



November 20, 1998

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**RE: Operation and Maintenance Report - Product Recovery System
ATF Area
G.M.P.T. Willow Run Plant**

Dear Ms. Kennedy:

Thanks for the opportunity to provide environmental services to G.M.P.T. This report contains the results of O&M activities for the Product Recovery Systems located in the ATF (Automatic Transmission Fluid) area at the General Motors Corporation Power Train facility in Ypsilanti, Michigan (Figure 1). The O&M activities were conducted on 5/18/98 and 5/19/98.

The specific objectives of the O&M activities included the following:

1. Monitored the recovery systems, gauge the depths to free product and groundwater and repair each recovery system.
2. Set-up the recovery systems to optimize the drainage and recovery of the free product.
3. Monitored specific monitoring wells in the ATF area.
4. Prepared a report summarizing the data collected during the O&M activities

ATF AREA

DESCRIPTION:

Each of the seven dual-well pumping systems contains two pneumatic pumps for the separate recovery of free product and groundwater (Figure 2). In principle, the dual-well system works as follows: the system uses two recovery pumps; one in the layer of product (ATF) and the other extending below the product layer into the groundwater zone. Product is pumped from the system at a rate to maximize the product recovery, while maintaining a layer of oil in the recovery well and maintaining continuity between the product in the soil with that in the recovery well (larger well). Groundwater is pumped at a pre-determined rate to maintain the initially depressed oil/water interface at its pre-pumped position to maximize the drainage and recovery of ATF. The pumping rates are controlled by preset timers and air-pressure in a control box. The recovered product and groundwater are discharged to an aboveground holding tank for subsequent discharge to the plant's wastewater treatment system. Each recovery system is enclosed in a cage along with the transfer pump, holding tank and the control system. The observed thickness of the product across the ATF area is shown in Figure 3 and the graph for depths to product and groundwater for each well are attached as Appendix A. Also, the dual recovery and monitoring well depths are provided in Appendix B.

INITIAL OPERATING CONDITIONS:

In general, all the recovery systems were in fairly good operating conditions. However, the pumps and their screens were covered with biomass and chemical precipitates. The control panel needed adjustment for effective operation, the groundwater pumps were pumping and the product pumps were typically discharging product and in some cases, mixed product and groundwater. The depths of some of the pumps appeared to be less than optimal, because of groundwater fluctuation. Therefore, each pump had to be adjusted for optimum product recovery. Overall, the systems displayed conditions of good maintenance and operation. Based on baseline measurements of the system before optimization, a contour plot of product thickness for the ATF Area is shown in Figure 3.

OPTIMIZED CONDITIONS:

The pumps were removed from the wells, disconnected from the system and cleaned by scrubbing/washing with Alconox/water. The tubing and connections were cleaned. (Unfortunately, tubing was not available in G.M.P.T. storage so semi-clogged tubing was not replaced.) Finally, the recovery pumps were replaced in their respective well and the control system was adjusted. In most cases, the pump tubing was disconnected from the pump and/or storage tank and the precipitated material was cleared from the tubing. Air leaks or kinks in the air lines were corrected. The control system was cleaned, parts were replaced as needed, and the timer and pressure settings were adjusted to further optimize the recovery rates. The pneumatic control system (refill and discharge) in each recovery system was adjusted to slow the pumping rates by allowing a longer recharge time. This

pumping rates by allowing a longer recharge time. This will increase the volume of liquid available for pumping from the well into the holding tanks. The discharge timers were adjusted so that there was enough time to pump a full volume of fluid from the pump cavity. Ultimately, minimizing the discharge of air will minimize biofouling and precipitation on the well screens and on the pump discharge tubing. The depths of the product and groundwater recovery were lowered to allow more drawdown and eventual draining of product into the product or recovery well. This will also minimize any mixing of the product and groundwater.

RESULTS FOR THE PRODUCT RECOVERY SYSTEMS

RECOVERY WELL NO: RW-03 (RW-400)

Well Diameter: 4 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	5.74	5.96	0.80
2/3/98	5.80	6.03	0.23
5/19/98	5.70	6.02	0.32

Well Diameter: 1.5 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	6.00	6.01	0.01
2/3/98	None	5.91	0.00
5/19/98	5.86	5.87	0.01

OPTIMIZED CONDITIONS: The product recovery pump (Hammerhead H4 Series) was pumping an emulsified mixture of product and water at an approximate rate of 1.0 L/min. The air pressure was set at 30 psi.

RECOVERY WELL NO: RW-10 (RW-401)

Well Diameter: 8 inch

Date of Observation	Depth to Product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	5.85	5.86	0.01
2/3/98	6.11	8.20	2.09
5/19/98	5.61	7.61	2.00

Well Diameter: 4 inch

Date of Observation	Depth to Product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	6.14	7.46	1.32
2/3/98	None	6.50	0.00
5/19/98	None	5.36	0.00

OPTIMIZED CONDITIONS: The product recovery pump (Pulse Pump Model # LP 1301) was pumping at the rate of 0.425 L/min. The air pressure was set at 30 psi.

RECOVERY WELL NO: RW-13 (RW-403)

Well Diameter: 4 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	6.82	7.75	0.93
2/3/98	7.16	8.10	0.94
5/19/98	6.46	9.20	2.74

Well Diameter: 1.5 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	6.80	6.90	0.10
2/3/98	7.11	7.12	0.10
5/19/98	6.43	6.44	0.01

OPTIMIZED CONDITIONS: The product recovery pump (Pulse Pump Model # LP 1301) was pumping at the rate of 0.5 L/min. The air pressure was set at 25 psi.

