
	j. Sieve No. 40	97.3	% Passed
	k. Sieve No. 60	90.9	% Passed
	l. Sieve No. 140	65.2	% Passed
	m. Sieve No. 200	52.6	% Passed
	n. Particle Size .023	18.2	% Passed
	o. Particle Size .007	9.9	% Passed
	p. Particle Size .001	3.6	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083:
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 1-C
NUS SAMPLE NO: P0151876
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	g. Sieve No. 4	100.0	% Passed
	h. Sieve No. 10	99.4	% Passed
	i. Sieve No. 20	96.6	% Passed
	j. Sieve No. 40	84.5	% Passed
	k. Sieve No. 60	59.0	% Passed
	l. Sieve No. 140	20.1	% Passed
	m. Sieve No. 200	10.9	% Passed
	n. Particle Size .023	0.0	% Passed
	o. Particle Size .007	0.0	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 2-A
NUS SAMPLE NO: P0151877
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.1	% Passed
	h. Sieve No. 10	96.7	% Passed
	i. Sieve No. 20	93.0	% Passed
	j. Sieve No. 40	89.0	% Passed
	k. Sieve No. 60	86.1	% Passed
	l. Sieve No. 140	81.4	% Passed
	m. Sieve No. 200	77.7	% Passed
	n. Particle Size .022	33.9	% Passed
	o. Particle Size .007	11.6	% Passed
	p. Particle Size .001	3.5	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083.
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

SAMPLE IDENTIFICATION: POND 2-B
NUS SAMPLE NO: P0151878
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	87.3	% Passed
	h. Sieve No. 10	60.7	% Passed
	i. Sieve No. 20	52.6	% Passed
	j. Sieve No. 40	47.2	% Passed
	k. Sieve No. 60	39.9	% Passed
	l. Sieve No. 140	23.3	% Passed
	m. Sieve No. 200	17.6	% Passed
	n. Particle Size .024	2.2	% Passed
	o. Particle Size .007	0.9	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 2-C
NUS SAMPLE NO: P0151879
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.8	% Passed
	h. Sieve No. 10	99.1	% Passed
	i. Sieve No. 20	97.5	% Passed
	j. Sieve No. 40	93.7	% Passed
	k. Sieve No. 60	82.5	% Passed
	l. Sieve No. 140	50.1	% Passed
	m. Sieve No. 200	34.5	% Passed
	n. Particle Size .024	5.6	% Passed
	o. Particle Size .007	3.6	% Passed
	p. Particle Size .001	1.5	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 3-A
NUS SAMPLE NO: P0151880
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.5	% Passed
	h. Sieve No. 10	98.1	% Passed
	i. Sieve No. 20	95.2	% Passed
	j. Sieve No. 40	91.0	% Passed
	k. Sieve No. 60	86.7	% Passed
	l. Sieve No. 140	63.2	% Passed
	m. Sieve No. 200	45.7	% Passed
	n. Particle Size .023	7.7	% Passed
	o. Particle Size .007	1.5	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

SAMPLE IDENTIFICATION: POND 3-B
NUS SAMPLE NO: P0151881
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.5	% Passed
	h. Sieve No. 10	97.0	% Passed
	i. Sieve No. 20	94.1	% Passed
	j. Sieve No. 40	91.8	% Passed
	k. Sieve No. 60	89.6	% Passed
	l. Sieve No. 140	78.4	% Passed
	m. Sieve No. 200	66.0	% Passed
	n. Particle Size .023	8.9	% Passed
	o. Particle Size .007	0.0	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 3-C
NUS SAMPLE NO: P0151882
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.1	% Passed
	h. Sieve No. 10	97.8	% Passed
	i. Sieve No. 20	97.2	% Passed
	j. Sieve No. 40	96.2	% Passed
	k. Sieve No. 60	94.5	% Passed
	l. Sieve No. 140	77.8	% Passed
	m. Sieve No. 200	66.3	% Passed
	n. Particle Size .023	13.5	% Passed
	o. Particle Size .007	5.5	% Passed
	p. Particle Size .001	1.4	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55930

REPORT DATE: 01/03/91

ATTENTION: BOB FARGO
CC:

SAMPLE IDENTIFICATION: POND 4-A
NUS SAMPLE NO: P0151883
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	e. 1/2 inch	100.0	% Passed
	f. 3/8 inch	99.0	% Passed
	g. Sieve No. 4	97.6	% Passed
	h. Sieve No. 10	96.7	% Passed
	i. Sieve No. 20	95.2	% Passed
	j. Sieve No. 40	93.0	% Passed
	k. Sieve No. 60	90.3	% Passed
	l. Sieve No. 140	84.3	% Passed
	m. Sieve No. 200	80.5	% Passed
	n. Particle Size .019	63.1	% Passed
	o. Particle Size .005	39.3	% Passed
	p. Particle Size .001	3.4	% Passed

COMMENTS: REVISED REPORT.

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 4-B
NUS SAMPLE NO: P0151884
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.6	% Passed
	h. Sieve No. 10	99.5	% Passed
	i. Sieve No. 20	98.7	% Passed
	j. Sieve No. 40	97.5	% Passed
	k. Sieve No. 60	96.7	% Passed
	l. Sieve No. 140	92.7	% Passed
	m. Sieve No. 200	88.6	% Passed
	n. Particle Size .019	65.0	% Passed
	o. Particle Size .006	38.3	% Passed
	p. Particle Size .001	3.5	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083:
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 4-C
NUS SAMPLE NO: P0151885
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.9	% Passed
	h. Sieve No. 10	99.7	% Passed
	i. Sieve No. 20	92.5	% Passed
	j. Sieve No. 40	88.5	% Passed
	k. Sieve No. 60	86.7	% Passed
	l. Sieve No. 140	82.2	% Passed
	m. Sieve No. 200	79.2	% Passed
	n. Particle Size .020	53.8	% Passed
	o. Particle Size .007	18.2	% Passed
	p. Particle Size .001	3.6	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

SAMPLE IDENTIFICATION: POND 5-A
NUS SAMPLE NO: P0151886
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	h. Sieve No. 10	100.0	% Passed
	i. Sieve No. 20	59.0	% Passed
	j. Sieve No. 40	44.4	% Passed
	k. Sieve No. 60	38.0	% Passed
	l. Sieve No. 140	31.6	% Passed
	m. Sieve No. 200	29.8	% Passed
	n. Particle Size .021	13.3	% Passed
	o. Particle Size .007	4.5	% Passed
	p. Particle Size .001	1.1	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-0832
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 5-B
NUS SAMPLE NO: P0151887
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	g. Sieve No. 4	100.0	% Passed
	h. Sieve No. 10	99.7	% Passed
	i. Sieve No. 20	98.9	% Passed
	j. Sieve No. 40	96.9	% Passed
	k. Sieve No. 60	93.7	% Passed
	l. Sieve No. 140	77.0	% Passed
	m. Sieve No. 200	63.8	% Passed
	n. Particle Size .023	17.1	% Passed
	o. Particle Size .007	4.6	% Passed
	p. Particle Size .001	1.5	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 5-C
NUS SAMPLE NO: P015188S
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	g. Sieve No. 4	100.0	% Passed
	h. Sieve No. 10	83.7	% Passed
	i. Sieve No. 20	53.7	% Passed
	j. Sieve No. 40	36.3	% Passed
	k. Sieve No. 60	27.4	% Passed
	l. Sieve No. 140	19.6	% Passed
	m. Sieve No. 200	18.2	% Passed
	n. Particle Size .023	17.9	% Passed
	o. Particle Size .007	12.6	% Passed
	p. Particle Size .001	3.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 5-D
NUS SAMPLE NO: P0151889
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	f. 3/8 inch	100.0	% Passed
	g. Sieve No. 4	99.6	% Passed
	h. Sieve No. 10	97.3	% Passed
	i. Sieve No. 20	92.6	% Passed
	j. Sieve No. 40	85.2	% Passed
	k. Sieve No. 60	74.3	% Passed
	l. Sieve No. 140	44.8	% Passed
	m. Sieve No. 200	29.8	% Passed
	n. Particle Size .024	2.4	% Passed
	o. Particle Size .007	0.4	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/03/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747502
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: POND 5-E
NUS SAMPLE NO: P0151890
DATE SAMPLED : 28-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	g. Sieve No. 4	100.0	% Passed
	h. Sieve No. 10	98.8	% Passed
	i. Sieve No. 20	77.5	% Passed
	j. Sieve No. 40	57.6	% Passed
	k. Sieve No. 60	47.9	% Passed
	l. Sieve No. 140	39.1	% Passed
	m. Sieve No. 200	36.2	% Passed
	n. Particle Size .022	28.9	% Passed
	o. Particle Size .007	20.7	% Passed
	p. Particle Size .001	7.6	% Passed

COMMENTS: REVISED REPORT.

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: DERAGHIS & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301

NUS CLIENT NO: 0617 0007
VENDOR NO: 0574[illegible]
WORK ORDER NO: 5523

REPORT DATE: 01/03/91

ATTENTION: BOB FARGO
CC:

SAMPLE IDENTIFICATION: SS-006
NUS SAMPLE NO: P0151891
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R VOIK

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	d. 3/4 inch	100.0	% Passed
	e. 1/2 inch	92.8	% Passed
	f. 3/8 inch	81.6	% Passed
	g. Sieve No. 4	51.5	% Passed
	h. Sieve No. 10	23.2	% Passed
	i. Sieve No. 20	14.9	% Passed
	j. Sieve No. 40	8.4	% Passed
	k. Sieve No. 60	1.7	% Passed
	l. Sieve No. 140	0.9	% Passed
	m. Sieve No. 200	0.7	% Passed
	n. Particle Size .029	0.0	% Passed
	o. Particle Size .007	0.0	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS: REVISED REPORT.

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: SB-008
NUS SAMPLE NO: P0151892
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	d. 3/4 inch	100.0	% Passed
	e. 1/2 inch	98.1	% Passed
	f. 3/8 inch	91.7	% Passed
	g. Sieve No. 4	47.3	% Passed
	h. Sieve No. 10	11.5	% Passed
	i. Sieve No. 20	3.0	% Passed
	j. Sieve No. 40	1.1	% Passed
	k. Sieve No. 60	0.6	% Passed
	l. Sieve No. 140	0.4	% Passed
	m. Sieve No. 200	0.3	% Passed
	n. Particle Size .023	0.0	% Passed
	o. Particle Size .007	0.0	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: SB-015
NUS SAMPLE NO: P0151893
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	d. 3/4 inch	100.0	% Passed
	e. 1/2 inch	93.5	% Passed
	f. 3/8 inch	85.4	% Passed
	g. Sieve No. 4	58.9	% Passed
	h. Sieve No. 10	33.7	% Passed
	i. Sieve No. 20	25.4	% Passed
	j. Sieve No. 40	18.1	% Passed
	k. Sieve No. 60	11.5	% Passed
	l. Sieve No. 140	5.7	% Passed
	m. Sieve No. 200	4.9	% Passed
	n. Particle Size .024	0.8	% Passed
	o. Particle Size .007	0.1	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205

NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-083
412-747-2500

LABORATORY ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC.
ADDRESS: 429 WASHINGTON TRUST BUILDING
WASHINGTON, PA 15301-

REPORT DATE: 01/02/91

ATTENTION: BOB FARGO
CC:

NUS CLIENT NO: 0617 0007
VENDOR NO: 05747503
WORK ORDER NO: 55830

SAMPLE IDENTIFICATION: SB-016
NUS SAMPLE NO: P0151894
DATE SAMPLED : 29-NOV-90
DATE RECEIVED: 05-DEC-90
APPROVED BY: R Volk

TEST	DETERMINATION	RESULT	UNIT
T45	Grain Size - Sieve & Hydrometer		
	d. 3/4 inch	100.0	% Passed
	e. 1/2 inch	99.2	% Passed
	f. 3/8 inch	95.3	% Passed
	g. Sieve No. 4	80.3	% Passed
	h. Sieve No. 10	43.3	% Passed
	i. Sieve No. 20	24.8	% Passed
	j. Sieve No. 40	12.9	% Passed
	k. Sieve No. 60	7.4	% Passed
	l. Sieve No. 140	3.3	% Passed
	m. Sieve No. 200	2.4	% Passed
	n. Particle Size .024	0.2	% Passed
	o. Particle Size .007	0.0	% Passed
	p. Particle Size .001	0.0	% Passed

COMMENTS:

NUS CORPORATION

Laboratory No. P151874 Sheet ____ of ____

t Name: Geraghty & Miller Project No. Pond 1-A Tested By DN Date 12/9/90

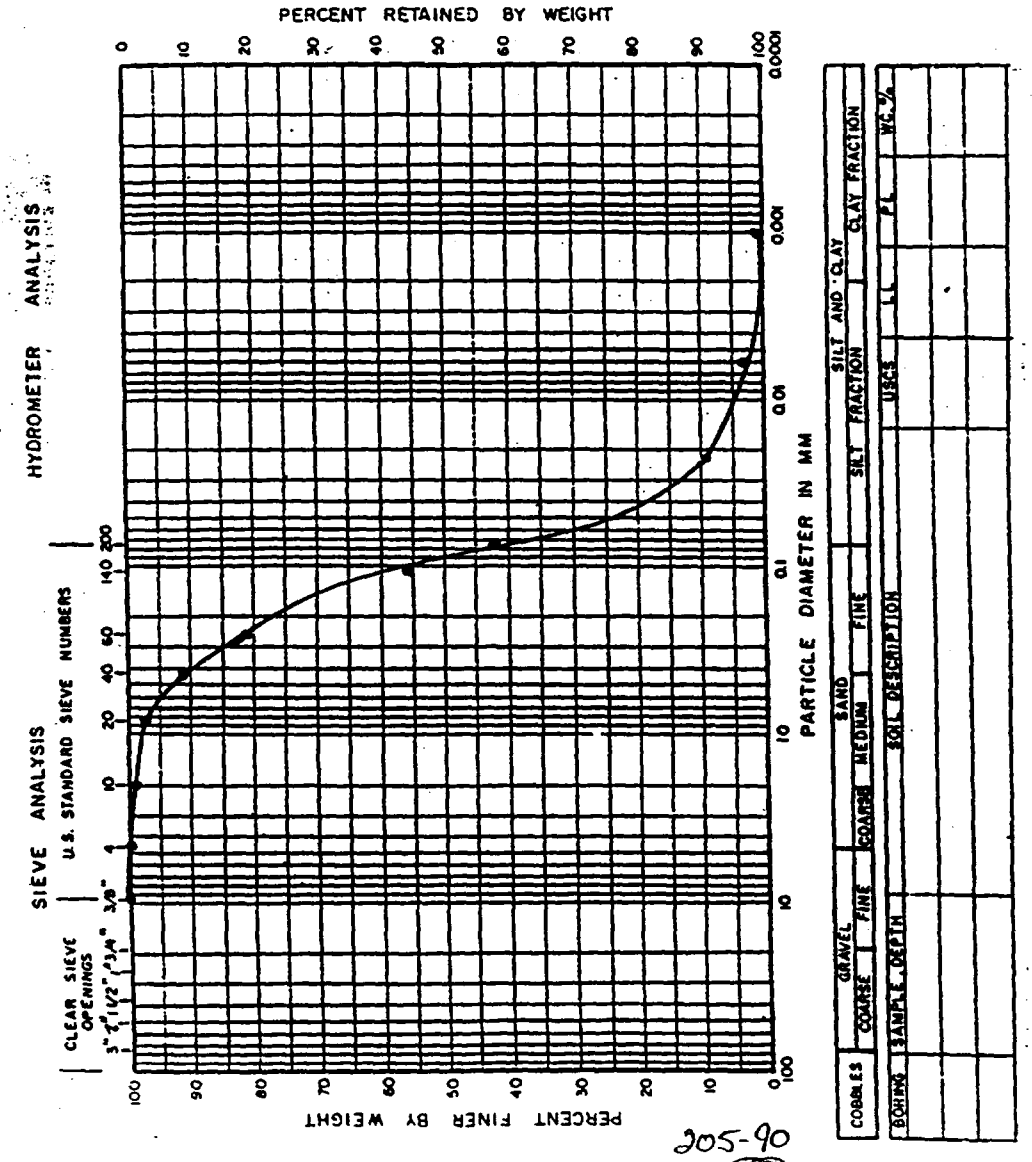
/Test Pit No. ____ Sample No. ____ Calculated By DN Date 1/2/91

e Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

e Description ____

le Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



205-90

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NUS CORPORATION

Laboratory No. P15875 Sheet ____ of ____

Name: Geraghty & Miller Project No. Pond 1-B Tested By DW Date 12/9/90

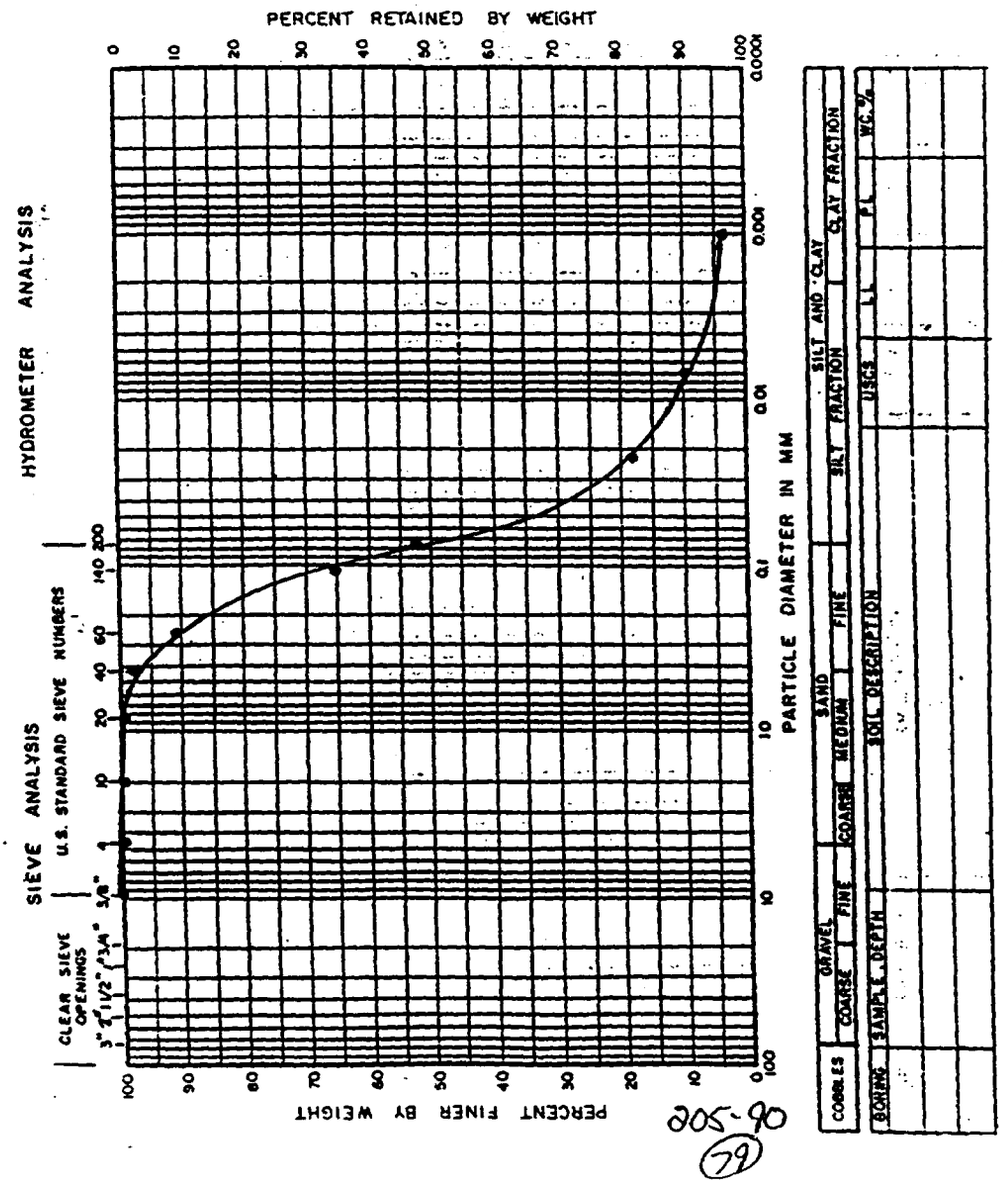
Test Pit No. ____ Sample No. ____ Calculated By DW Date 1/2/91

Depth ____ Sample Type ____ Checked By JCL Date 8 JAN 91

Description ____

Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



205-90

79

NUS CORPORATION

Laboratory No. P151876 Sheet ____ of ____

ject Name: Geraghty & miller Project No. Pond 1-C Tested By DNI Date 12/9/90

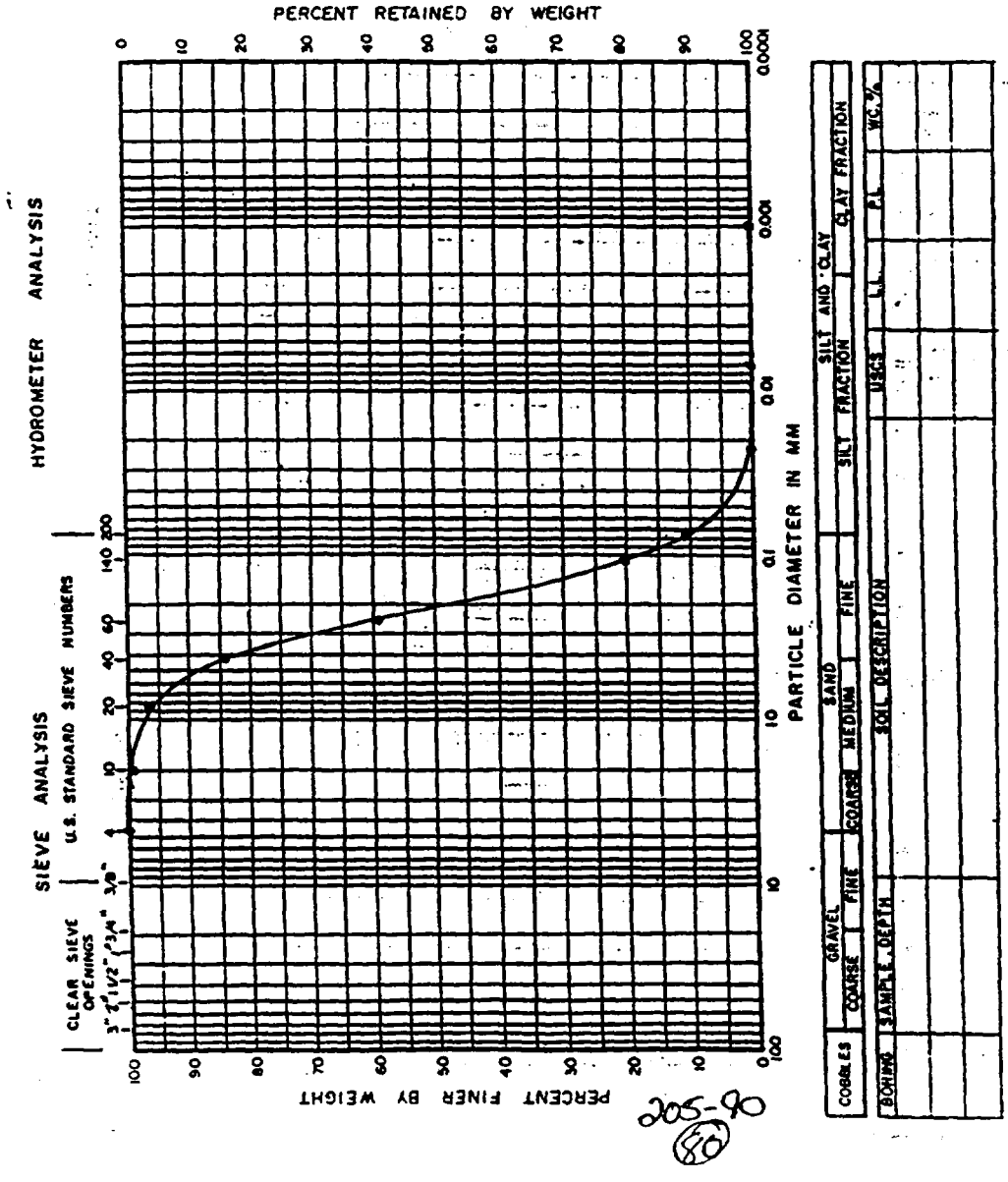
ring/Test Pit No. ____ Sample No. ____ Calculated By DNI Date 1/2/91

mple Depth ____ Sample Type ____ Checked By JCL Date 8 JAN 91

mple Description ____

mple Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



205-90
(80)

NUS CORPORATION

Laboratory No. P151877 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond 2-A Tested By DN/ Date 12/9/90

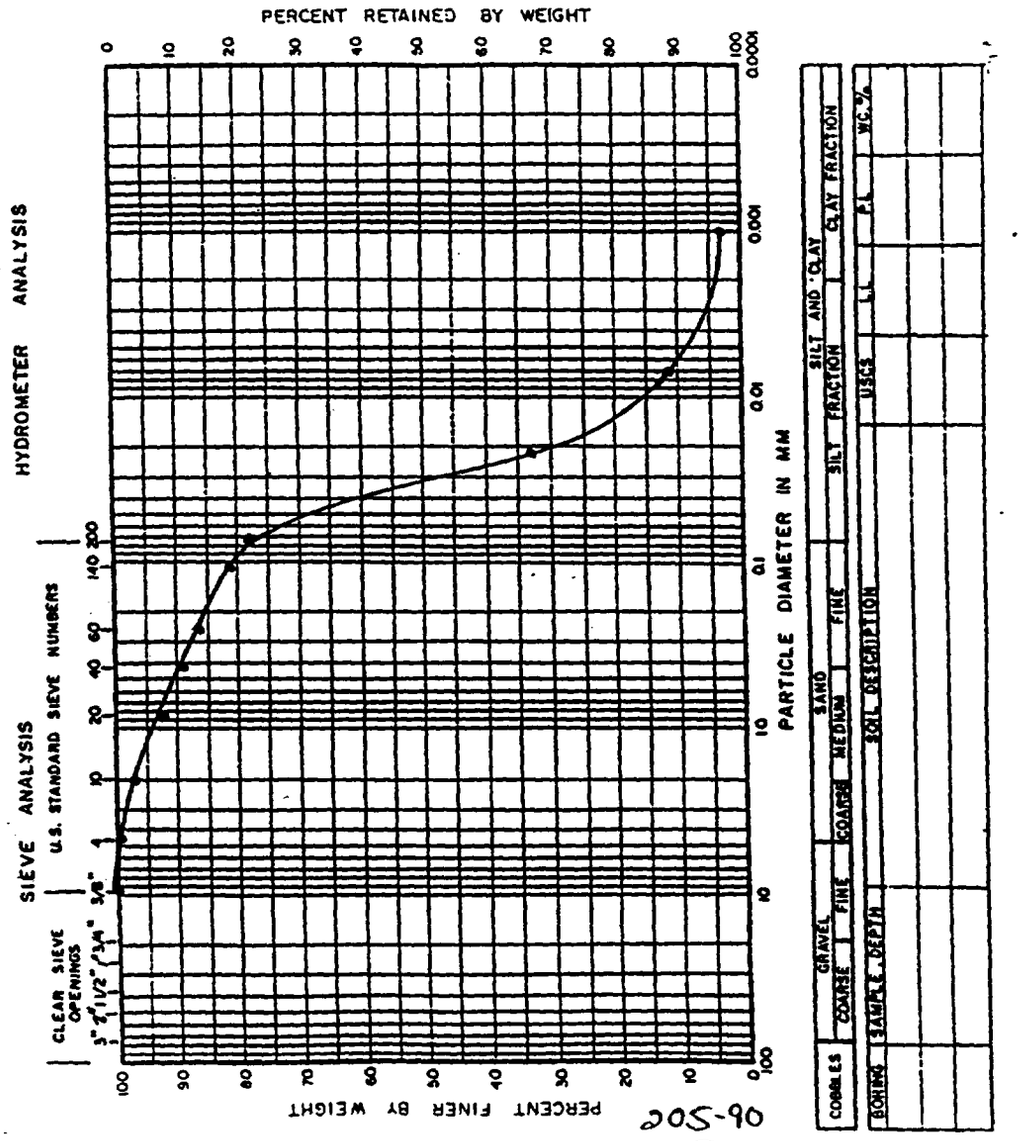
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN/ Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



205-90

(81)

NUS CORPORATION

Laboratory No. P151878 Sheet ____ of ____

Project Name: Gaughty & Miller Project No. Pond 2-B Tested By DN/ Date 12/9/90

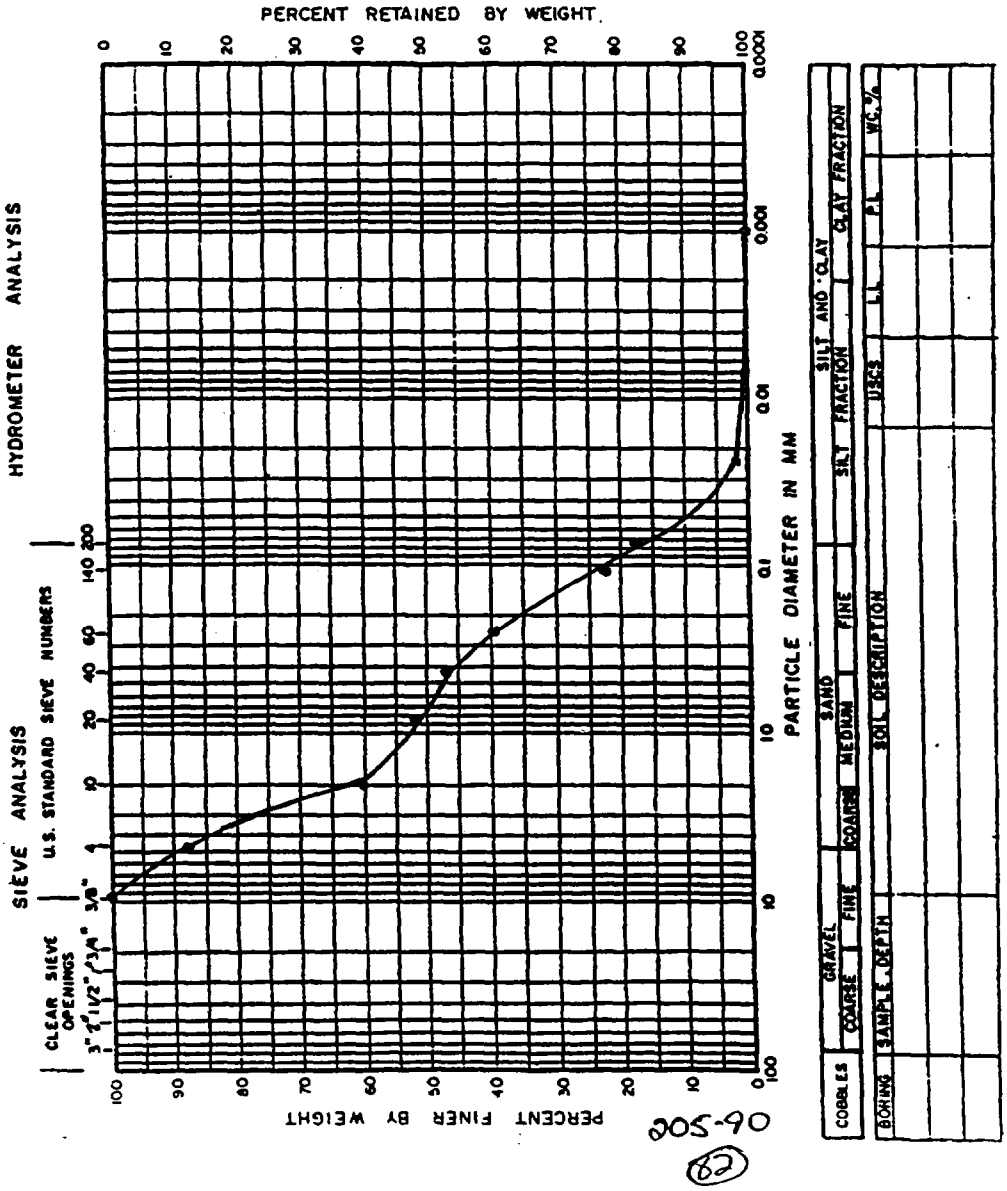
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN/ Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8 JAN 91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



205-90

(82)

