

Hydrogeologic Analysis and Data Collection for the Oneida Tie Yard Site

by

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(ABSTRACT)

The objectives of this report involved analyzing the hydrogeology of the Oneida, Tennessee site and organizing the collected data for the purpose of evaluating the impact of the phytoremediation and interception trench systems on the aquifer. The water level data was used to evaluate water level and hydraulic gradient changes due to evapotranspiration, rainfall, and groundwater extraction. It was obvious from the water level and rainfall comparison plots that the rainfall has a measurable effect on the water table elevation (i.e. groundwater flow). Some areas may be less affected because the coal layer has a tendency to decrease recharge. Meanwhile, the interception trench lowers the water level around the trench. The decrease in head occurs before and after the trench, thus the water level forms a “v-shape” at the trench. This “v-shape” lends to the notion that the hydraulic gradient also slopes towards the trench in both directions. As for the phytoremediation, there was not sufficient evidence to suggest that the water levels were being lowered by evapotranspiration. This was expected since the poplar trees were had only completed their second growing season.

GMS MODFLOW was used to predict the effects on the water table due to the phytoremediation and the interception trench systems. The calibrated model did an adequate job in simulating the site when the interception trench was not in operation and the trees were not in their growing season. By using variable recharge in some areas, the results are expected to improve. For example, it is important to know the location of the coal layer so this area can be given a lower recharge value than the other areas in the model. As for the trench model, the simulated heads were much lower than the observed heads, which emphasizes that using wells is not the best method to simulate the interception trench. In the future, a transient model should be used to simulate the site with the trench operation, and the drain package could be used to model the trench itself. Meanwhile, the ET model was a valuable simulation, because it illustrates how effective the poplar trees can be even under conservative conditions. With an assumed root zone of just 3 feet and a maximum potential evapotranspiration rate of 4.6 gallons per day per tree, the majority of the site will experience the dry conditions expected.

TABLE OF CONTENTS

ABSTRACT.....	II
TABLE OF CONTENTS	III
LIST OF FIGURES	V
LIST OF TABLES	VIII
1 INTRODUCTION.....	1
2 HYDROGEOLOGIC SETTING.....	3
2.1 GEOLOGY	3
2.2 HYDROGEOLOGY	7
2.2.1 <i>Water Levels</i>	7
2.2.2 <i>Hydraulic Gradients</i>	15
2.2.3 <i>Groundwater Velocity</i>	20
3 FINITE DIFFERENCE MODEL.....	22
3.1 OBJECTIVES	22
3.2 MODEL CONSTRUCTION	22
3.3 CALIBRATION	27
3.4 WATER BALANCE COMPARISON.....	30
3.5 NON-UNIQUE SOLUTION	31
3.6 SENSITIVITY ANALYSIS	32
3.7 MODEL WITH THE INTERCEPTION TRENCH IN OPERATION.....	33
3.8 MODEL WITH EVAPOTRANSPIRATION BY THE POPLAR TREES	36
4 ADDITIONAL DATA.....	39
4.1 SOIL AND GROUNDWATER DATA.....	39
4.2 TREE HEIGHTS	39
4.3 TENSIMETERS	39
5 CONCLUSIONS	41

REFERENCES.....	42
APPENDICES.....	43
APPENDIX A: DATA FROM THE SITE	44
APPENDIX B: SAMPLE CALCULATIONS	133
<i>December 1997 Triangle 1 Gradient Magnitude and Direction.....</i>	<i>133</i>
<i>December 1997 Triangle 1 Velocity.....</i>	<i>134</i>
<i>Statistical Calculations for the Calibrated Model (Widdowson 1998)</i>	<i>134</i>
<i>Flowrate Leaving the Site</i>	<i>135</i>
<i>Sensitivity Analysis for Hydraulic Conductivity.....</i>	<i>135</i>
<i>Poplar Uptake Rate</i>	<i>135</i>
APPENDIX C: REGISTERING THE CONCEPTUAL IMAGE	137
APPENDIX D: MODFLOW INPUT FILES	138
<i>Basic Package for all Models.....</i>	<i>138</i>
<i>BCF Package for all Models.....</i>	<i>168</i>
<i>Drain Package for all Models.....</i>	<i>217</i>
<i>Recharge Package for the Calibrated and ET Model</i>	<i>222</i>
<i>Recharge Package for the Trench Model</i>	<i>245</i>
<i>Well Package for the Trench Model.....</i>	<i>272</i>
<i>Head Values and Water Budget for the Calibrated Model.....</i>	<i>273</i>
<i>Head Values and Water Budget for the Trench Model.....</i>	<i>292</i>
<i>Head Values and Water Budget for the ET Model.....</i>	<i>311</i>
VITA.....	330