RECOVERY WELL NO: RW-15 (RW-402)

Well Diameter: 4 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	6.38	7.18	0.80
2/3/98	6.31	7.52	1.21
5/19/98	6.10	6.70	0.70

Well Diameter: 1.5 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	None	6.48	0.00
2/3/98	None	6.44	0.00
5/19/98	None	6.21	0.00

OPTIMIZED CONDITIONS: The product recovery pump (Pulse Pump Model # LP 1301) was pumping at the rate of 0.6 L/min. The air pressure was set at 50 psi.

RECOVERY WELL NO: RW-24 (RW-406)

Well Diameter: 4 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	7.26	8.67	1.14
2/3/98	6.49	9.23	2.74
5/19/98	6.17	8.2	2.03

Well Diameter: 1.5 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	None	7.78	0.00
2/3/98	None	6.83	0.00
5/19/98	None	6.47	0.00

OPTIMIZED CONDITIONS: The product recovery pump (Pulse Pump Model # LP 1301) was pumping at the rate of 0.35 L/min. The air pressure was set at 70 psi.

RECOVERY WELL NO: RW-30 (RW-405)

Well Diameter: 8 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	9.12	9.90	0.78
2/3/98	9.51	10.9	1.39
5/19/98	9.42	10.1	0.68

Well Diameter: 4 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	8.88	9.47	2.73
2/3/98	9.51	10.9	1.39
5/19/98	9.36	9.61	0.25

OPTIMIZED CONDITIONS: The product recovery pump (Pulse Pump Model # LP 1301) was pumping at the rate of 0.45 L/min. The air pressure was set at 20 psi.

RECOVERY WELL NO: RW-39 (RW-404)

Well Diameter: 4 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	7.74	7.76	0.02
2/3/98	7.91	7.97	0.06
5/19/98	None	7.80	0.00

Well Diameter: 1.5 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)
11/4/97	7.12	7.13	0.01
2/3/98	None	7.29	0.00
5/19/98	None	7.06	0.00

OPTIMIZED CONDITIONS: The product recovery pump (Pulse Pump Model # LP 1301) was pumping at the rate of 0.3 L/min. The air pressure was set at 26 psi.

SPECIFIC MONITORING WELLS (ATF AREA)

MONITORING WELL NO: MW-13

Well Diameter: 2 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)	Well Depth (feet)
5/19/98	6.61	11.56	4.95	11.96

MONITORING WELL NO: MW-24

Well Diameter: 2 inch

Date of Observation	Depth to product TOC (feet)	Depth to Groundwater TOC (feet)	Product Thickness (feet)	Well Depth (feet)
5/19/98	6.58	9.27	2.67	12.6

The ATF recovery systems are being maintained and optimized every quarter. While the O&M efforts are very effective, the tubing and pumps for several of the recovery wells would accumulate biofouling material and chemical precipitates. The problem is the result of fluctuation of the water table, which impacts the optimization of the pumps. While we were able to improve product recovery with quarterly O&M activities, we recommend that the pumps be maintained more regularly to maintain the system performance.

We appreciate this opportunity to be on your team and look forward to your approval and schedule for the next O&M event. If you have any questions or would like to discuss the results, please call us at (248)-524-1951.

Respectfully Submitted:
AV/NESA

Kirk Pfannes, BS
Staff Engineer

Scott Drozsowicz, BS, MS
Project Manager

cc: Abdul S. Abdul, Ph.D., PHG (NESA)