NUS CORPORATION

Laboratory No. P151879 Sheet ____ of ____

Project Name: Groughty & Miller Project No. Pond 2-C Tested By DW Date 12/9/90

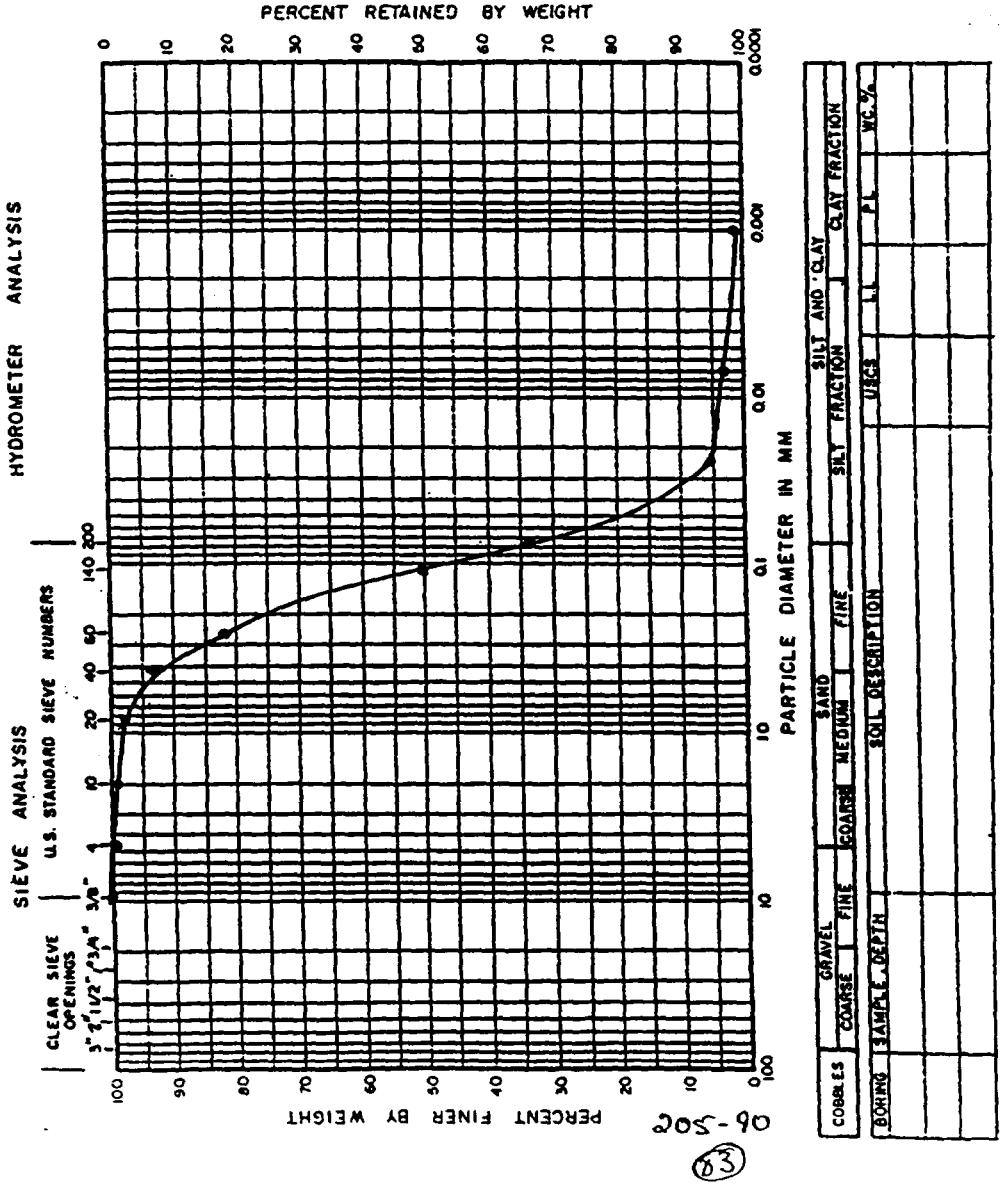
Boring/Test Pit No. ____ Sample No. ____ Calculated By DW Date 4/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



205-90

(83)

NUS CORPORATION

Laboratory No. P151880 Sheet _____ of _____

Project Name: Geraghty & Miller Project No. Pond 3-A Tested By DNI Date 12/9/90

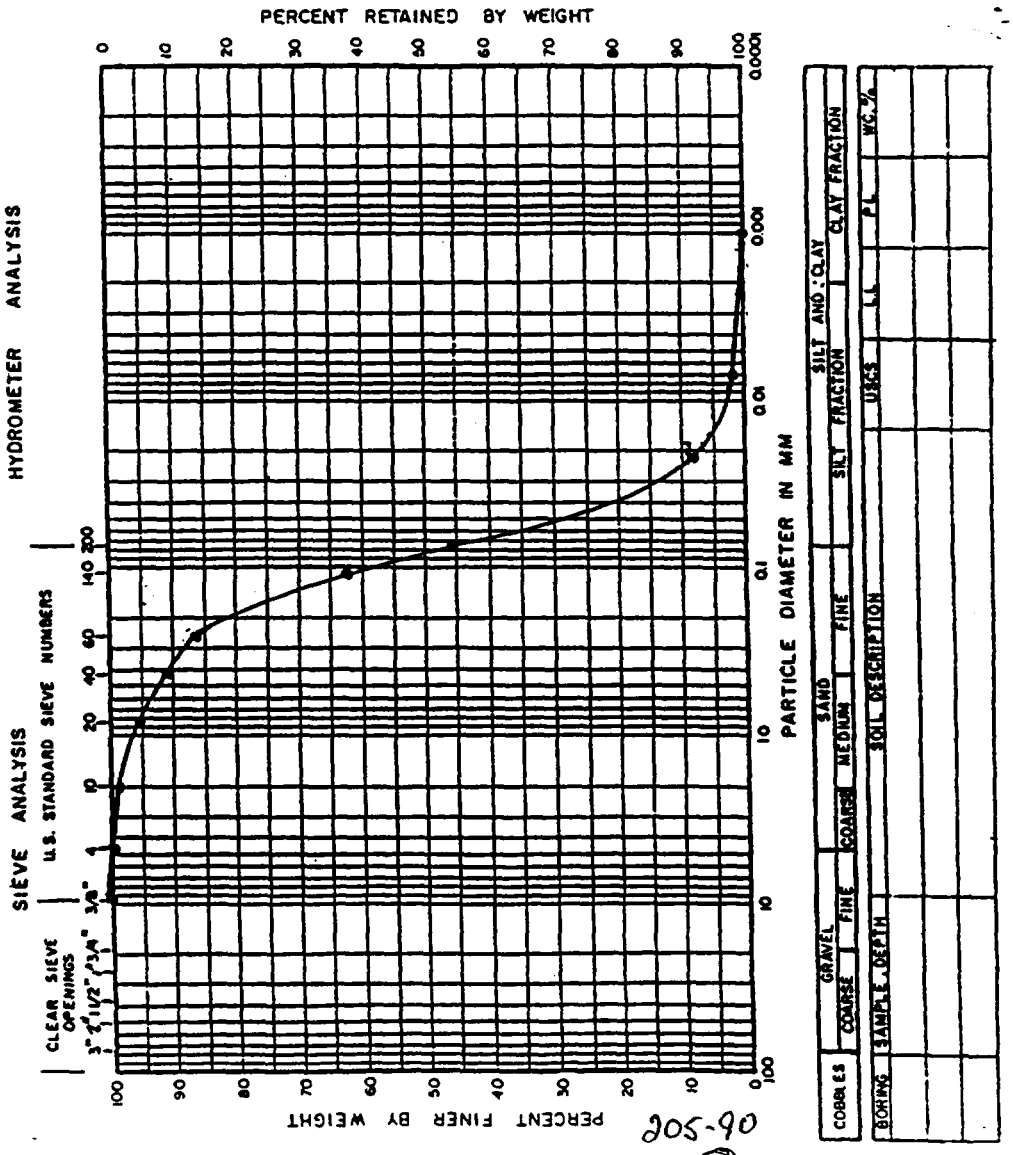
Boring/Test Pit No. _____ Sample No. _____ Calculated By DNI Date 1/2/91

Sample Depth _____ Sample Type _____ Checked By JCL Date 8JAN91

Sample Description _____

Sample Preparation Method _____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151881 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond 3-B Tested By DN Date 12/9/90

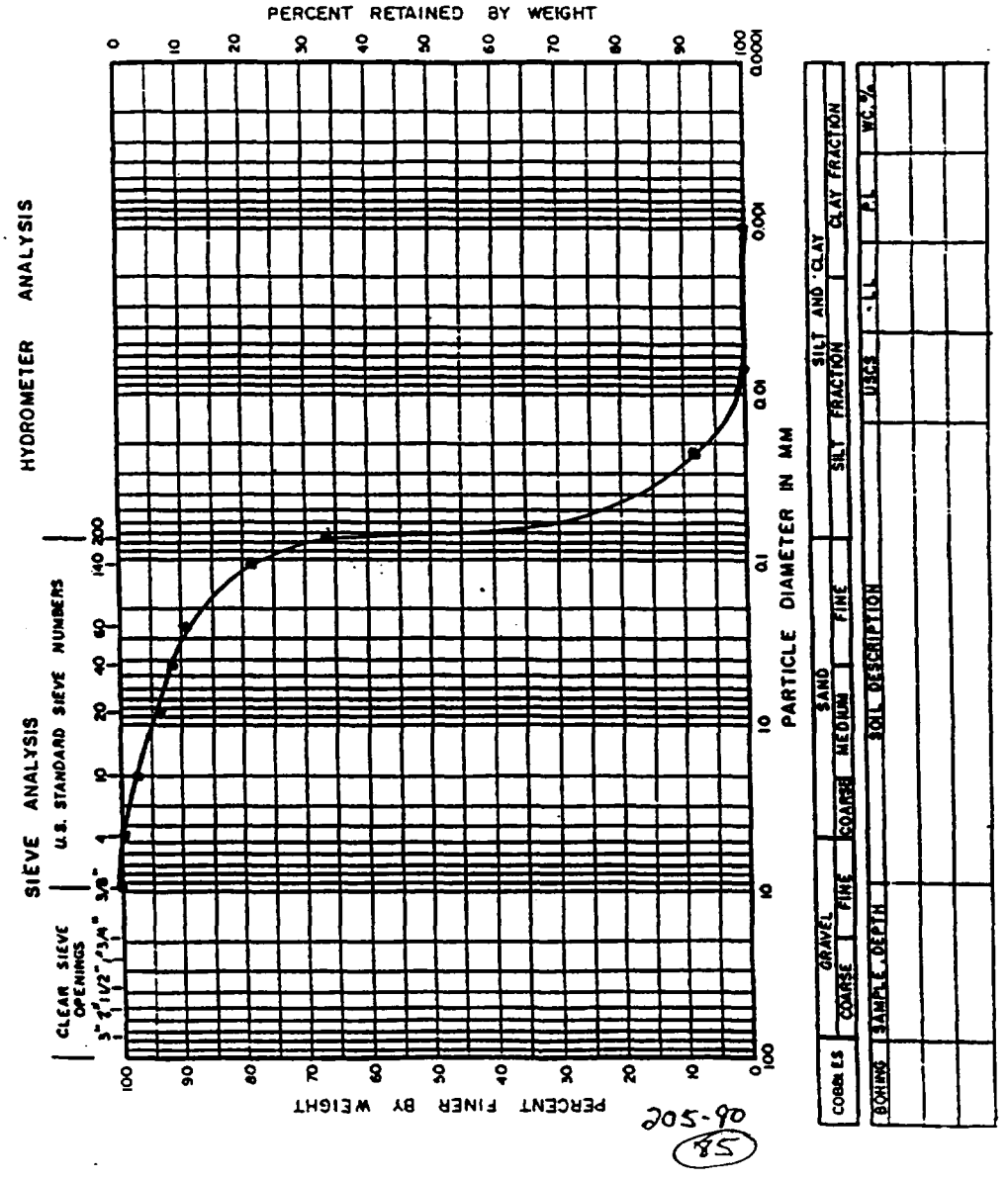
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN Date 4/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8 JAN 91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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85

NUS CORPORATION

Laboratory No. P151882 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond 3-C Tested By DN/ Date 12/7/90

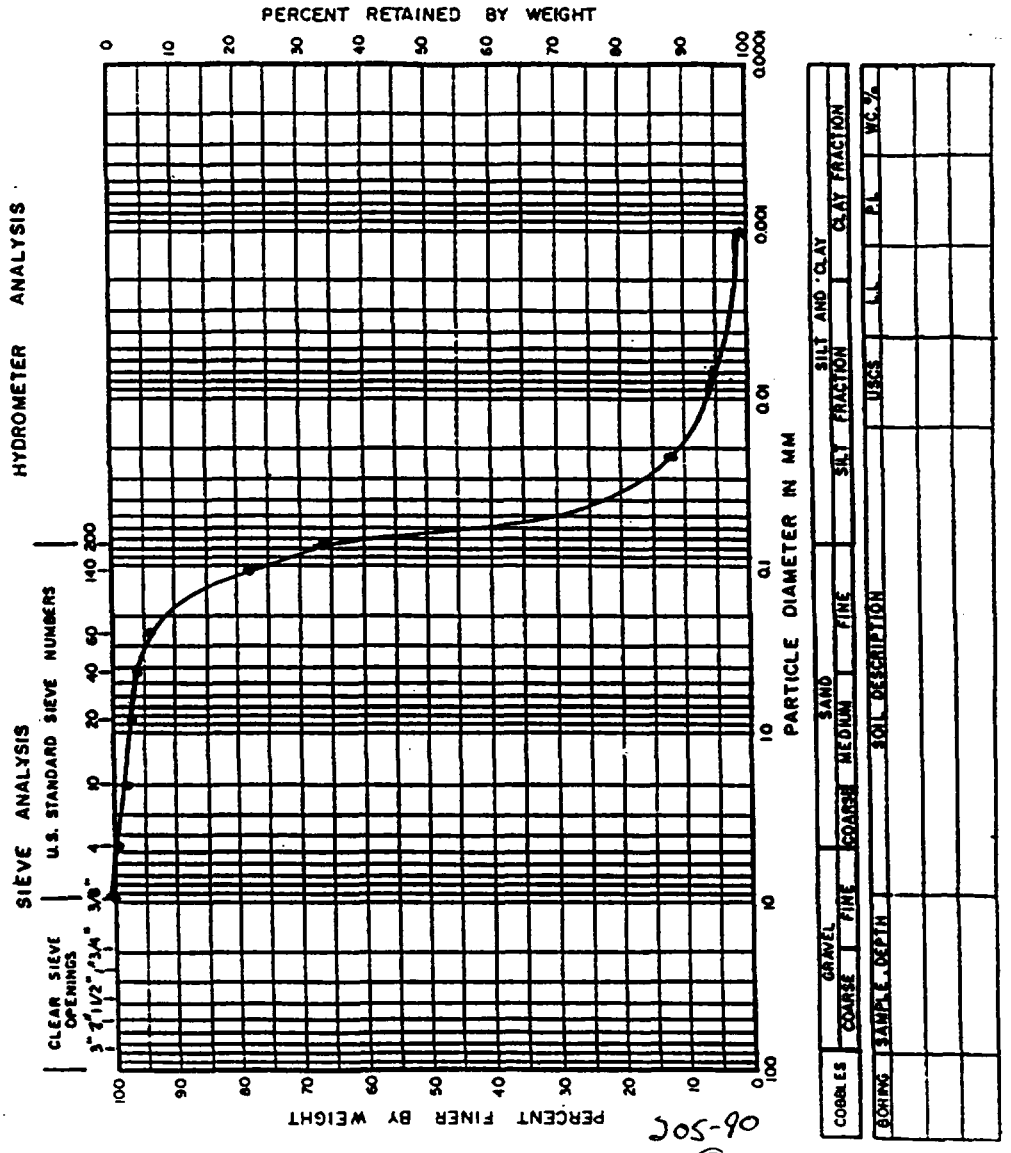
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN/ Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151873 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond 4-A Tested By DN/ Date 12/19/90

