GAUGING/PRODUCT RECOVERY
and
SEMI-ANNUAL SAMPLING REPORT
JANUARY THROUGH MARCH 1995
BAY E-28 AREA
GM POWERTRAIN
YPSILANTI, MICHIGAN

SEPTEMBER 1995

TOLTEST, INC.

TOLTEST, INC.
Founded in 1927
Toledo, Ohio • Detroit, Michigan • Monroe, Michigan • Pittsburgh, Pennsylvania

September 5, 1995

Project No. 70172.01-13

Mr. Walter Mixon
Senior Environmental Engineer
General Motors Corporation
Powertrain Division
1 Hydra-matic M/C 130
Ypsilanti, Michigan 48197

Gauging / Product Recovery
and
Semi-Annual Sampling Report
January Through March 1995
Bay E-28 Area
GM Powertrain
Ypsilanti, Michigan

Dear Mr. Mixon:

TolTest, Inc., (TolTest) is pleased to submit the enclosed separate-phase product gauging and recovery, and the first semi-annual sampling report for the Bay E-28 Area at the General Motors Powertrain Division (Powertrain) plant in Ypsilanti, Michigan. This report contains TolTest's product thickness gauging, product recovery monitoring, and groundwater sampling activities conducted at Bay E-28 Area during the months of January through March 1995.

We believe that the data and observations presented in this report are sufficient to fulfill your present requirements. If you have any questions or require additional assistance, please feel free to contact us.

Sincerely,

TolTest, Inc.

Joseph M. Cook

Jose E. Castillo
Environmental Engineer

Joseph M. Cook
Project Manager

[P:\WP51\IH\REPORTS\ASBESTOS\GMPWRYPS\70172\ATF41-51]

GAUGING/ PRODUCT RECOVERY
and
SEMI-ANNUAL SAMPLING REPORT
JANUARY THROUGH MARCH 1995
GENERAL MOTORS POWERTRAIN
BAY E-28 AREA
YPSILANTI, MICHIGAN

PREPARED FOR

GENERAL MOTORS CORPORATION
POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

SUBMITTED

MAY 1995
T0LTEST PROJECT NO. 70172.24

TOLTEST, INC.
44191 PLYMOUTH OAKS BOULEVARD
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PLYMOUTH, MICHIGAN
(313) 455-8600

TOLTEST, INC.

TABLE OF CONTENTS

1.0 INTRODUCTION

This report summarizes the field activities conducted by TolTest, Inc. (TolTest) from the months of January through March 1995, at the General Motors Powertrain Division (Powertrain) in Ypsilanti, Michigan. Site activities included the groundwater/product thickness gauging, remedial system monitoring and the groundwater sampling of 1 monitoring well. In addition, a summary of ground water analysis is presented for the groundwater samples collected. The sections that follow discuss the field activities performed by TolTest and include analytical testing methodologies.

2.0 FIELD ACTIVITIES

Field activities conducted by TolTest in the Bay E-28 Area consisted of groundwater/product thickness gauging, remedial system monitoring, and groundwater sampling of 1 monitoring well (see Appendix A, Groundwater/Product Gauging Record and Appendix B, Operation and Maintenance Logs). Each well was first gauged with an oil/water interface probe to determine the static water level and the thickness of separate-phase product. Separate-phase product was detected in monitoring wells MW-1, and MW-3. In addition, separate-phase product was detected at recovery wells RW-6, RW-10, RW-11, RW-16, RW-17, and RW-18.

2.1 OPERATION AND MAINTENANCE ACTIVITIES

During the operation and maintenance activities conducted from the months of January through March 1995 on each recovery well system in the Bay E-28 area, the pump hardware, pump screen, and plumbing was checked for integrity. The recovery pump controller was checked for pressure, leaks at all fittings, and pump cycles. Flow measurements were determined by opening the petcock located between the product discharge line and the main waste discharge line, then using a 500 ml graduated cylinder, measurable product was obtained by allowing the product to discharge into the graduated cylinder for five minutes (see Appendix B, Operation and Maintenance Logs and Appendix C, Fluid Collection Rates, Volumes, and Descriptions from Recovery Well Locations).

Based on the gauging data, pump cycle, system inspection and product flow rate, each of the product recovery systems was optimized as follows:

A. PULSE PUMP PNEUMATIC PUMPING SYSTEM

1. Flow throttle was turned fully clockwise.
2. The refill control was set at the "D" setting.
3. The discharge control was at the "A" setting.
4. The discharge control was gradually increased (in 1/2 sec. increments) giving the pump time to go through 3 to 5 cycles between each adjustment. The discharge control was increased until air bubbles were seen coming through the pump discharge tubing at the end of the discharge cycle. Pump discharge control was slowly decreased until air bubbles were no longer seen at the end of the cycle.