FIGURES

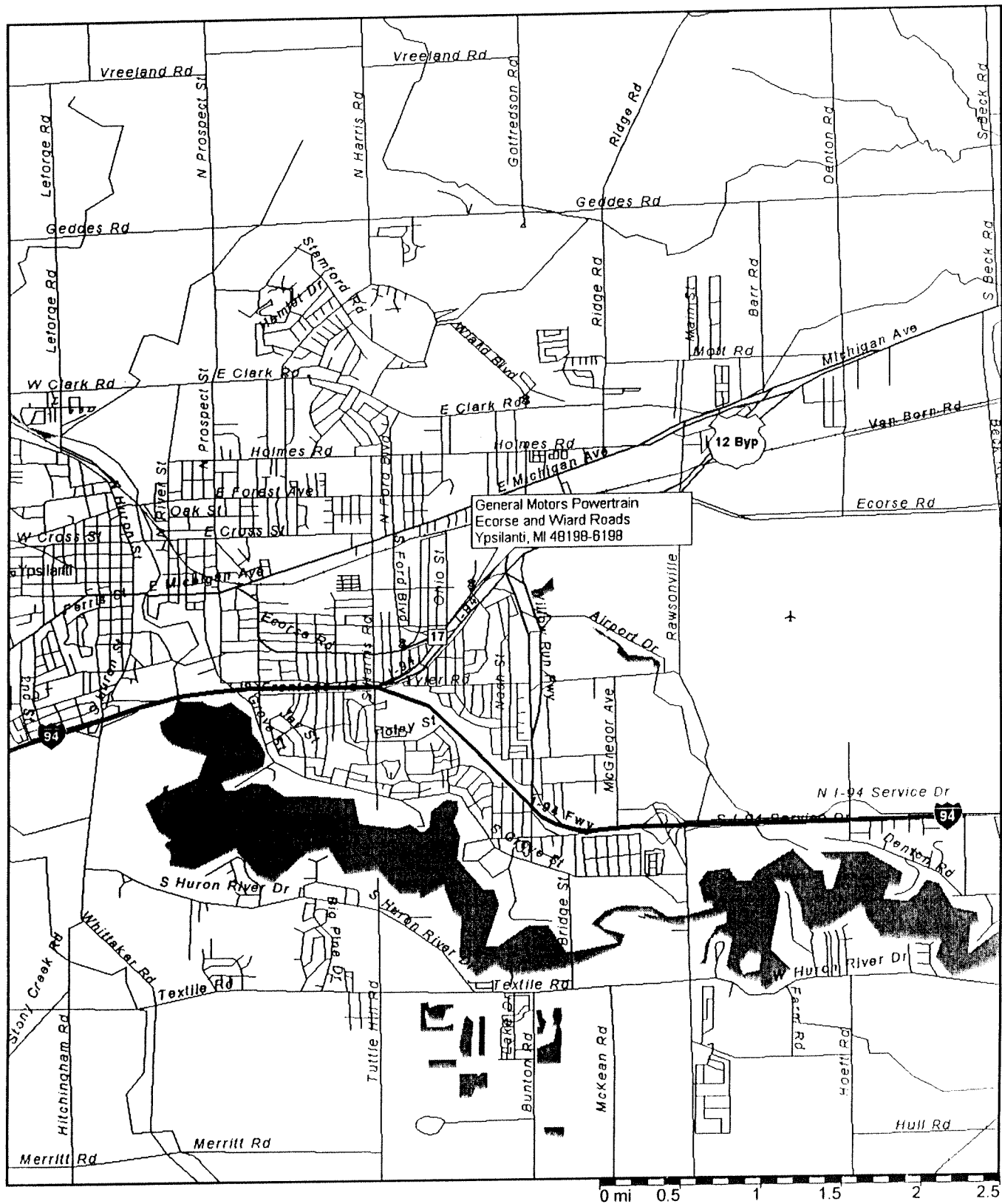


Figure 1 - Site Location Map
General Motors Powertrain Facility, Ypsilanti, Michigan