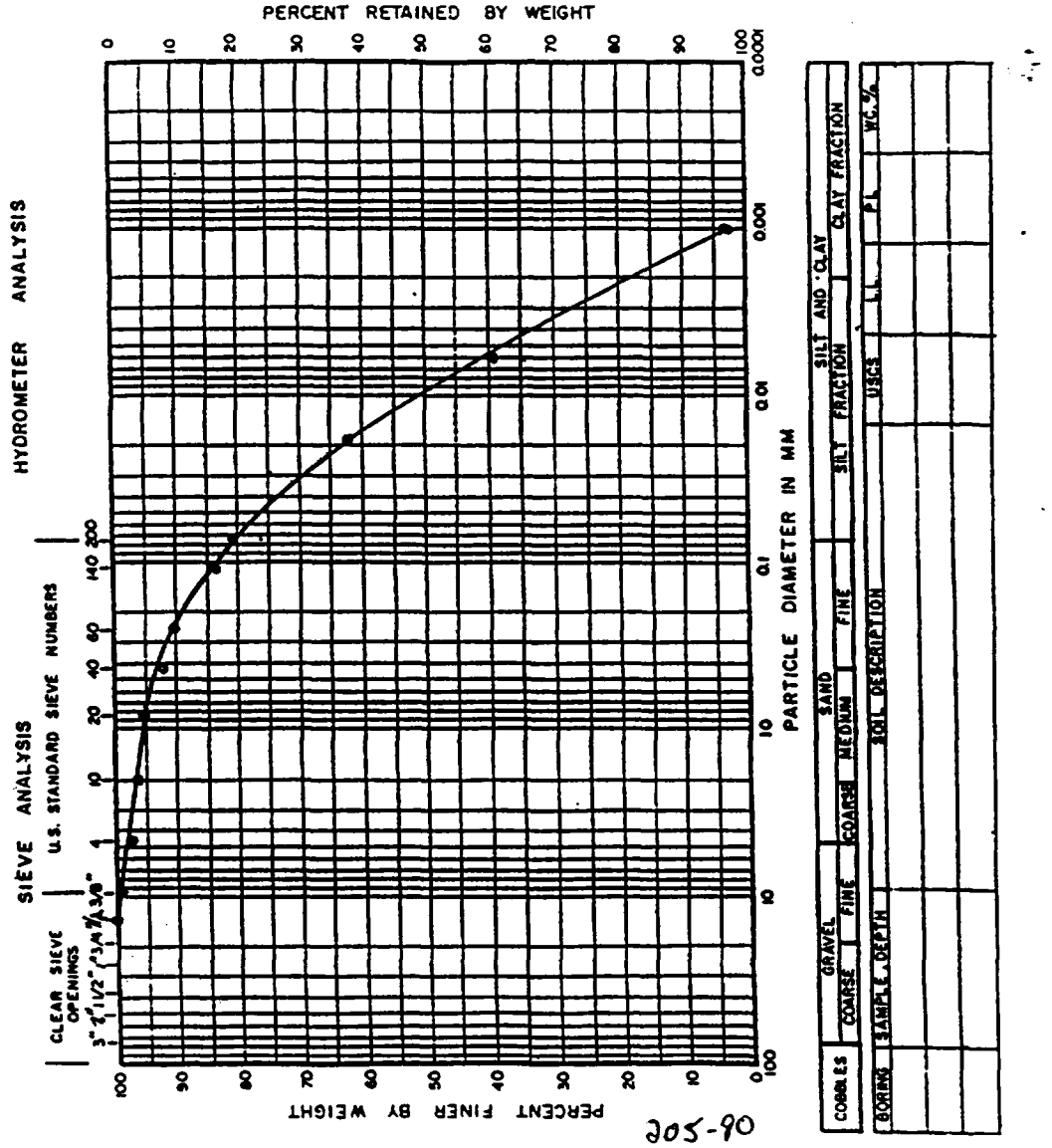
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN/ Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. A51884 Sheet ____ of ____

Project Name: Gaughty & miller Project No. Pond 4-B Tested By DW Date 12/9/90

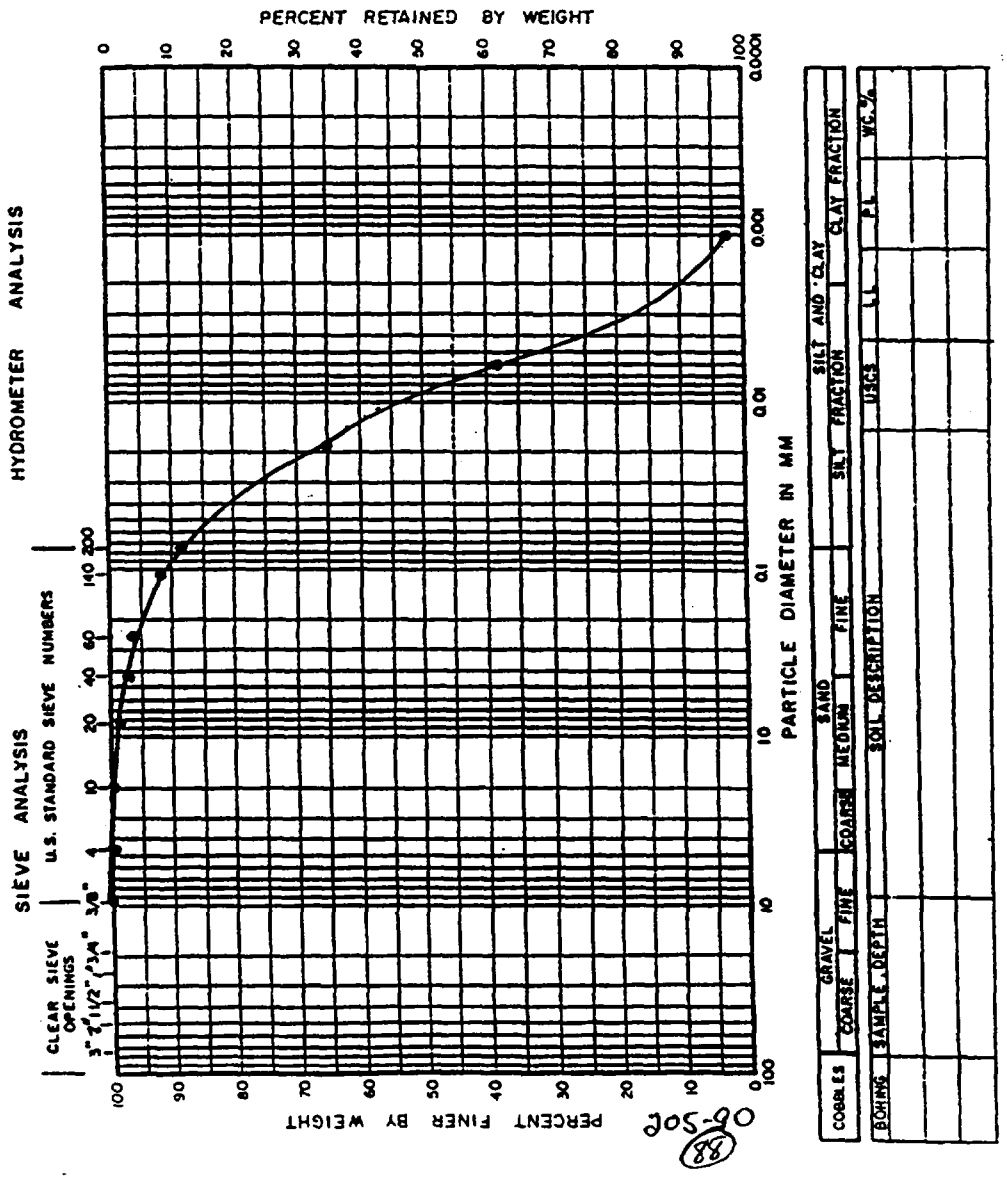
Boring/Test Pit No. ____ Sample No. ____ Calculated By DW Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151885 Sheet ____ of ____

Project Name: Geoghty & miller Project No. Pond 4-C Tested By DN/ Date 12/9/90

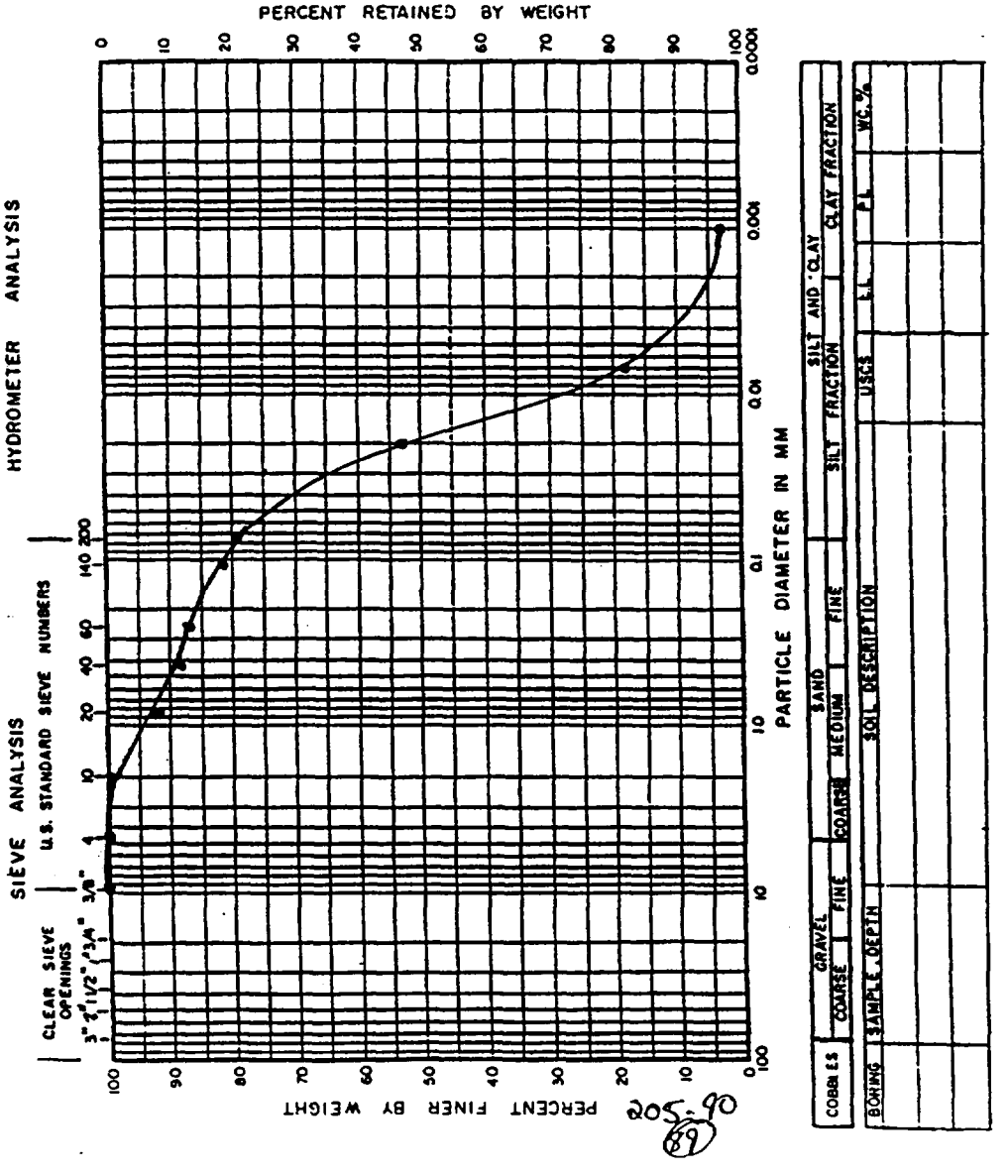
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN/ Date 4/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P15786 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond 5-A Tested By DW Date 12/9/90

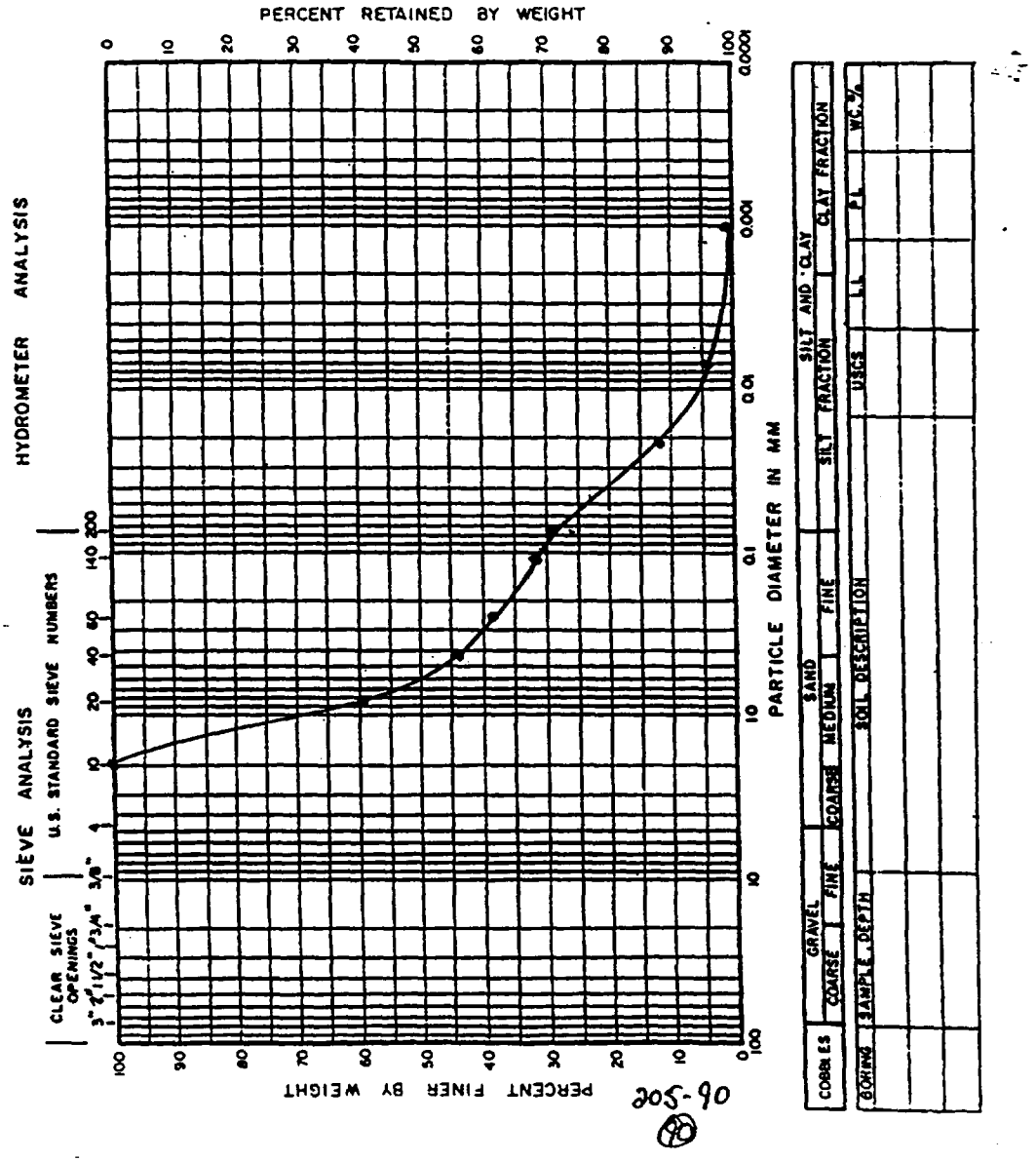
Boring/Test Pit No. ____ Sample No. ____ Calculated By DW Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8 JAN 91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. A51887 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond 5-B Tested By DNI Date 12/9/90

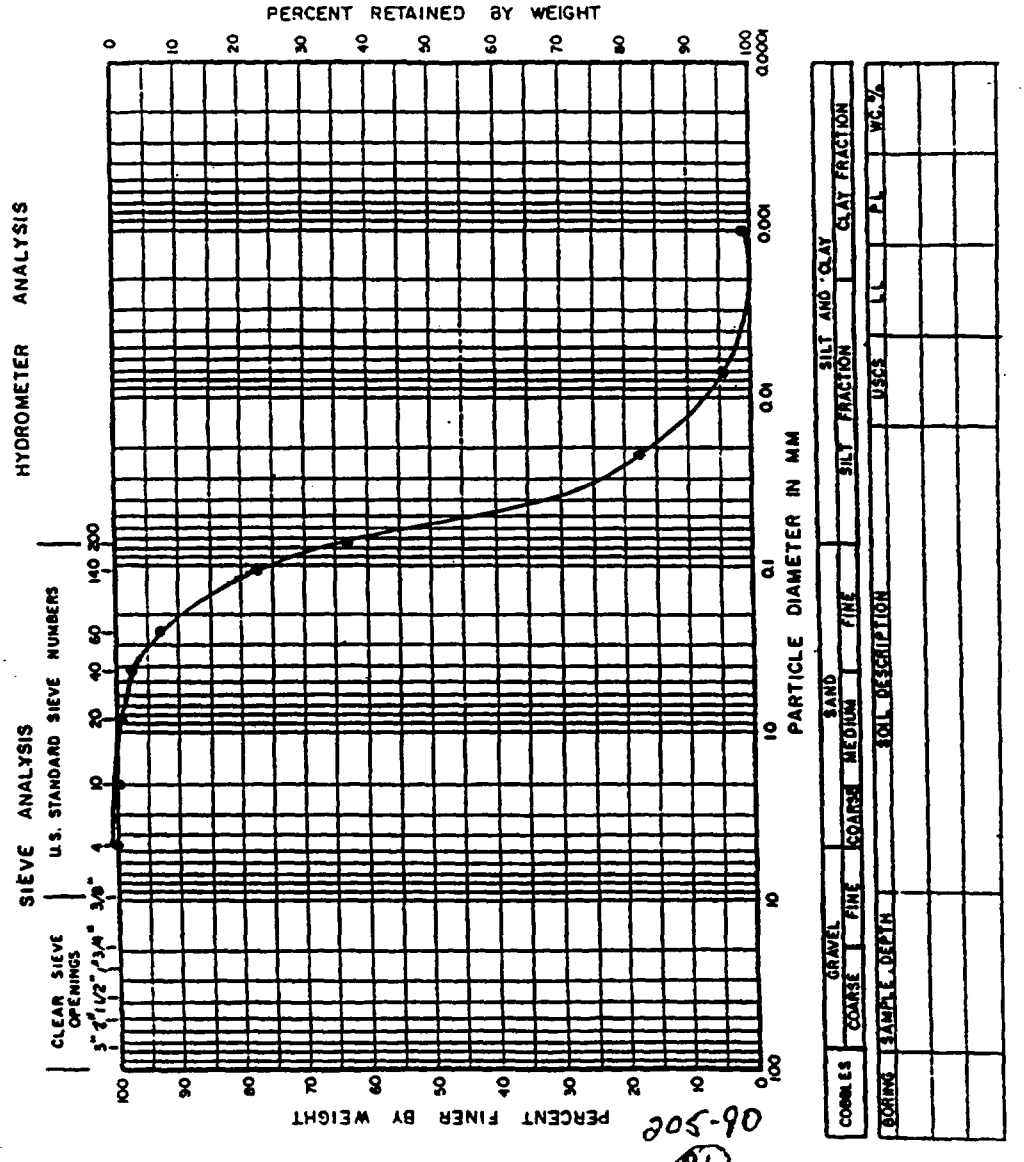
Boring/Test Pit No. ____ Sample No. ____ Calculated By DNI Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8 JAN 91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151888 Sheet ____ of ____