LIST OF FIGURES

Figure 1.1 : Site Layout (Geraghty & Miller Inc.).....	2
Figure 2.1: Location of Geologic Cross-Sections (Geraghty & Miller, Inc. 1997).....	4
Figure 2.2: A-A' Geologic Cross-Section (Geraghty & Miller, Inc. 1997).....	5
Figure 2.3: B-B' Geologic Cross-Section (Geraghty & Miller, Inc. 1997).....	6
Figure 2.4: Location of Piezometers and Monitoring Wells (Geraghty & Miller, Inc.)....	8
Figure 2.5: Schematic of a Piezometer (provided by Geraghty & Miller, Inc.).....	10
Figure 2.6: Water Level and Rainfall Comparisons for MW-1 and MW-2.....	11
Figure 2.7: Rainfall and Water Level Comparisons for P-2, P-15, and P-16.....	12
Figure 2.8: Rainfall and Water Level Comparisons for P-6, P-7, P-8, and P-9	13
Figure 2.9: Estimated Location of the Coal Layer.....	14
Figure 2.10: Gradient Directions and Magnitudes for December 1997 (modified drawing from Geraghty & Miller, Inc.).....	17
Figure 2.11: Gradient Directions and Magnitudes for August 1998 (modified drawing from Geraghty & Miller, Inc.).....	18
Figure 3.1: Location and Type of Boundary Arcs	23
Figure 3.2: Drain Diagram.....	24
Figure 3.3: Grid Layout.....	25
Figure 3.4: Bedrock Elevation	26
Figure 3.5: Observation Wells	27
Figure 3.6: Calibrated Model Results	29
Figure 3.7: Comparison of the Observed and Calculated Heads.....	30
Figure 3.8: Location of the Interception Trench Wells.....	33
Figure 3.9: Results with the Interception Trench in Operation	34
Figure 3.10: Results with a Water Uptake Rate of 4.6 gallons per day per tree	38
Figure A1: Rainfall and Water Level Comparisons for MW-1 and MW-2	56
Figure A2: Rainfall and Water Level Comparisons for MW-3, MW-4, and MW-7	57
Figure A3: Rainfall and Water Level Comparisons for MW-5 and MW-6	58
Figure A4: Rainfall and Water Level Comparisons for P-1, P-4, and P-5.....	59
Figure A5: Rainfall and Water Level Comparisons for P-2, P-15, and P-16.....	60
Figure A6: Rainfall and Water Level Comparisons for P-3, P-17, P-18, and P-19.....	61