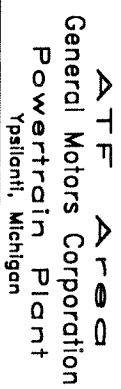


Figure 2



Aeroenvironment/NEESA, LLC
AV/NEESA

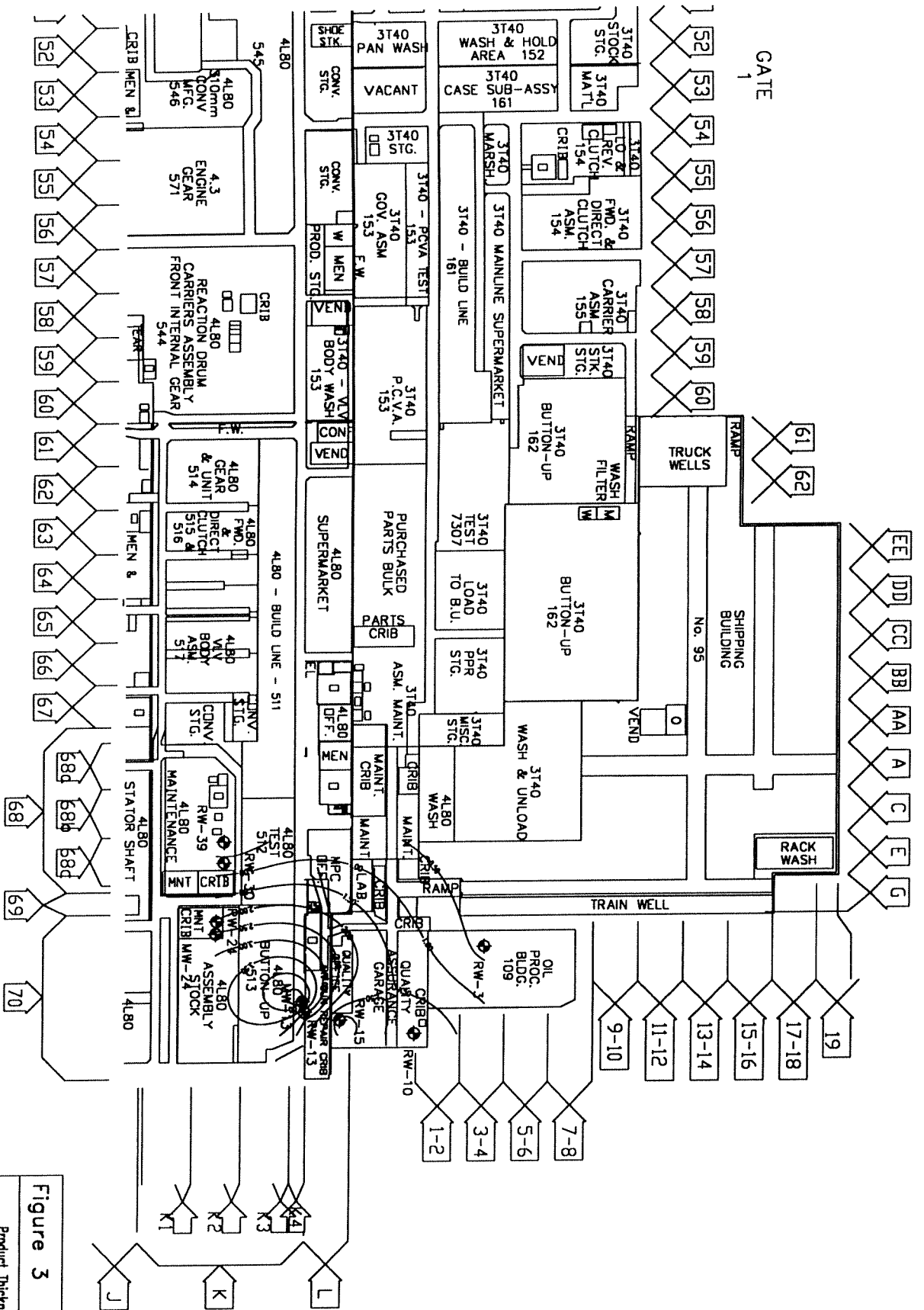


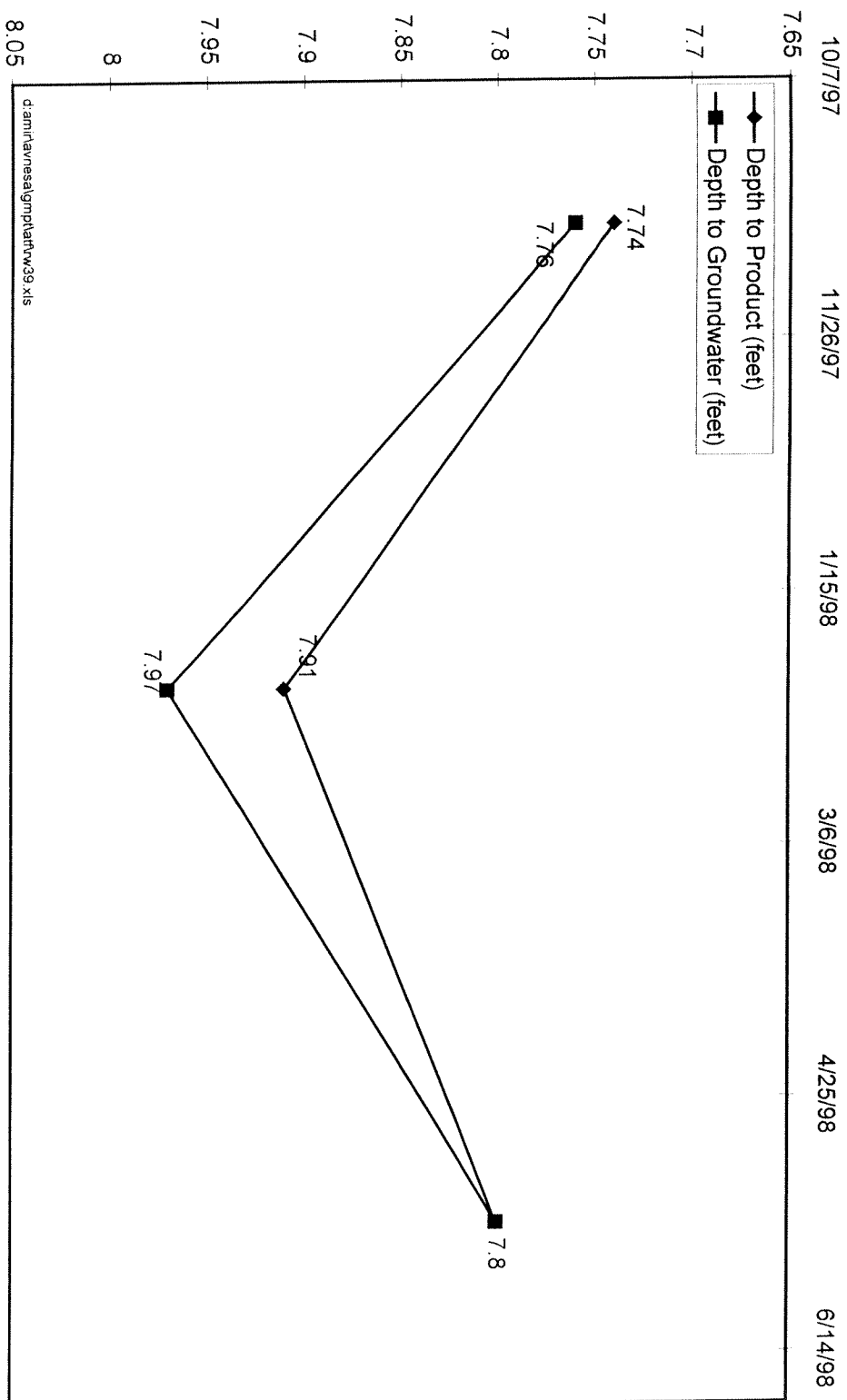
Figure 3

Product Thickness Contours/AT Area
General Motors Corporation
Powertrain Plant
Ypsilanti, Michigan