Project Name: Geoghty & miller Project No. Pond 5-C Tested By DNJ Date 12/9/90

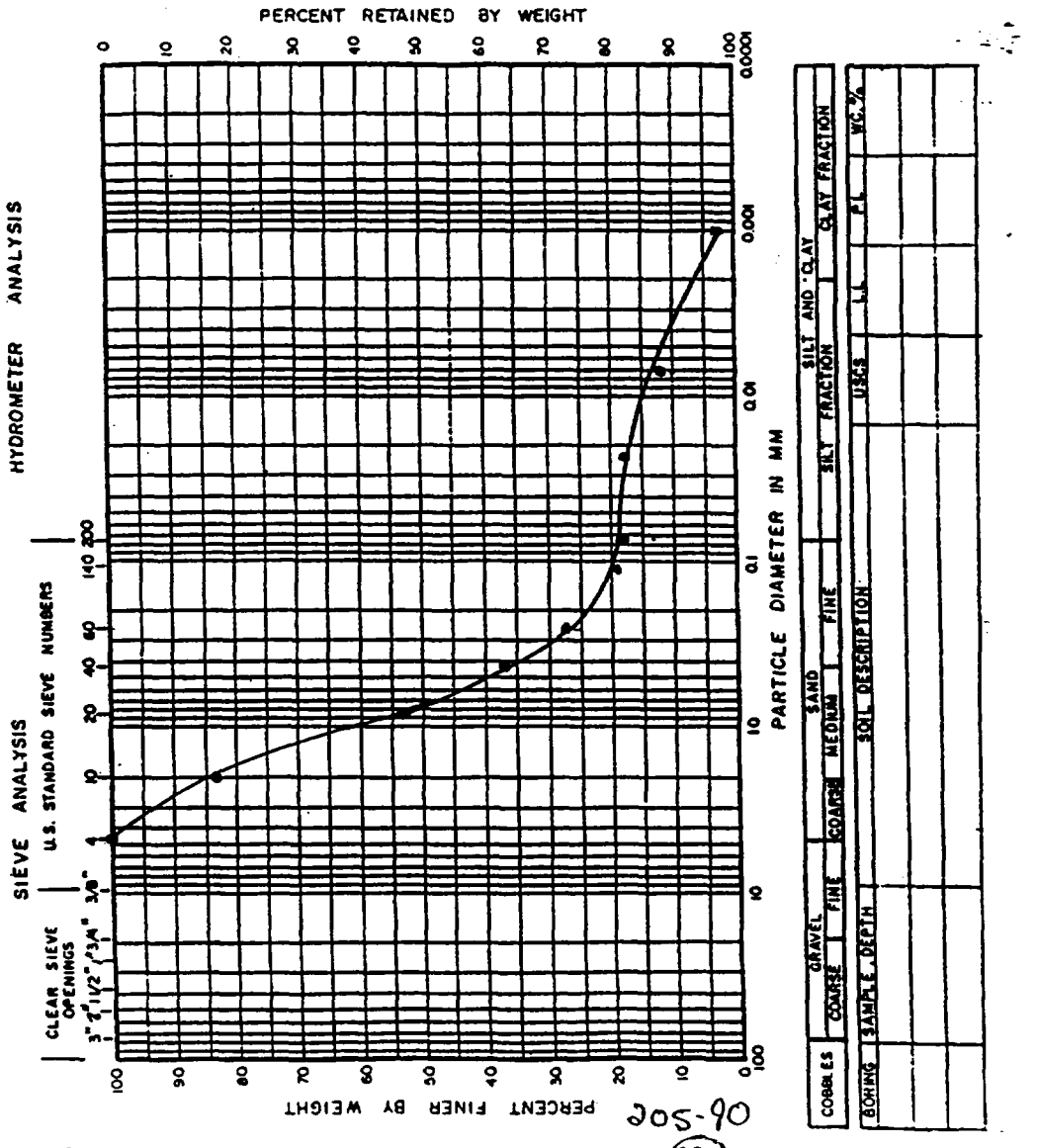
Boring/Test Pit No. ____ Sample No. ____ Calculated By DNJ Date 4/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151884 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond 5-D Tested By DW Date 12/9/90

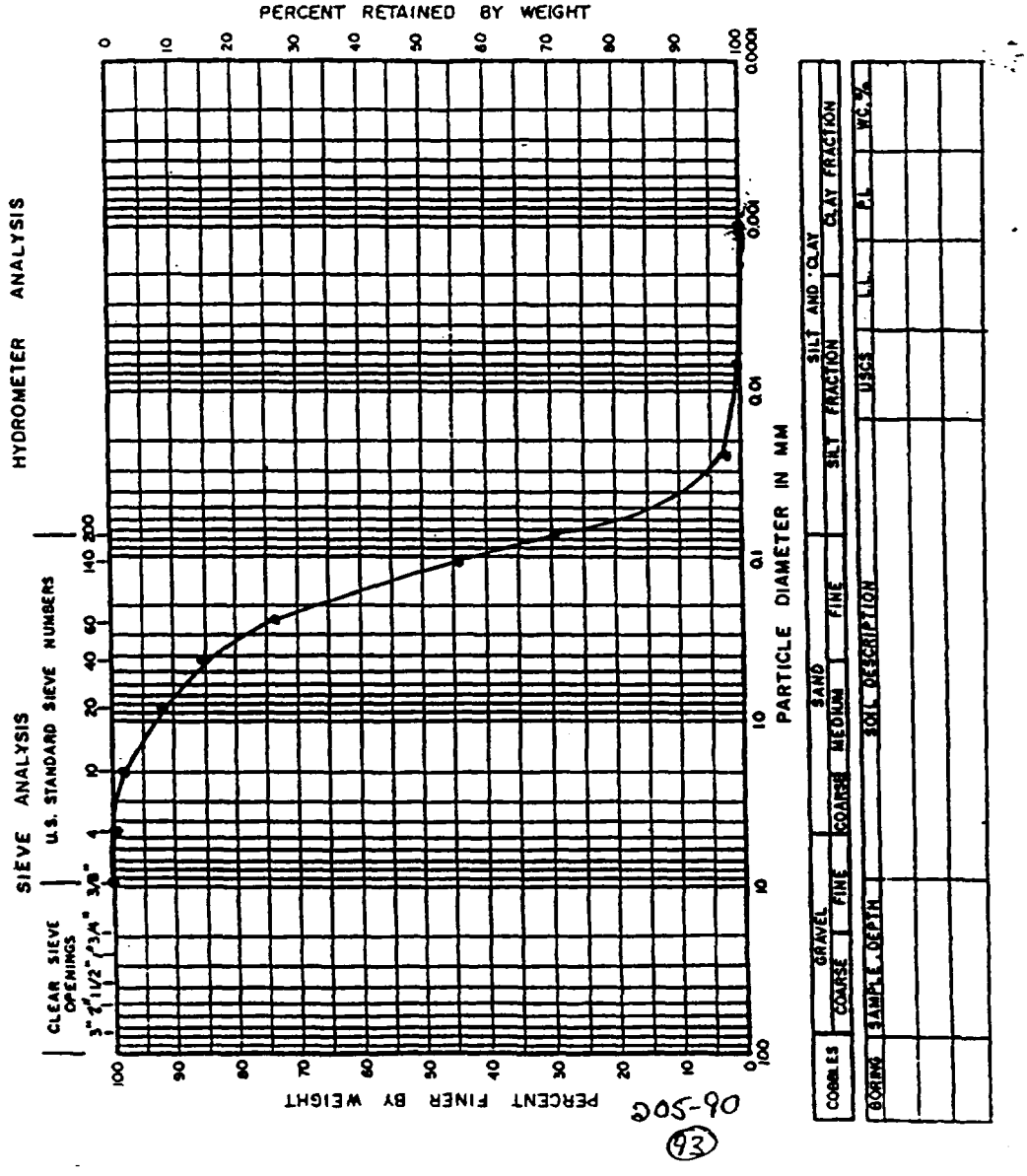
Boring/Test Pit No. ____ Sample No. ____ Calculated By DW Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151890 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. Pond S-E Tested By DN Date 12/9/90

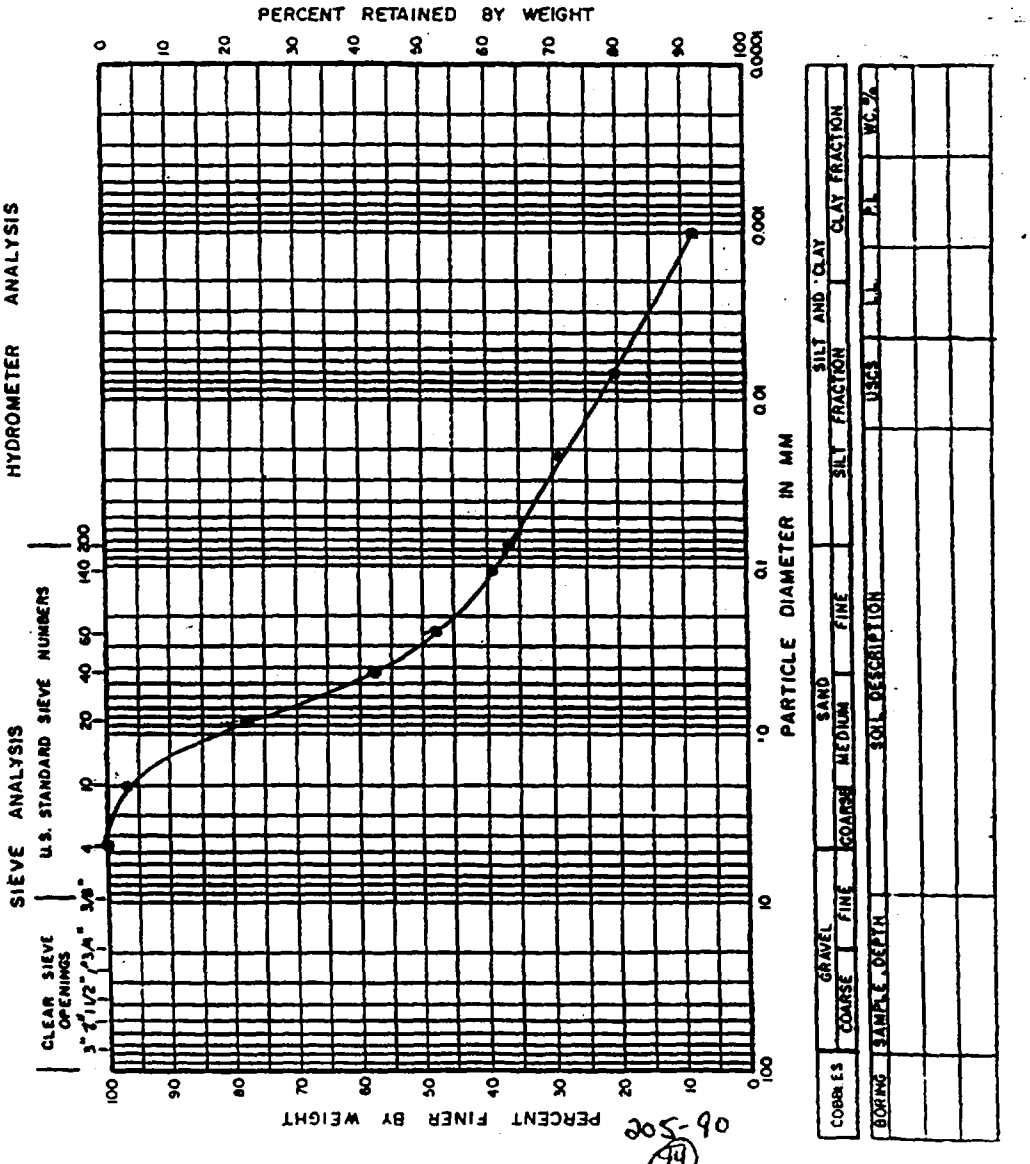
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151891 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. SB-006 Tested By DN Date 12/9/90

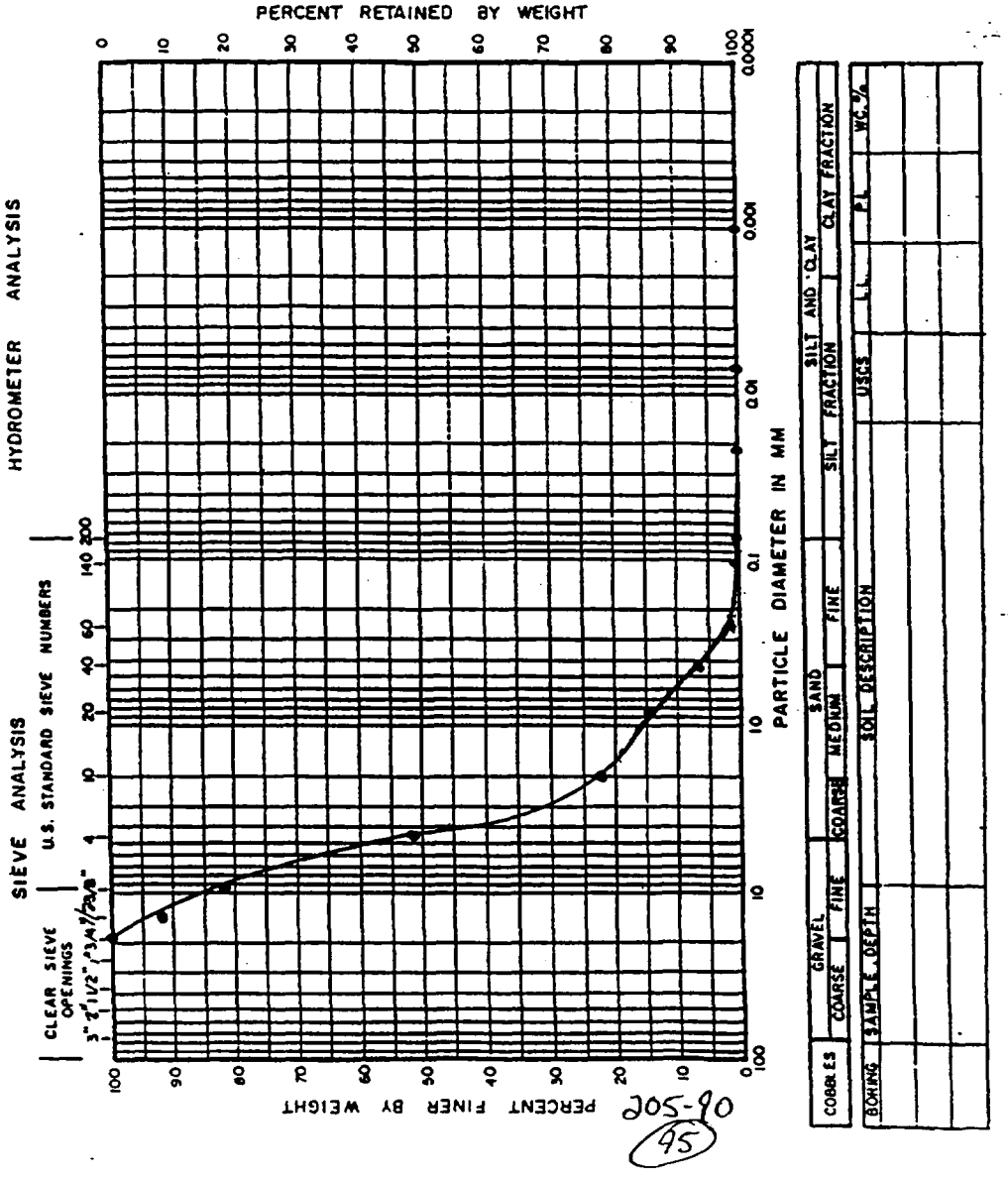
Boring/Test Pit No. ____ Sample No. ____ Calculated By DN Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151892 Sheet ____ of ____