Figure A7: Rainfall and Water Level Comparisons for P-6, P-7, P-8, and P-9	62
Figure A8: Rainfall and Water Level Comparisons for P-10, P-11, and P-12	63
Figure A9: Rainfall and Water Level Comparisons for P-13 and P-14	64
Figure A10: Rainfall and Water Level Comparison for P-20	65
Figure A11: Diagram of a Multi-level Sampling Well	66
Figure A12: Transect 1 Groundwater Acenaphthene Concentration Profile	86
Figure A13: Transect 1 Acenaphthylene Groundwater Concentration Profile	87
Figure A14: Transect 1 Anthracene Groundwater Concentration Profile.....	88
Figure A15: Transect 1 Groundwater Fluoranthene Concentration Profile	89
Figure A16: Transect 1 Groundwater Fluorene Concentration Profile.....	90
Figure A17: Transect 1 Groundwater Naphthalene Concentration Profile	91
Figure A18: Transect 1 Groundwater Phenanthrene Concentration Profile.....	92
Figure A19: Transect 1 Groundwater Pyrene Concentration Profile.....	93
Figure A20: Transect 1 Groundwater Dissolved Oxygen Concentration Profile	94
Figure A21: Transect 3 Groundwater Acenaphthene Concentration Profile	95
Figure A22: Transect 3 Groundwater Acenaphthylene Concentration.....	96
Figure A23: Transect 3 Groundwater Anthracene Concentration Profile.....	97
Figure A24: Transect 3 Groundwater Fluoranthene Concentration Profile	98
Figure A25: Transect 3 Groundwater Fluorene Concentration Profile.....	99
Figure A26: Transect 3 Groundwater Naphthalene Concentration Profile	100
Figure A27: Transect 3 Groundwater Phenanthrene Concentration Profile.....	101
Figure A28: Transect 3 Groundwater Pyrene Concentration Profile.....	102
Figure A29: Transect 3 Groundwater Dissolved Oxygen Concentration Profile	103
Figure A30: Transect 1 Soil Acenaphthene Concentration Profile	104
Figure A31: Transect 1 Soil Chrysene Concentration Profile	105
Figure A32: Transect 1 Soil Fluoranthene Concentration Profile	106
Figure A33: Transect 1 Soil Fluorene Concentration Profile.....	107
Figure A34: Transect 1 Soil Phenanthrene Concentration Profile.....	108
Figure A35: Transect 1 Soil Pyrene Concentration Profile.....	109
Figure A36: Transect 1 Soil Total PAH Concentration Profile.....	110
Figure A37: Transect 2 Soil Acenaphthene Concentration Profile	111

Figure A38: Transect 2 Soil Chrysene Concentration Profile	112
Figure A39: Transect 2 Soil Fluoranthene Concentration Profile	113
Figure A40: Transect 2 Soil Fluorene Concentration Profile	114
Figure A41: Transect 2 Soil Phenanthrene Concentration Profile.....	115
Figure A42: Transect 2 Soil Pyrene Concentration Profile	116
Figure A43: Transect 2 Soil Total PAH Concentration Profile.....	117
Figure A44: Diagram of a Multi-level Sampler.....	118
Figure A45: Tensiometer.....	119
Figure B1: Diagram for Calculating the Gradient Magnitude and Direction.....	133
Figure B2: Location and Area of the ET Polygons.....	136
Figure C1: Location and Value of the Coordinates Used to Register the Conceptual Image.....	137

LIST OF TABLES

Table 2.1: Bedrock Data.....	3
Table 2.2: Gradient Summary.....	16
Table 2.3: Hydraulic Heads used in Gradient Calculations.....	19
Table 2.4: Calculated Velocities	21
Table 3.1: Calibration Results	28
Table 3.2: Mass Balance for the Calibrated Model	31
Table 3.3: Non-Unique Solution Results.....	31
Table 3.4: Results of the Sensitivity Analysis	32
Table 3.5: Mass Balance Results for the Trench Model	35
Table 3.6: Trench Simulation Heads Compared with March 1998 Heads.....	36
Table A1: Rainfall Amounts.....	44
Table A2: Water Levels.....	45
Table A3: November 1997 Groundwater Field Data.....	66
Table A4: March 1998 Groundwater Field Data	68
Table A5: January 1999 Groundwater Field Data	69
Table A6: Groundwater PAH Concentrations for March 1998.....	72
Table A7: Groundwater PAH Concentration Taken June 10, 1998	73
Table A8: Groundwater PAH Concentration Taken January 15, 1999	74
Table A9: Groundwater Sampling Elevations	75
Table A10: Soil PAH Concentration from July 1997	76
Table A11: Soil PAH Concentration form June 1998	79
Table A12: Interpolation Methodology.....	81
Table A13: Groundwater Surfer Data Points for Transect 1	82
Table A14: Groundwater Surfer Data Points for Transect 3	83
Table A15: Soil Surfer Data Points for Transect 1	84
Table A16: Soil Surfer Data Points for Transect 2	85
Table A17: Tree Heights	119