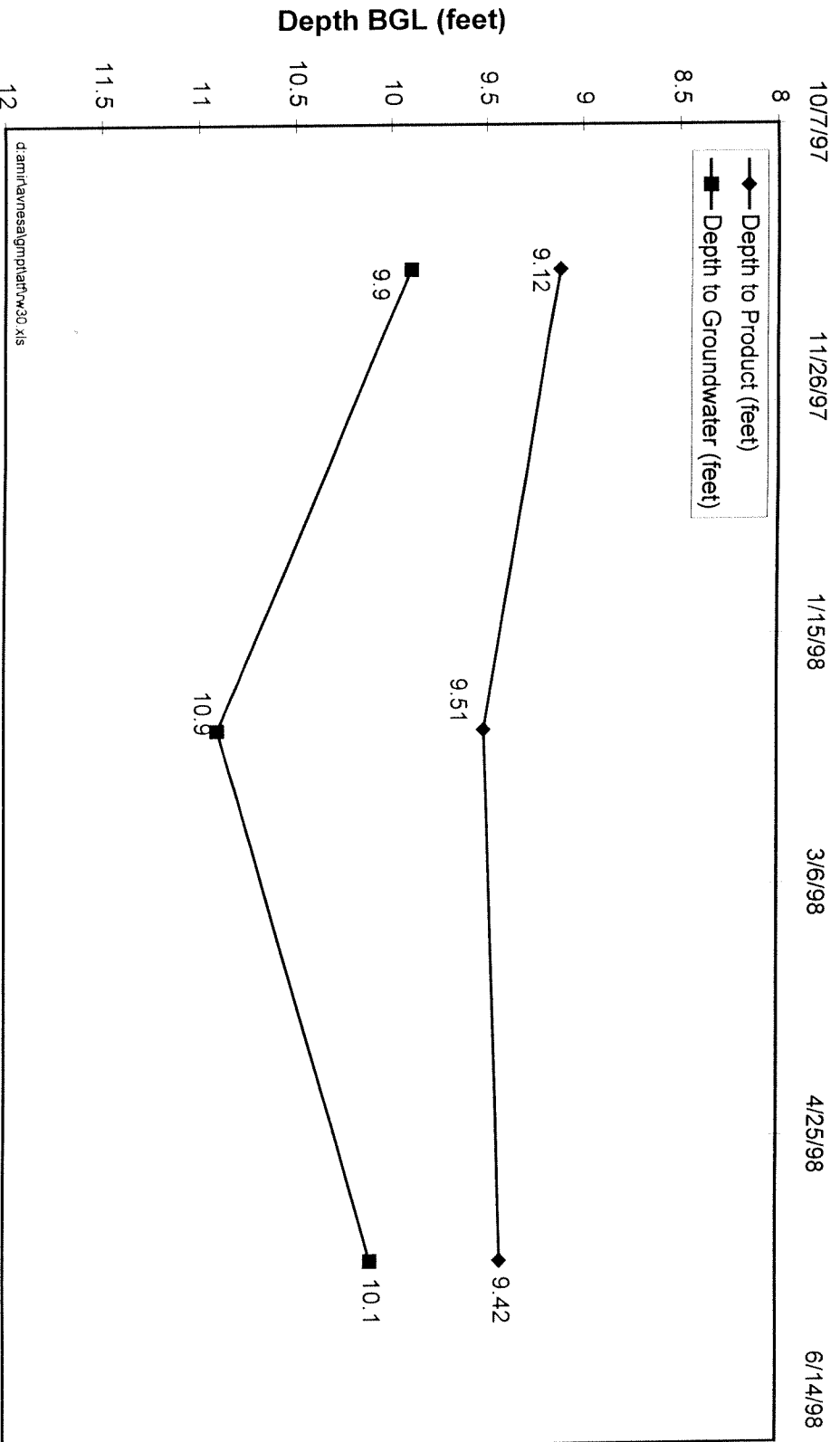

Aeroproduct/NECA, LLC
AV/NECA

APPENDIX A

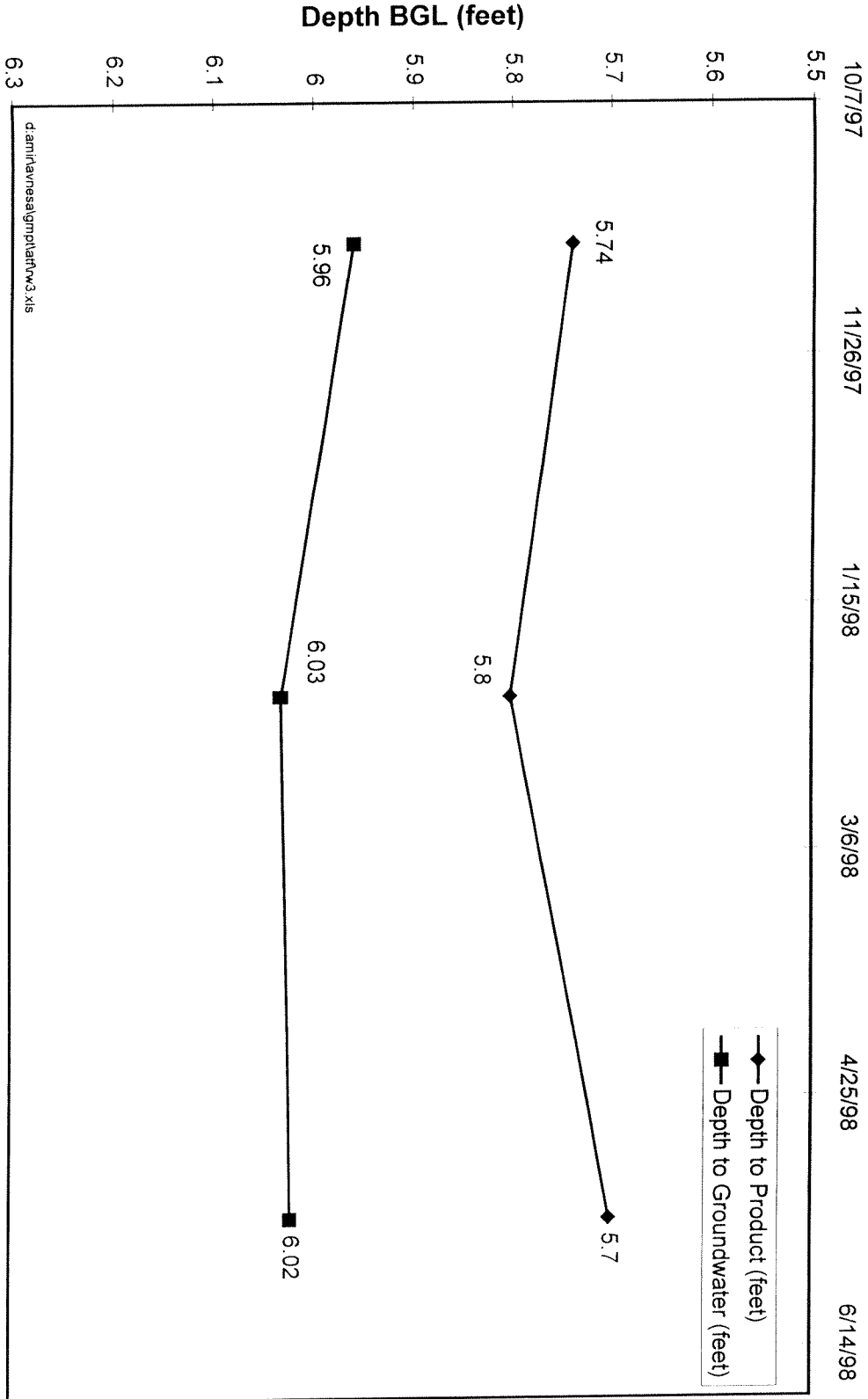
Depths to Product and Groundwater ATF Area- RW-39 (RW-404)- 4-Inch Well