Project Name: Gelaghty & miller Project No. SB-008 Tested By DW Date 12/9/90

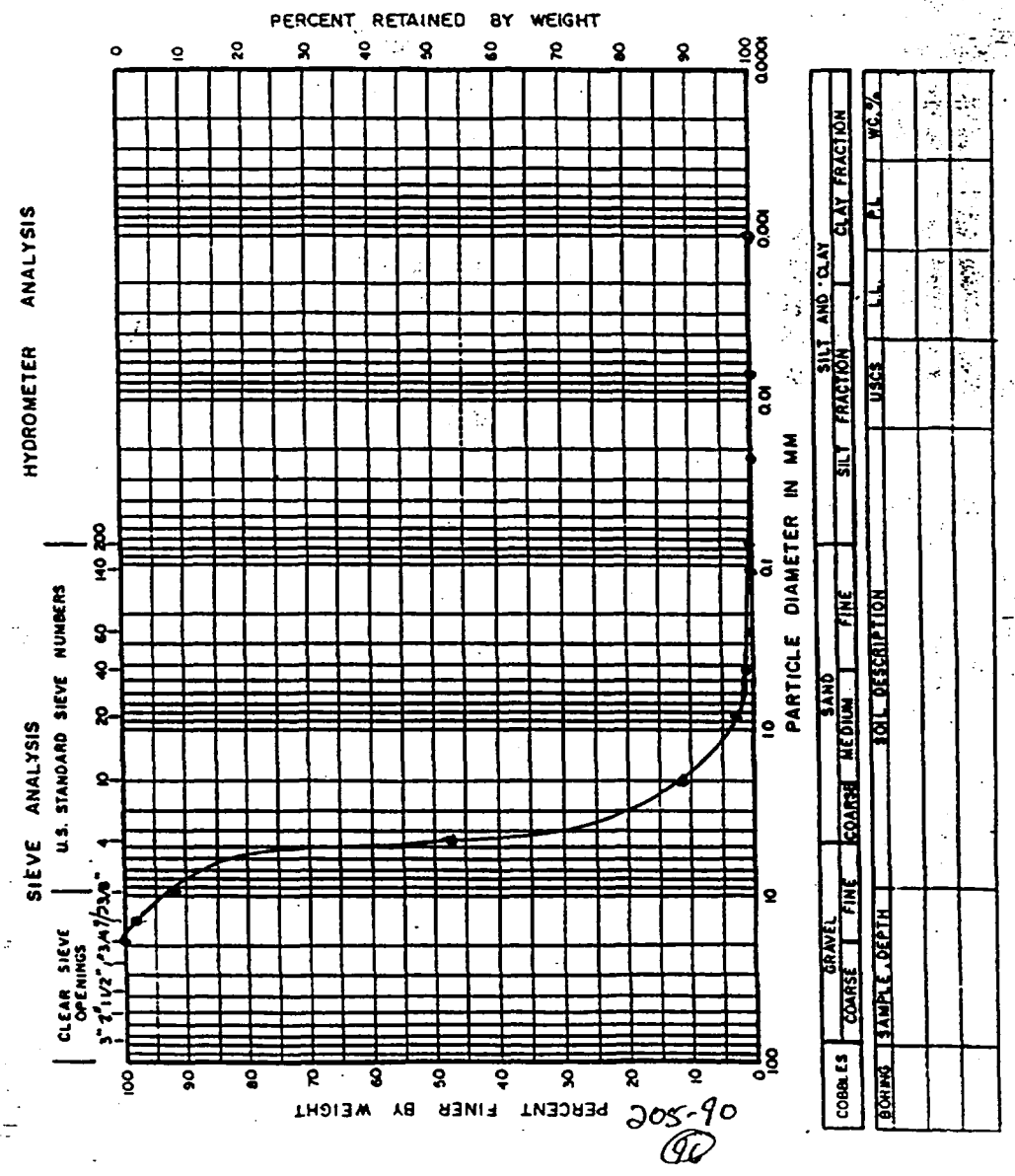
Boring/Test Pit No. ____ Sample No. ____ Calculated By DW Date 1/8/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8 JAN 91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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(90)

NUS CORPORATION

Laboratory No. P151893 Sheet _____ of _____

Project Name: Geraghty & Miller Project No. SB-015 Tested By DN Date 12/9/90

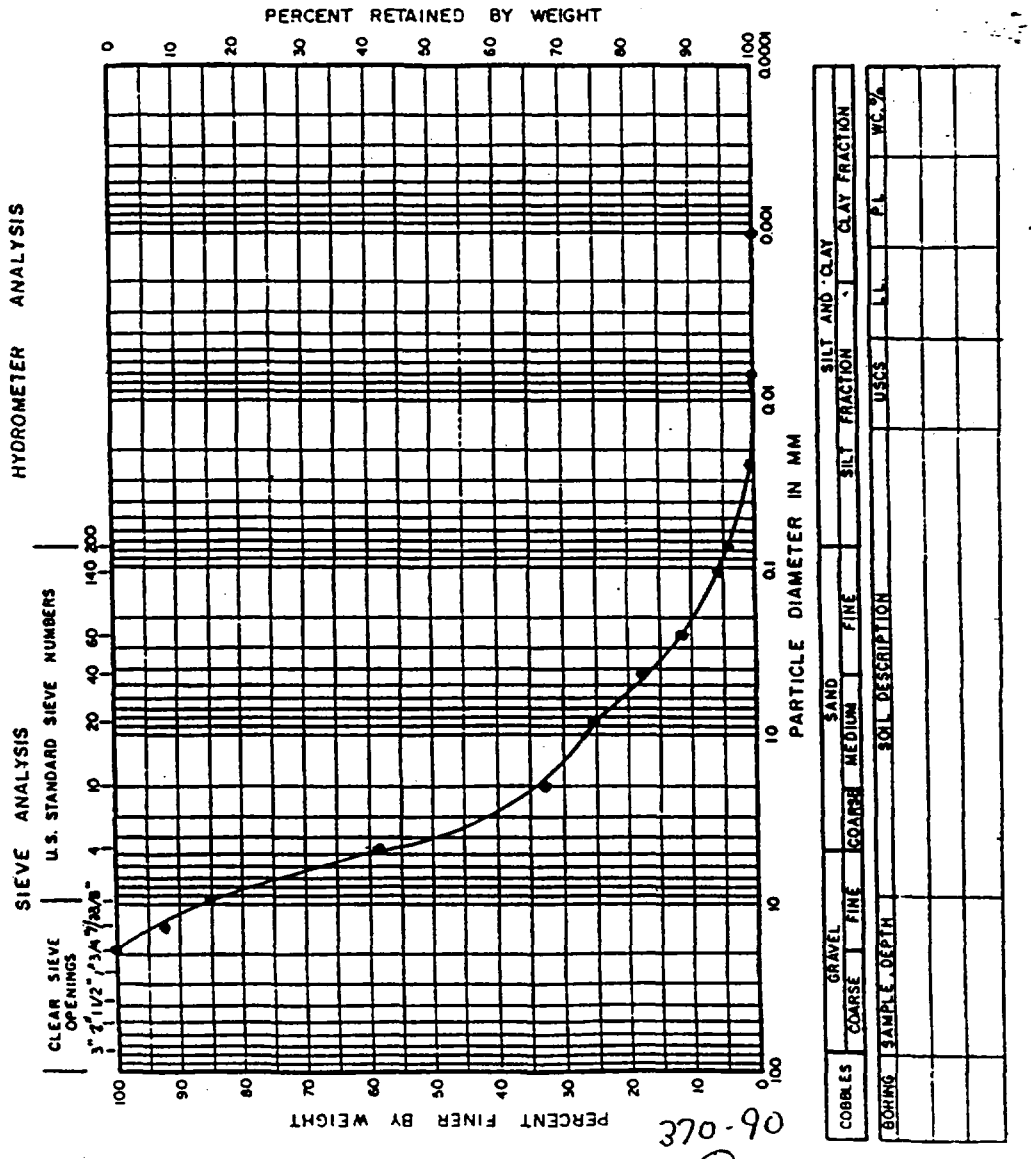
Boring/Test Pit No. _____ Sample No. _____ Calculated By DN Date 1/2/91

Sample Depth _____ Sample Type _____ Checked By JCL Date 8 JAN 91

Sample Description _____

Sample Preparation Method _____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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NUS CORPORATION

Laboratory No. P151894 Sheet ____ of ____

Project Name: Geraghty & Miller Project No. SB-016 Tested By DW Date 12/9/90

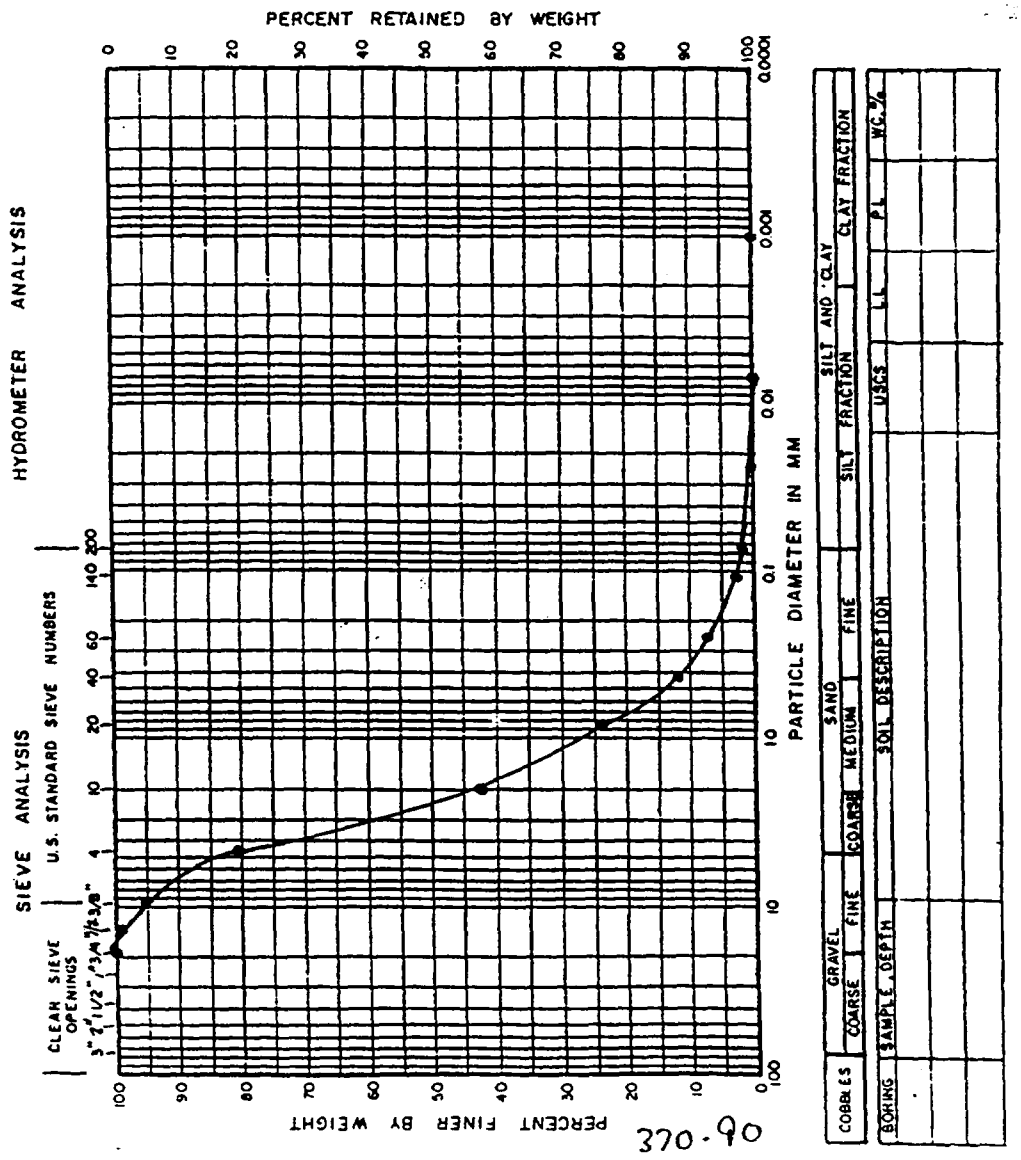
Boring/Test Pit No. ____ Sample No. ____ Calculated By DW Date 1/2/91

Sample Depth ____ Sample Type ____ Checked By JCL Date 8JAN91

Sample Description ____

Sample Preparation Method ____

GRAIN SIZE ANALYSIS – COHESIVE MATERIAL



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APPENDIX Q

SUMMARY OF CLP DATA VALIDATION

ORMET CORPORATION
HANNIBAL, OHIO

APPENDIX Q-1 **Summary of CLP Data Validation for the Phase I RI**

APPENDIX Q-2 **Summary of CLP Data Validation for the Phase II RI**

APPENDIX Q-1

SUMMARY OF CLP DATA VALIDATION FOR THE PHASE I RI

Memorandum

TO: John Reggi / Ormet DATE: May 25, 1989

FROM: Bob Fargo / Geraghty & Miller, Inc.

SUBJECT: 'J' and 'UJ' Flagging of Phase I RI Data

At the April 26 meeting in Columbus, Ohio with USEPA and OEPA, JoAnn Duchene of Life Systems, USEPA's Endangerment Assessment contractor, requested an explanation of the J and UJ qualifiers that were attached to some of the Phase I RI analytical results. During the Phase I RI, analytical data generated using USEPA Contract Laboratory Program protocols were validated by Geraghty & Miller using the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" and "Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses" dated May 28, 1985.

These Functional Guidelines define the J qualifier as representing a detected value that is considered an estimated quantity. A J qualifier is assigned when any one or more of several quality control criteria are not met. According to the guidelines, a UJ qualifier is assigned when a given parameter is analyzed for and not detected, but the quantitation limit is considered estimated, because one or more quality control criteria were not met. Attachment A to this memo provides a summary of the various criteria that may result in J or UJ qualifiers being attached to a particular analytical result in accordance with the Functional Guidelines. It should be noted that the J and UJ qualifiers do not signify that the associated data are rejected. Data that are deemed unusable because the analysis failed certain QA/QC criteria, indicating that the compound may or may not be present, are flagged with an R. A summary of the criteria for each J and UJ qualifier assigned to the Phase I data is provided as Attachment B.

Ms. Duchene also requested an explanation for the R qualifiers that were assigned to the analytical results for sample CRA-B1-C, which is a carbon sample from the carbon runoff and

deposition area. A review of the validation notes for that sample indicates that the R qualifier was assigned only to the results for those semi-volatile organic compounds that were below the respective detection limit. This is because the surrogate recoveries for these data were out of specification for three of the six surrogate spikes and one of the three surrogates out of specification exhibited a recovery of less than 10%. According to the Functional Guidelines, when a surrogate recovery is less than 10%, any associated positive sample results (i.e., a value above the detection limit) should be considered estimated and qualified with a J. Any associated sample results that are below the detection limit should be regarded as unusable and flagged with an R, which was the case with the semi-volatiles for sample CRA-B1-C.

I hope that the information contained in this transmittal is sufficient to resolve this issue. If there are any further questions regarding this matter, please contact me.

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I hope that the information contained in this transmittal is sufficient to resolve this issue. If there are any further questions regarding this matter, please contact me.