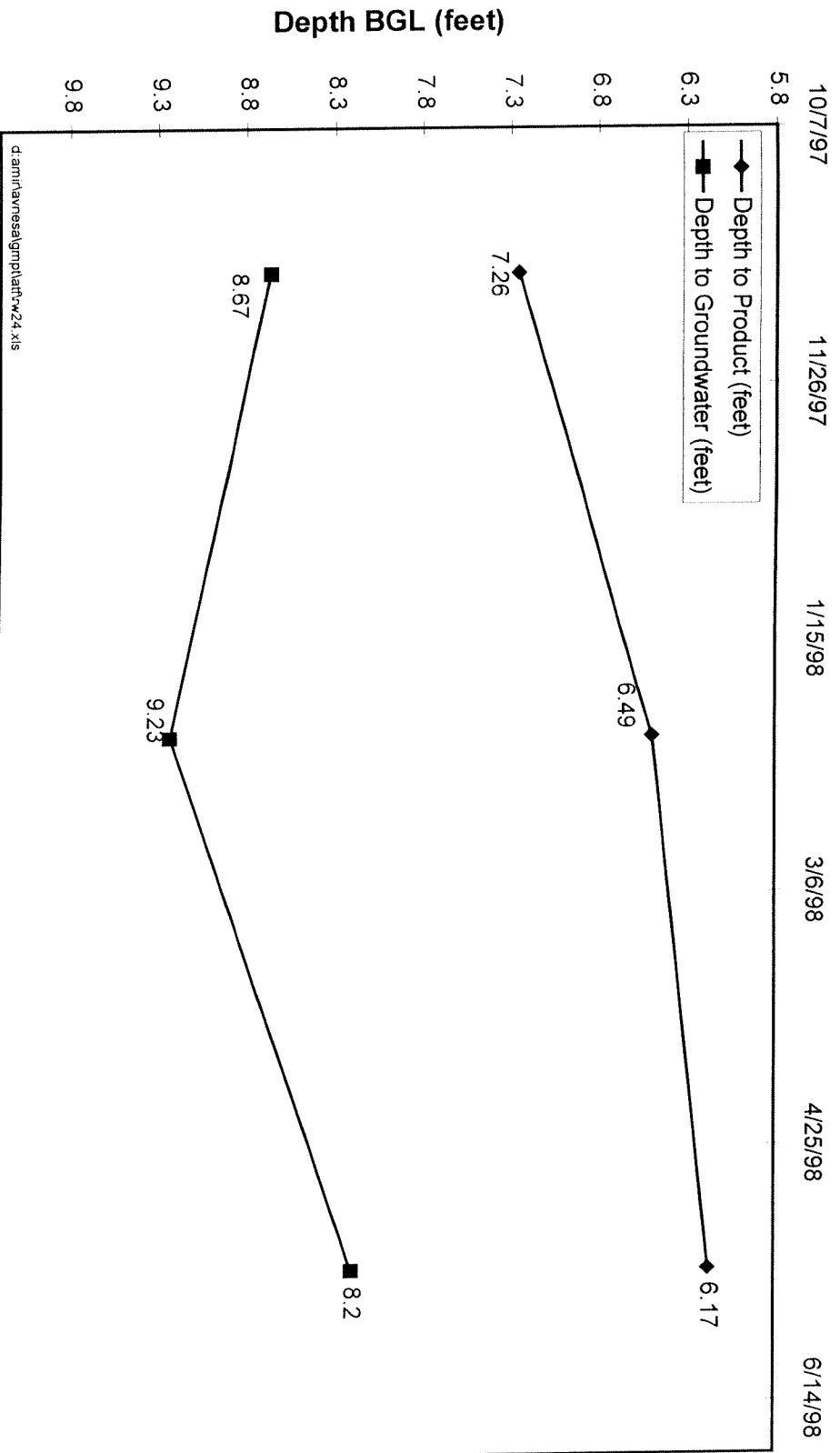
Depths to Product and Groundwater ATF Area- RW-30 (RW-405)- 8-Inch Well