ATTACHMENT A

LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING ORGANICS ANALYSES

VOLATILES/SEMIVOLATILES

One or More of the Following Criteria May Result in Data Being Flagged with a J OR UJ:

- Sample holding times exceeded;
- GC/MS tuning and performance criteria are not met, yet results fall within ±25% of these criteria;
- RRF (average relative response factor) <0.05 during initial instrument calibration for one or more of the TCL compounds;
    - positive results for TCL compounds having an RRF <0.05 are flagged J
- % RSD (relative standard deviation) >30% during initial instrument calibration for one or more of the TCL compounds;
    - positive results for TCL compounds showing a RSD > 30% are flagged J
- %D (difference) >25% between initial and continuing calibration for one or more of the TCL compounds;
    - positive results for TCL compounds showing a D >25% are flagged J
- RRF <0.05 during continuing instrument calibration for one or more of the TCL compounds;
- surrogate spike recoveries out of specification; and/or
    - if (2) surrogates in a semivolative fraction are out of specification, but show recoveries >10%, results for that sample are flagged J, UJ
    - if (1) surrogate in a volative fraction is out of specification, but shows a recovery >10%, results for that sample are flagged J, UJ.
    - if any surrogate in a fraction shows <10% recovery, positive results for that fraction are flagged J
- IS (internal standards) performance criteria are not met.

PESTICIDES/PCBs

One or More of the Following Criteria May Result in Data Being Flagged with a J OR UJ:

- Sample holding times exceeded;
- DDT breakdown >20%;
    - positive DDT results are flagged J
- endrin breakdown >20%;
    - positive endrin results are flagged J

- DBC retention time shift criteria are not met;
- Initial calibration linearity criteria are not met;
    - positive pesticide results are flagged J
- Continuing calibration % Difference criteria are not met; and/or
    - positive pesticide results are flagged J
- Pesticide surrogate recovery criteria are not met.

CLP INORGANIC COMPOUNDS

One or More of the Following Criteria May Result in Data Being Flagged with a J OR UJ:

- Sample holding times exceeded;
- Calibration correlation coefficient <0.995;
- Mid-range CN standard not distilled;
    - associated CN results are flagged J
- ICV (initial calibration verification) % recovery criteria are not met, yet results meet suggested expanded criteria;
- CCV (continuing calibration verification) % recovery criteria are not met, yet results meet suggested expanded criteria;
- ICP ICS (interference check sample) % recovery criteria are not met, yet results meet expanded criteria;
    - associated ICP results flagged J, UJ
- Aqueous LCS (laboratory control sample) % recovery criteria are not met, yet results meet expanded criteria;
- Solid LCS % recovery criteria are not met, yet results meet expanded criteria;
- RPD (relative percent difference) criteria are not met for duplicate analyses;
- Matrix spike recovery criteria are not met, yet results meet expanded criteria;
- FAA (furnace atomic absorption) duplicate injection %RSD criteria are not met;
- FAA post digestion spike recovery criteria are not met;
- For FAA samples requiring MSA (method of standard additions); and/or
    - if MSA has not been done, associated data is flagged J
    - if samples were not spiked at appropriate levels, associated data is flagged J
    - if MSA correlation coefficient is <0.995, associated data is flagged J
- ICP serial dilution criteria are not met.

ATTACHMENT B

CLP LABORATORY DATA VALIDATION FOR GROUND-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING VOC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
MW-2			x	x		
MW-5			x	x		
MW-8			x	x		
MW-11			x	x		
MW-12			x	x		
MW-13			x	x		
MW-14			x	x		
MW-15			x	x		
MW-16			x	x		
MW-17			x	x		
MW-18			x	x		
MW-19			x	x		
MW-28			x	x		
MW-29S			x	x		
MW-29D			x	x		
MW-30			x	x		
MW-31			x	x		
MW-32			x	x		
MW-33S			x	x		
MW-33D			x	x		
MW-34S			x	x		
MW-34D			x	x		
MW-35			x	x		
MW-36			x	x		
MW-37			x	x		
MW-39S			x	x		
MW-39D			x	x		
MW-40S			x	x		
MW-40D			x	x		
MW-42S			x	x		
MW-42D			x	x		
MW-43S			x	x		
MW-43D			x	x		
MW-44S			x	x		
MW-44D			x	x		
MW-45			x	x		
MW-48			x	x		
MW-49			x	x		
MW-50			x	x		
SEEP 1			x	x		
SEEP 2			x	x		
SEEP 3			x	x		
CONDUIT			x	x		
REC AREA			x	x		

CLP LABORATORY DATA VALIDATION FOR GROUND-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING SEMI-VOLATILE LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
MW-2			x	x		
MW-5				x		
MW-8						
MW-11						
MW-12					x	x
MW-12 RE	x		x	x		
MW-13				x	x	
MW-14						
MW-15				x	x	
MW-16				x		
MW-17					x	
MW-17 RE	x		x	x		
MW-18			x	x		x
MW-19						
[illegible]28				x		x
[illegible]28 RE				x		
MW-29S						x
MW-29S RE						
MW-29D				x		x
MW-29D RE						
MW-30				x		x
MW-30 RE				x		
MW-31				x		x
MW-32 DL				x		
MW-33S						
MW-33D					x	
MW-33D RE	x		x	x	x	
MW [illegible]			x	x	x	x
[illegible] RE	x			x	x	
[illegible]			x	x		x
MW-34D RE	x			x		
MW-35			x	x		x
MW-35 RE	x		x	x		
MW-36			x	x		x
MW-36 RE	x		x	x		x
MW-37				x	x	
[illegible]9S				x		
[illegible]9D				x		
MW-40S						x
MW-40S RE						
MW-40D						x
MW-40D RE						
MW-42S						
MW-42D			x	x		
MW-43S					x	
MW-43S RE	x		x	x	x	
MW-43D					x	
MW-43D RE	x		x	x		
MW-44S						x
MW-44S RE						x
MW-44D						x
MW-44D RE						
MW-45						
MW-48						
MW-49	x			x	x	
MW-49 RE	x		x	x	x	x
MW-50			x	x	x	x
SEEP 1			x	x	x	x
SEEP 1 RE	x			x		
SF[illegible]			x	x		
[illegible]3			x	x		
[illegible]IT				x		
[illegible] AREA			x	x		

CLP LABORATORY DATA VALIDATION FOR GROUND-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING PESTICIDE/PCB LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Surrogate Recovery
MW-2	x			
MW-5	x			
MW-8				
MW-11				
MW-12				
MW-13				
MW-14				
MW-15				
MW-16	x			
MW-17				
MW-18	x			
MW-19				
MW-28				
MW-29S				
MW-29D				
MW-30				
MW-31				
MW-32				
MW-33S				
MW-33D				
MW-34S				
MW-34D				
MW-35				
MW-36				
MW-37	x			
MW-39S				
MW-39D				
MW-40S				
MW-40D				
MW-42S				
MW-42D				
MW-43S				
MW-43D				
MW-44S				
MW-44D				
MW-45				
MW-48				
MW-49	x			
MW-50				
SEEP 1				
SEEP 2				
SEEP 3				
CONDUIT				
REC AREA				

CLP LABORATORY DATA VALIDATION FOR GROUND-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING INORGANIC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	ICP ICS	LCS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA
MW-1							x	x			
MW-2						x	x				
MW-3							x	x			
MW-4							x	x			
MW-5						x	x				
MW-6							x	x			
MW-7							x	x			
MW-8							x	x			
MW-9							x	x			
MW-10							x	x			
MW-11							x	x			
MW-12						x	x				
MW-13						x	x				
MW-14						x	x				
[illegible]-15							x	x			
[illegible]-16							x	x			
MW-17							x	x			
MW-18							x	x			
MW-19							x	x			
MW-20							x	x			
MW-21S							x	x			
MW-21D							x	x			
MW-22S							x	x			
MW-22D							x	x			
MW-23D							x	x			
MW-24D							x	x			
MW-25							x	x			
[illegible] D							x	x			
[illegible]							x	x			
[illegible]3						x	x				
MW-29S						x	x				
MW-29D							x	x			
MW-30						x	x				
MW-31						x	x				
MW-32							x	x			
MW-33S							x	x			
33D							x	x			
MW-34S							x	x			
MW-34D							x	x			
MW-35							x	x			
MW-36							x	x			
MW-37							x	x			
MW-38							x	x			
MW-39S						x	x				
MW-39D						x	x				
MW-40S						x	x				
MW-40D						x	x				
MW-42S						x	x				
MW-42D						x	x				
MW-43S						x	x				
MW-43D						x	x				
MW-44S	x					x	x				
MW-44D	x					x	x				
MW-45							x	x			
MW-46							x	x			
MW-47							x	x			
MW-48							x	x			
MW-49							x	x			
MW-50							x	x			
1								x			
2								x			
3								x			
CONDUIT								x			

CLP LABORATORY DATA VALIDATION FOR DISPOSAL POND SOLIDS SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING VOC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
1A-0-1			x	x		
1A-1-4			x	x		
1A-1-4 RE			x	x	x	
1A-4-INT			x	x	x	
2A-0-1			x	x	x	
2A-0-1 RE			x	x	x	
2A-1-3			x	x	x	
2A-1-3 RE			x	x	x	
2A-3-INT			x	x	x	
2A-3-INT RE			x	x	x	
3A-0-1			x			
3A-2-5			x	x		
3A-6-9			x	x		
3A-10-INT			x	x		
4A-0-1			x			
4A-1-4			x	x		
4A-4-INT			x	x		
4B-0-1			x			
4B-1-4			x	x		
4B-4-7			x	x	x	
4B-4-7 RE			x	x	x	
4B-8-INT			x	x		
5A-0-1			x			
5A-5-8			x	x		
5A-10-13			x	x		
5A-15-18			x	x		
5A-INT			x	x	x	
5A-INT RE			x	x	x	
5B-0-1			x			
5B-5-8			x	x		
5B-10-13			x	x		
5B-10-13 RE			x	x	x	
5B-15-18			x	x	x	
5B-15-18 RE			x	x		
5B-INT			x	x	x	
5B-INT RE			x	x	x	
5C-0-1			x			
5C-5-8			x	x	x	
5C-5-8 RE			x	x	x	
5C-10-13			x	x	x	
5C-10-13 RE			x	x	x	
5C-15-18			x	x	x	
5C-15-18 RE			x	x	x	
5C-25-INT			x	x	x	
5C-25-INT RE			x	x	x	
5D-0-1			x		x	
5D-0-1 RE			x	x		
5D-5-8			x	x		
5D-10-INT			x	x	x	
5D-10-INT RE			x	x	x	
5E-0-1			x			
5E-5-8			x	x		
5E-10-13			x	x	x	
5E-10-13 RE			x	x	x	
5E-15-18			x	x	x	
5E-15-18 RE			x	x	x	
5E-20-23			x	x	x	
5E-20-23 RE			x	x	x	
5E-INT			x	x		
5E-INT RE			x	x	x	
6A-0-1			x	x		
6A-1-4			x	x	x	
6A-1-4 RE			x	x	x	
6A-4-7			x	x		
6A-4-7 RE			x	x		
6A-6-9			x	x		
6B-5-8			x	x		
6B-20-23			x	x	x	
6B-20-23 RE			x	x	x	
6E-10-13			x	x	x	
6E-10-13 RE			x	x	x	

CLP LABORATORY DATA VALIDATION FOR DISPOSAL POND SOLIDS SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING SEMI-VOLATILE LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
1A-0-1				x	x	
1A-0-1 RE	x			x	x	
1A-1-4				x		
1A-4-INT				x		
2A-0-1				x		
2A-1-3				x		
2A-3-INT				x		
3A-0-1				x	x	
3A-2-5				x		
3A-6-9				x		
3A-10-INT				x		
4A-0-1				x		
4A-1-4				x		
4A-4-INT				x		
4B-0-1				x		
4B-1-4				x		
4B-4-7				x		
4B-8-INT				x		
5A-0-1				x	x	x
5A-5-8				x		
5A-10-13				x	x	
5A-15-18				x		
5A-INT				x	x	
5A-INT RE	x			x	x	
5B-0-1				x		
5B-5-8				x		
5B-10-13				x		
5B-15-18				x		
5B-INT				x		
5C-0-1				x		
5C-5-8				x		
5C-10-13				x		
5C-15-18				x		
5C-25-INT				x	x	
5C-25-INT RE				x		
5D-0-1					x	
5D-0-1 RE	x			x	x	
5D-5-8				x		
5D-10-INT				x		
5E-0-1				x		
5E-5-8				x		
5E-10-13				x		
5E-15-18				x		
5E-20-23				x		
5E-INT				x		
6A-0-1				x		
6A-1-4				x		
6A-4-7				x		
6A-6-9				x		
6B-5-8				x		
6B-20-23				x		
6E-10-13				x		

CLP LABORATORY DATA VALIDATION FOR DISPOSAL POND SOLIDS SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING PCB LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Surrogate Recovery
1A-0-1		x		
1A-1-4				
1A-4-INT				
2A-0-1				
2A-1-3		x		
2A-3-INT				
3A-0-1				
3A-2-5				
3A-6-9				
3A-10-INT				
4A-0-1				
4A-1-4				
4A-4-INT				
4B-0-1				
4B-1-4				
4B-4-7				
4B-8-INT				
5A-0-1				
5A-5-8				
5A-10-13				
5A-15-18				
5A-INT				
5B-0-1				
5B-5-8				
5B-10-13		x		
5B-15-18		x		
5B-INT				
5C-0-1				
5C-5-8				
5C-10-13		x		
5C-15-18		x		
5C-25-INT				
5D-0-1				
5D-5-8				
5D-10-INT				
5E-0-1				
5E-5-8				
5E-10-13				
5E-15-18				
5E-20-23				
5E-INT				
6A-0-1				
6A-1-4				
6A-4-7				
6A-6-9				
6B-5-8				
6B-20-23				
6E-10-13				

CLP LABORATORY DATA VALIDATION FOR DISPOSAL POND SOLIDS SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING INORGANIC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	ICP ICS	LCS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA
1A-0-1						x		x			
1A-1-4								x			
1A-4-INT						x		x			
2A-0-1							x	x			
2A-1-3								x			
2A-3-INT								x			
3A-0-1						x		x			
3A-2-5						x	x	x			
3A-6-9						x	x	x			
3A-10-INT						x	x	x			
4A-0-1						x		x			
[illegible]-4						x		x			
[illegible]4-INT						x		x			
4B-0-1						x		x			
4B-1-4						x		x			
4B-4-7						x		x			
4B-8-INT						x	x	x			
5A-0-1						x	x	x			
5A-5-8						x	x	x			
5A-10-13						x	x	x			
5A-15-18						x	x	x			
5A-INT						x	x	x			
5[illegible]								x			
[illegible]						x	x	x			
[illegible]-13						x	x	x			
5B-15-18						x	x	x			
5B-INT						x	x	x			
5C-0-1						x		x			
5C-5-8						x	x	x			
5C-10-13						x	x	x			
5[illegible]15-18						x	x	x			
[illegible]5-INT						x	x	x			
5D-0-1							x	x			
5D-5-8						x	x	x			x
5D-10-INT						x	x	x			
5E-0-1							x	x			
5E-5-8						x	x	x			
5E-10-13						x	x	x			
5E-15-18						x	x	x			
5E-20-23						x	x	x			
5E-INT						x	x	x			
6A-0-1						x		x			
6A-1-4						x		x			
6A-4-7	x					x	x	x			
6A-6-9						x	x	x			
6B-5-8						x	x	x			
6B-20-23							x	x			
6E-10-13						x	x	x			

CLP LABORATORY DATA VALIDATION FOR CARBON RUNOFF AREA SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING VOC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

ımple ımber	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
℞A-A1-C			x	x	x	
℞A-A1-C RE			x	x	x	
℞A-A1-S			x	x		
℞A-A2-C			x	x	x	
℞A-A2-C RE			x	x	x	
℞A-A2-S			x	x		
℞A-B1-C			x	x	x	
℞A-B1-C RE			x	x	x	
℞A-B1-S			x	x		
℞A-B2-C			x	x		
℞A-B2-S			x	x		
℞A-C1-C			x	x	x	
℞A-C1-C RE			x	x	x	
℞A-C1-S			x	x		
℞A-C2-C			x	x	x	
℞A-C2-C RE			x	x	x	
℞A-C2-S			x	x		
℞A-D1-C			x	x	x	
℞A-D1-C RE			x	x	x	
℞A-D2-S			x	x		

CLP LABORATORY DATA VALIDATION FOR CARBON RUNOFF AREA SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING SEMI-VOLATILE LABORATORY DATA AS ESTIMATED (ie. J, UJ)

ample umber	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
RA-A1-C				x		
RA-A1-S				x		
RA-A2-C				x		
RA-A2-S				x		
RA-B1-C				x	x	
RA-B1-C RE				x		
RA-B1-S				x		
RA-B2-C				x	x	
RA-B2-C RE						
RA-B2-S				x		
RA-C1-C				x	x	
RA-C1-S				x		
RA-C2-C				x	x	
RA-C2-C RE				x		
RA-C2-S				x		
RA-D1-C				x	x	
RA-D1-C RE				x	x	
RA-D2-S				x		

CLP LABORATORY DATA VALIDATION FOR CARBON RUNOFF AREA SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING INORGANIC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

ample umber	Holding Time	Initial Calibration	Continuing Calibration	ICP ICS	LCS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA
RA-A1-C						x	x	x			
RA-A1-S						x	x	x			
RA-A2-C						x	x	x			
RA-A2-S						x	x	x			
RA-B1-C						x	x	x			
RA-B1-S						x	x	x			
RA-B2-C						x	x	x			
RA-B2-S						x	x	x			
RA-C1-C						x	x	x			
RA-C1-S						x	x	x			
RA-C2-C						x	x	x			
RA-C2-S						x	x	x			
RA-D1-C						x	x	x			
RA-D2-S						x	x	x			

CLP LABORATORY DATA VALIDATION FOR SELECTED POTLINER AREA SOIL SAMPLES

ORMET CORPORATION - HANNIBAL, OHIO

Reasons for Flagging VOC Laboratory Data as Estimated (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
SB-006-0-2			x	x		
SB-006-2-4			x	x		
SB-006-4-6			x	x		
SB-006-6-8			x	x		
SB-006-8-10			x	x		
SB-008-0-2			x	x		
SB-008-2-4			x	x		
SB-008-4-6			x	x		
SB-008-6-8			x	x		
SB-008-8-10			x	x		
SB-015-0-2			x	x		
SB-015-2-4			x	x		
SB-015-4-6			x	x		
SB-015-6-8			x	x		
SB-015-8-10			x	x		
SB-016-0-2			x	x		
SB-016-2-4			x	x		
SB-016-4-6			x	x		
SB-016-6-8			x	x		
SB-016-8-10			x	x		

CLP LABORATORY DATA VALIDATION FOR SELECTED POTLINER AREA SOIL SAMPLES

ORMET CORPORATION - HANNIBAL, OHIO

Reasons for Flagging Semi-Volatile Laboratory Data as Estimated (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
SB-006-0-2			x			
SB-006-2-4			x	x		
SB-006-4-6			x	x		
SB-006-6-8			x	x		
SB-006-8-10			x			
SB-008-0-2			x	x		
SB-008-2-4			x	x		
SB-008-4-6			x	x		
SB-008-6-8			x	x		
SB-008-8-10			x	x		
SB-015-0-2			x	x		
SB-015-2-4			x	x		
SB-015-4-6			x	x		
SB-015-6-8			x	x		
SB-015-8-10			x	x		
SB-016-0-2			x			
SB-016-2-4			x	x		
SB-016-4-6			x	x		
SB-016-6-8			x			
SB-016-8-10			x			

CLP LABORATORY DATA VALIDATION FOR SELECTED POTLINER AREA SOIL SAMPLES

ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING INORGANIC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	ICP ICS	LCS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA
SB-006-0-2							x	x			
-006-2-4							x	x			
SB-006-4-6							x	x			
SB-006-6-8							x	x			
SB-006-8-10							x	x			
SB-008-0-2	x						x	x			
SB-008-2-4							x	x			
S' J-4-6	x						x	x			
008-6-8							x	x			
SB-008-8-10							x	x			
SB-015-0-2							x	x			
015-2-4							x	x			
SB-015-4-6							x	x			
SB-015-6-8							x	x			
SB-015-8-10							x	x			
SB-016-0-2							x	x			
SB-016-2-4							x	x			
SB-016-4-6							x	x			
SB-016-6-8							x	x			
SB-016-8-10							x	x			

CLP LABORATORY DATA VALIDATION FOR RIVER SEDIMENT SAMPLES

ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING INORGANIC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	ICP ICS	LCS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA
RS-1						x	x	x			
RS-2						x	x	x			
[illegible]-3						x	x	x			
RS-4						x	x	x			
RS-5						x	x	x			
RS-6						x	x	x			
RS-7						x	x	x			

CLP LABORATORY DATA VALIDATION FOR RIVER SEDIMENT SOLIDS SAMPLES

ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING SEMI-VOLATILE LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
RS-1				x		
RS-2				x		
RS-3				x		
RS-4				x		
RS-5				x		
RS-5 DL				x		
RS-6						
RS-7				x		

CLP LABORATORY DATA VALIDATION FOR RIVER SEDIMENT SAMPLES

ORMET CORPORATION - HANNIBAL, OHIO

REASONS FOR FLAGGING VOC LABORATORY DATA AS ESTIMATED (ie. J, UJ)

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance
RS-1			x	x		
RS-2			x	x		
RS-3			x	x		
RS-4			x	x		
RS-5			x	x		
RS-6			x	x		
RS-7			x	x		

APPENDIX Q-2

SUMMARY OF CLP DATA VALIDATION FOR THE PHASE II RI

MEMORANDUM

TO: John Reggi - Ormet

DATE: August 20, 1990

FROM: Bob Fargo - Geraghty & Miller, inc.

SUBJECT: Data Validation Summary for Phase II RI Data

During the Phase II RI, analytical data generated using USEPA Contract Laboratory Program protocols were validated by Geraghty & Miller using "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" dated February, 1988 and "Laboratory Data Validation Function Guidelines for Evaluating Inorganic Analyses" dated July 1, 1988.

These Functional Guidelines define the "J" qualifier as representing a detected value that is considered an estimated quantity. A "J" qualifier is assigned when any one or more of several quality control criteria are not met. According to the guidelines, a "UJ" qualifier is assigned when a given parameters is analysed for and not detected, but the quantitation limit is considered estimated, because one or more quality control criteria were not met. Data flagged with a "B" qualifier states that the analyte was present above reporting detection limits within laboratory blanks. Attachment A to this memo provides a summary of the various criteria that may result in J, UJ or B qualifiers being attached to a particular analytical result in accordance with the Functional Guidelines. It should be noted that the J, UJ and B qualifiers do not signify that the associated data were rejected. Data that are deemed unusable because the analysis failed certain QA/QC criteria, indicating that the compound may or may not be present, are flagged with an "R". A summary of the criteria for each J, UJ and B qualifier assigned to the Phase II data is provided at Attachment B.

ATTACHMENT A

LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING ORGANICS ANALYSES

VOLATILES/SEMIVOLATILES

One or More of the Following Criteria May Result in Data Being Flagged with a J OR UJ:

- Sample holding times exceeded;
- GC/MS tuning and performance criteria are not met, yet results fall within ±25% of these criteria;
- RRF (average relative response factor) <0.05 during initial instrument calibration for one or more of the TCL compounds;
    - positive results for TCL compounds having an RRF <0.05 are flagged J
- % RSD (relative standard deviation) >30% during initial instrument calibration for one or more of the TCL compounds;
    - positive results for TCL compounds showing a RSD > 30% are flagged J
- %D (difference) >25% between initial and continuing calibration for one or more of the TCL compounds;
    - positive results for TCL compounds showing a D >25% are flagged J
- RRF <0.05 during continuing instrument calibration for one or more of the TCL compounds;
- surrogate spike recoveries out of specification; and/or
    - if (2) surrogates in a semivolative fraction are out of specification, but show recoveries >10%, results for that sample are flagged J, UJ
    - if (1) surrogate in a volative fraction is out of specification, but shows a recovery >10%, results for that sample are flagged J, UJ.
    - if any surrogate in a fraction shows <10% recovery, positive results for that fraction are flagged J
- IS (internal standards) performance criteria are not met.

If an analyte is detected in one or more of the associated laboratory blanks, the reported result for that analyte may be flagged with a B.

PESTICIDES/PCBs

One or More of the Following Criteria May Result in Data Being Flagged with a J OR UJ:

- Sample holding times exceeded;

- DDT breakdown >20%;
    - positive DDT results are flagged J
- endrin breakdown >20%;
    - positive endrin results are flagged J
- DBC retention time shift criteria are not met;
- Initial calibration linearity criteria are not met;
    - positive pesticide results are flagged J
- Continuing calibration % Difference criteria are not met; and/or
    - positive pesticide results are flagged J
- Pesticide surrogate recovery criteria are not met.

If an analyte is detected in one or more of the associated laboratory blanks, the reported result for that analyte may be flagged with a B.

CLP INORGANIC COMPOUNDS

One or More of the Following Criteria May Result in Data Being Flagged with a J OR UJ:

- Sample holding times exceeded;
- Calibration correlation coefficient <0.995;
- Mid-range CN standard not distilled;
    - associated CN results are flagged J
- ICV (initial calibration verification) % recovery criteria are not met, yet results meet suggested expanded criteria;
- CCV (continuing calibration verification) % recovery criteria are not met, yet results meet suggested expanded criteria;
- ICP ICS (interference check sample) % recovery criteria are not met, yet results meet expanded criteria;
    - associated ICP results flagged J, UJ
- Aqueous LCS (laboratory control sample) % recovery criteria are not met, yet results meet expanded criteria;
- Solid LCS % recovery criteria are not met, yet results meet expanded criteria;
- RPD (relative percent difference) criteria are not met for duplicate analyses;
- Matrix spike recovery criteria are not met, yet results meet expanded criteria;
- FAA (furnace atomic absorption) duplicate injection %RSD criteria are not met;

- FAA post digestion spike recovery criteria are not met;
- For FAA samples requiring MSA (method of standard additions); and/or
    - if MSA has not been done, associated data is flagged J
    - if samples were not spiked at appropriate levels, associated data is flagged J
    - if MSA correlation coefficient is <0.995, associated data is flagged J
- ICP serial dilution criteria are not met.

If an analyte is detected in one or more of the associated laboratory blanks, the reported result for that analyte may be flagged with a B.

ATTACHMENT B

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SURFACE-WATER SAMPLES

ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING INORGANIC CLP LABORATORY DATA

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	ICP	ICS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA	Preperation Blank
V-1						X				X		
SW-1F						X						
SW-1 (Dup.)						X				X		
SW-1F (Dup.)						X				X		
SW-4						X				X		
-						X				X		
SW-5						X				X		
SW-5F						X						
SW-9						X				X		
SW-9F						X				X		
SW-12						X				X		
SW-12F						X				X		

F - filtered samples

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SURFACE-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING VOC LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performace	Method Blank
SW-1			X	X			X
SW-1 (Dup.)			X	X			X
SW-4			X	X			X
SW-5			X	X			X
SW-9			X	X			X
SW-12			X	X			X

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SURFACE-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING CLP CYANIDE DATA

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	Spike %R
SW-1				
SW-1 (Dup.)				
SW-4				
SW-5	Data met all QA/QC criteria specified in the Functional Guidelines; therefore, no qualifiers have been assigned to these data.			
SW-9				
SW-12				

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SURFACE-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING SEMI-VOLATILE LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance	Method Blank
SW-1			X				
SW-1 (Dup.)			X				
SW-4			X				
SW-5			X				
SW-9			X				
SW-12			X				

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SURFACE-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING PESTICIDE/PCB LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Surrogate Recovery	Method Blank
SW-1					
SW-1 (Dup.)					
SW-4					
SW-5	Data met all QA/QC criteria specified in the Functional Guidelines; therefore, no qualifiers have been assigned to these data.				
SW-9					
SW-12					

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SEEP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING INORGANIC CLP LABORATORY DATA

Sample Number	Holding Time	Initial alibration	Continuing Calibration	ICS	LCS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA	Preperation Blank
Seep 1						X				X		
Seep 2						X				X		X
Seep 2 (Dup.)						X						X
Seep 3						X				X		
Seep 4						X				X		
ep 5						X						X
Seep 6						X				X		X

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SEEP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRIETERIA FOR FLAGGING CLP CYANIDE DATA

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	Spike %R
Seep 1				
Seep 2				
Seep 2 (Dup.)				
Seep 3				
Seep 4	Data met all QA/QC criteria specified in the Functional Guidelines; therefore, no qualifiers have been assigned to these data.			
Seep 5				
Seep 6				

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SEEP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING VOC LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance	Method Blank
Seep 1			X				
Seep 2			X	X			
Seep 2 (Dup.)			X	X			
Seep 3			X				
Seep 4			X				
Seep 5			X	X			
Seep 6			X	X			

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SEEP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING SEMI-VOLATILE LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performanc	Method Blank
Seep 1				X			
Seep 2				X			
Seep 2 (Dup.)				X			
Seep 3				X			
Seep 4				X			
Seep 5				X			
Seep 6				X			

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR SEEP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING PESTICIDE/PCB LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Surrogate Recovery	Method Blank
Seep 1					
Seep 2					
eep 2 (Dup.)					
Seep 3					
Seep 4	Data met all QA/QC criteria specified in the Functional Guidelines; therefore, no qualifiers have been assigned to these data.				
Seep 5					
Seep 6					

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR CONSTRUCTION MATERIAL SCRAP DUMP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING INORGANIC CLP LABORATORY DATA

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	ICS	LCS	Duplicate %RPD	Spike %R	Serial Dilution	FAA Duplicate	FAA Spike	FAA MSA	Preparation Blank
CMSD-1	X*					X	X		X	X		
CMSD-2	X*					X	X		X	X		
CMSD-3	X*					X	X		X	X		
CMSD-3 (Dup.)	X*					X	X		X	X		
CMSD-4	X*					X	X		X	X		

* - Refers to Cyanide parameter only

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR CONSTRUCTION MATERIAL SCRAP DUMP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING VOC LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance	Method Blank
CMSD-1			X	X			X
CMSD-2			X	X			X
CMSD-3			X	X			X
CMSD-3 (Dup.)			X	X			X
CMSD-4			X	X			X

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR CONSTRUCTION MATERIAL SCRAP DUMP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING SEMI-VOLATILE LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance	Method Blank
CMSD-1			X	X			
CMSD-2			X	X			
CMSD-3			X	X			
CMSD-3 (Dup.)			X	X			
CMSD-4				X			

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR CONSTRUCTION MATERIAL SCRAP DUMP SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING PESTICIDE/PCB LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Surrogate Recovery	Method Blank
CMSD-1					
CMSD-2					
CMSD-3				X	
CMSD-3 (Dup.)		X			
CMSD-4					

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR RIVER SEDIMENT SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING SEMI-VOLATILE LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Continuing Calibration	Surrogate Recovery	Internal Standards Performance	Method Blank
RSII-1A				X			X
RSII-1B				X	X		X
RSII-1BRE	X		X	X			X
RSII-1C				X			X
RSII-1D				X			X
RSII-2				X			X
RSII-3				X			X
R[illegible] 4				X			X
[illegible]-5				X			X
RSII-6				X	X		X
RSII-6RE			X	X			X
[illegible]II-7				X	X		X
RSII-7RE	X		X	X	X		X
RSII-9				X			X
RSII-9RE	X		X	X			X
RSII-9 (Dup.)			X	X			X
RSII-9 (Dup.) RE	X		X	X			X
RSII-12			X	X	X		X
RSII-12RE	X		X	X			X
RSII-12			X	X	X		X
[illegible]12 (Dup.) RE	X		X	X			X

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR GROUND-WATER SAMPLES
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING CLP CYANIDE DATA

Sample Number	Holding Time	Initial Calibration	Continuing Calibration	Spike %R
MW-2				
MW-3				
MW-3 (Dup.)				
MW-14				
MW-17				
MW-18				
MW-19	Data met all QA/QC criteria specified in the Functional Guidelines; therefore, no qualifiers have been assigned to these data.			
MW-23S				
MW-23D				
MW-31				
MW-34S				
MW-34 (Dup.)				
MW-35				
MW-37				
MW-42S				
RANNEY				
RANNEY (Dup.)				

PHASE II CLP LABORATORY DATA VALIDATION SUMMARY FOR RIVER SEDIMENT SAMPLE
ORMET CORPORATION - HANNIBAL, OHIO

CRITERIA FOR FLAGGING PESTICIDE/PCB LABORATORY DATA

Sample Number	Holding Time	Instrument Performance	Initial Calibration	Surrogate Recovery	Method Blank
RSII IA					
RSII IB					
RSII IC					
RSII ID					
RSII 2	Data met all QA/QC criteria specified in the Functional Guidelines; therefore, no qualifiers have been assigned to these data.				
RSII 3					
RSII 4					
RSII 5					
RSII 6					
RSII 7					
RSII 9					
RSII 9 (Dup.)					
RSII 12					
RSII 12 (Dup.)					

APPENDIX R

NOT AVAILABLE

AS OF

5/4/99