Depths to Product and Groundwater
ATF Area- RW-03 (RW-400)- 4-Inch Well

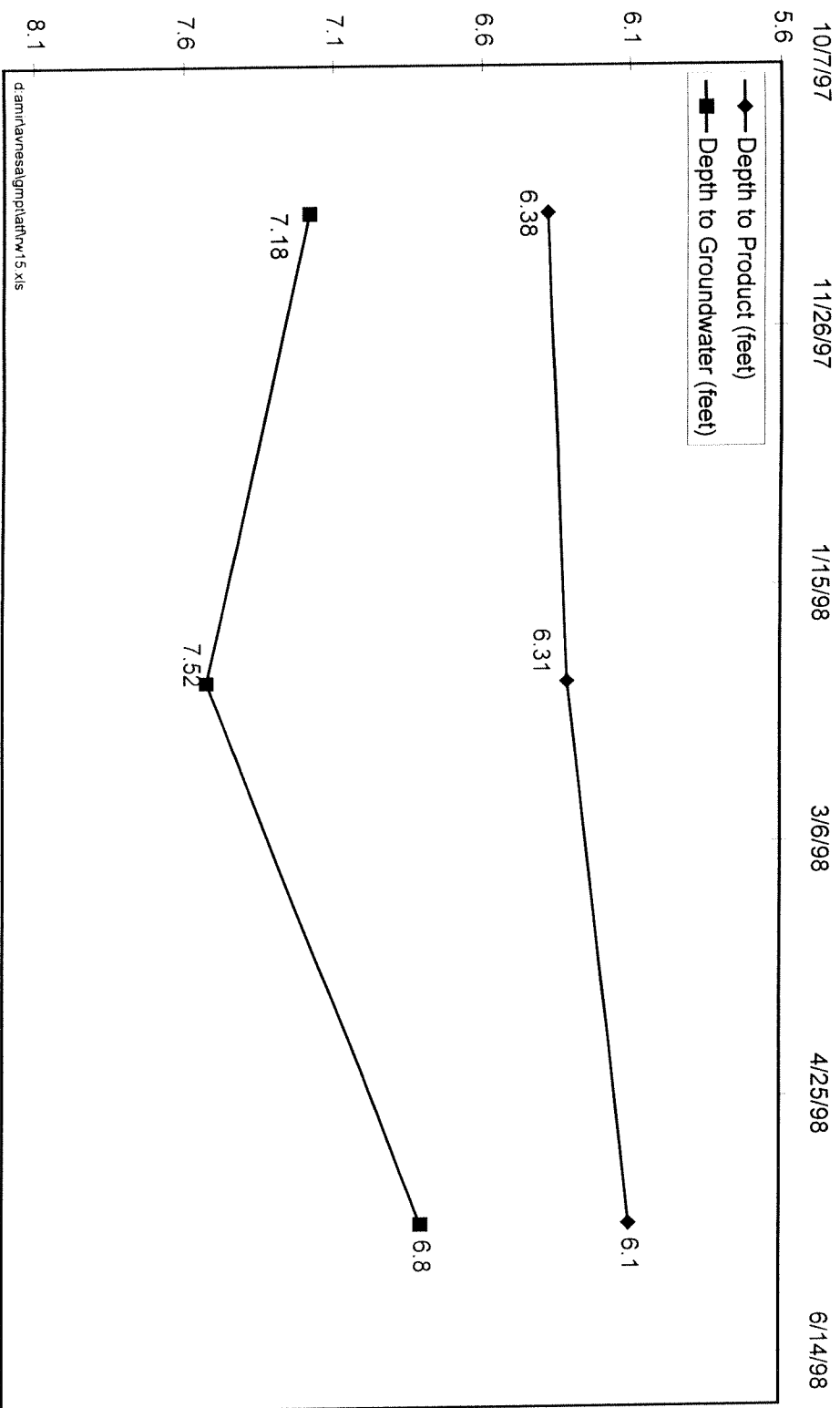


Depths to Product and Groundwater ATF Area- RW-24 (RW-406)- 4-Inch Well

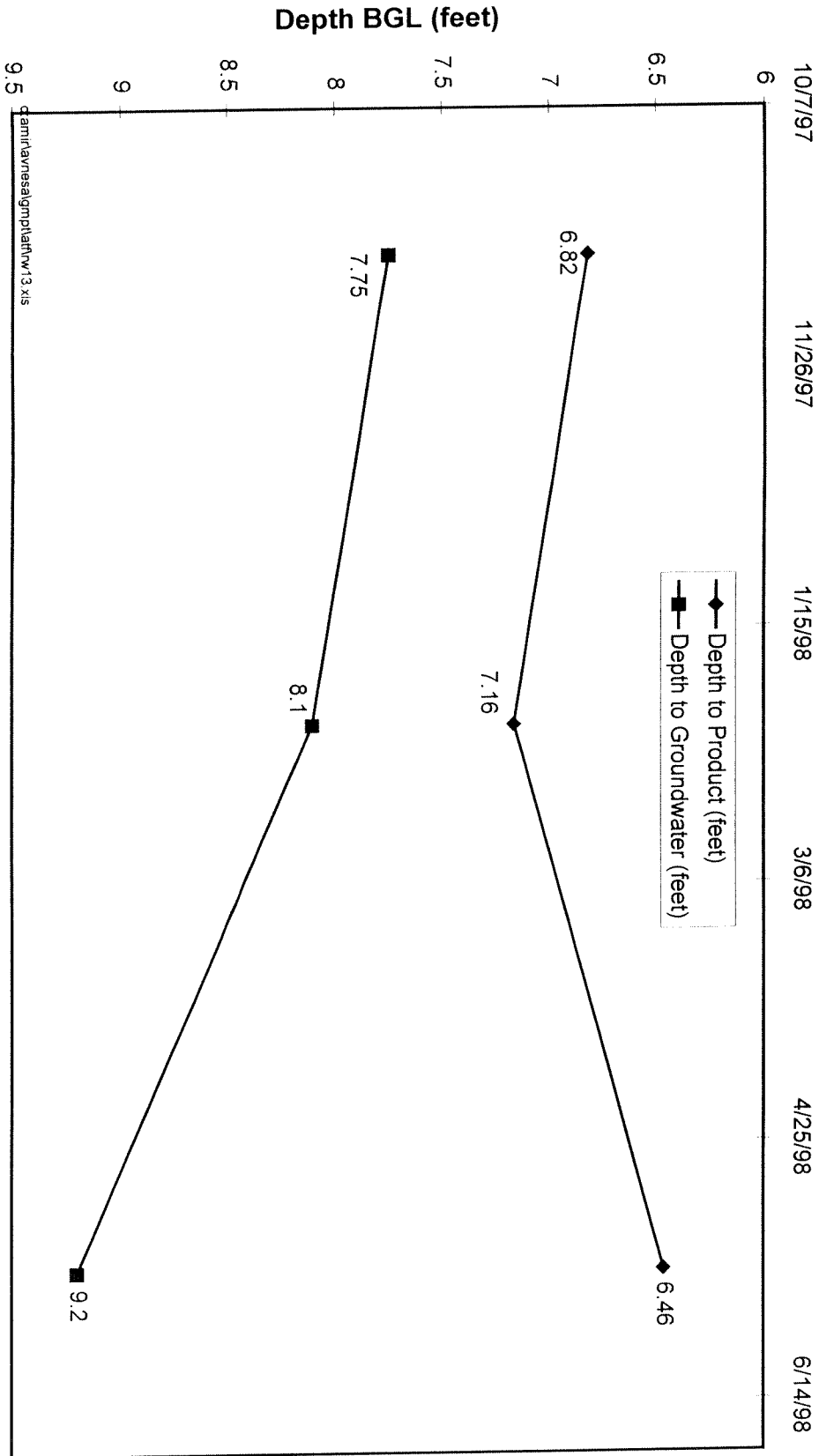


Depths to Product and Groundwater

ATF Area- RW-15 (RW-402)- 4-Inch Well

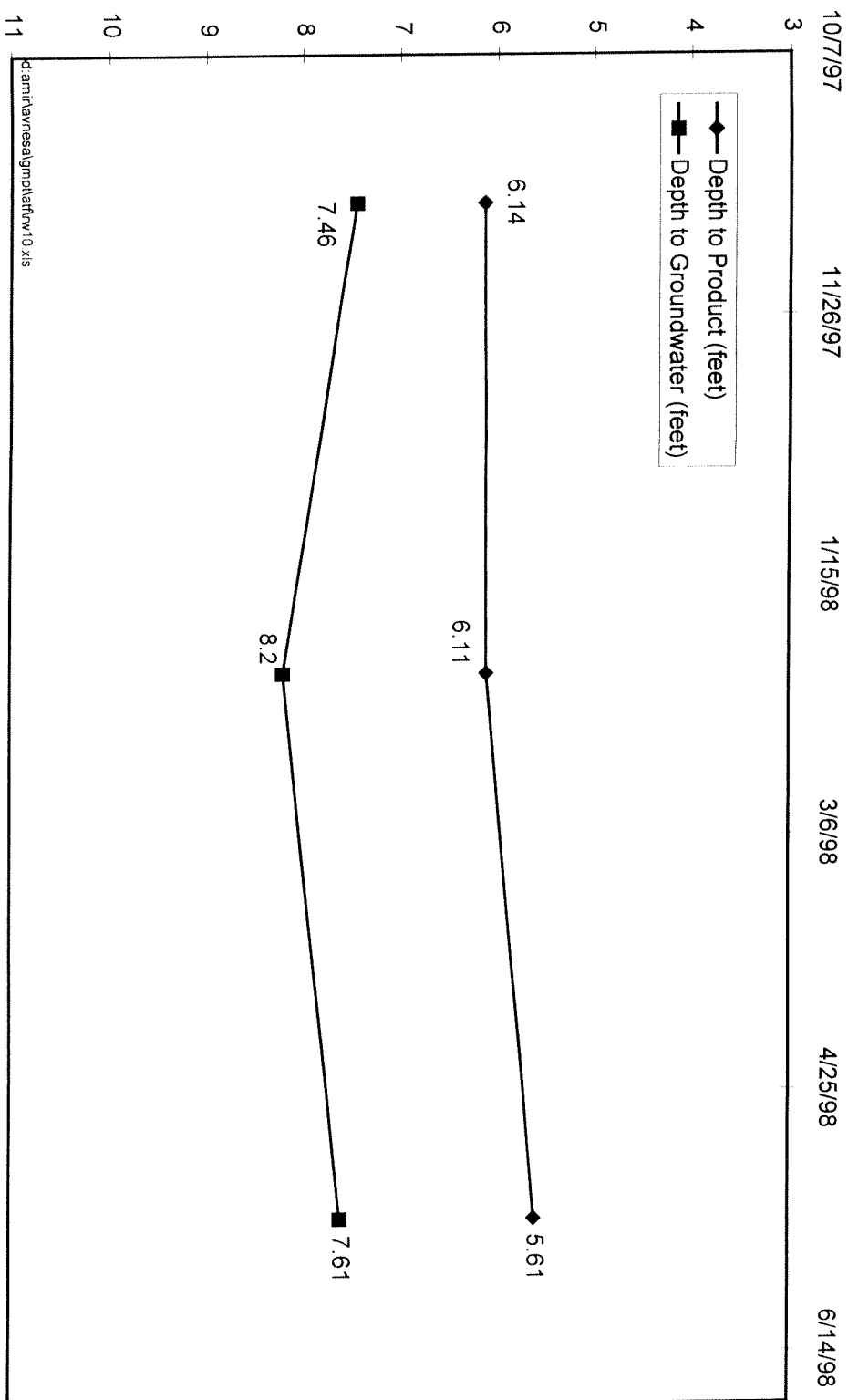


Depths to Product and Groundwater ATF Area- RW-13 (RW-403)- 4-Inch Well



Depths to Product and Groundwater

ATF Area- RW-10 (RW-401)- 8-Inch Well



APPENDIX B

RECOVERY WELL DEPTHS (ATF AREA)

Well	Type	Diameter (inches)	Depth (feet)
RW-3	Water	4.0	9.72
	Product	1.5	11.20
RW-10	Water	8.0	9.70
	Product	4.0	16.00
RW-13	Water	4.0	8.90
	Product	1.5	11.10
RW-15	Water	4.0	8.00
	Product	1.5	10.78
RW-24	Water	4.0	10.33
	Product	1.5	12.59
RW-30	Water	8.0	11.05
	Product	4.0	11.05
RW-39	Water	4.0	10.70
	Product	1.5	12.40

MONITORING WELL DEPTHS (ATF AREA)

Well	Diameter (inches)	Depth (feet)
MW-13	2.0	11.96
MW-24	2.0	12.60