5. The refill control was gradually decreased (in 1 sec. increments) giving the pump time to go through 3 to 5 cycles between each adjustment. Decreasing the refill control continued until air bubbles were seen coming through the pump discharge tubing at the end of the discharge cycle. Refill control was then slowly increased until air bubbles were no longer seen at the end of the cycle.

B. SOLO CONTROLLERLESS PNEUMATIC PUMPING SYSTEM

The solo pumping system was optimized by adjusting the pressure control knob to any values between 40 to 100 psi. Flow rate is dependent on the amount of air pressure that is received by the pump.

See appendix B, Operation and Maintenance Logs, for the setting and adjustments of each of the recovery wells.

2.2 GROUNDWATER SAMPLING

Samples of groundwater were collected from 1 monitoring well (MW-5) on April 4, 1995 as shown on figure 1. The remaining monitoring wells (MW-1, and MW-3) were not sampled because a layer of product was detected at each well. Groundwater was sampled using two-inch diameter plastic bailers dedicated to each well. Each well was purged of three wells casing volumes or evacuated, and allowed to recharge prior to sampling. Groundwater was sampled by lowering the plastic bailer down into the well casing below the groundwater interface. Water entered through a ball check valve seated at the bailer bottom capturing a column of water. The sample was extracted by retrieving the bailer from the bore hole.

A one litter amber glass jar was filled for the sample collected. The sample jar was capped using zero headspace filling procedures. The sample was delivered to TolTest's analytical laboratory for analysis of total petroleum hydrocarbons TPH by using U.S Environmental Protection Agency Method 8015, Lube-Range only. The results of the analysis are summarized in Appendix D.

2.3 EQUIPMENT DECONTAMINATION

Between each monitoring well, the interface probe was decontaminated by washing with Alconox and rinsing the probe and cable with deionized water. The probe and exposed cable were all triple rinsed and allowed to air dry before using at the next sampling point.

3.0 SAMPLE CUSTODY

The following sections identify the procedures utilized to document, collect, and transport the samples to the analytical testing laboratory.

3.1 SAMPLE DOCUMENTATION

Each water sample collected at the site was labeled with the following information:

- Project number
- Sample number
- Sample location
- Date and time collected
- Preservation method
- Name of sampler

3.2 CHAIN-OF-CUSTODY LOGS

Each sample collected at the site was documented on a chain-of-custody (COC) log prior to sample transportation. Appendix E presents the COC logs that accompanied the samples. The COC logs document sample integrity, transfer, shipment and final receipt to the laboratory.

3.3 SAMPLE STORAGE

Each sample collected at the site was placed in plastic coolers with absorbent materials. Chilled ice packs were then placed inside each cooler to preserve sample integrity.

3.4 SAMPLE SHIPMENT

Samples collected at the site were retained on ice prior to release to the laboratory. Samples were transferred to the receiving laboratory with all required sample documentation.

4.0 ANALYTICAL RESULTS

4.1 GROUNDWATER ANALYTICAL DATA

A groundwater sample was obtained from groundwater monitoring well MW-5 for laboratory analysis of Total Petroleum Hydrocarbons (TPH) Lube-Range Organics using U.S. EPA Method 8015M. Analytical results for the groundwater sample is presented in Table 1.0. Groundwater laboratory data and chain-of-custody sheets are presented in Appendix D.

Groundwater analytical results detected TPH Lube-Range Organic concentrations in MW-5 of 2.68 mg/l. The MDNR has no action level for TPH; however, 100 mg/l is frequently cited by the MDNR as an action level. A summary of analytical results is presented in Table 1.0.

5.0 CONCLUSIONS

Recovery system monitoring was performed to see that the pumps were functioning as desired, and to collect data to evaluate system performance. Fluid levels and apparent product thicknesses in the nine (9) actively recovery wells were measured once a month during the first quarter of 1995. Product thickness and groundwater elevations were also measured in 4 monitoring wells (MW-1, MW-3, MW-5, and MW-8) on March 20, 1995 to monitor the influence of the recovery well pumping. Fluid levels measurements taken during the monthly monitoring events confirm the presence of depressed fluid levels in the recovery wells. Also, measurements in the month of March 1995 as compared to the month of August 1994 for the monitoring wells indicate that depressed fluid levels were achieved throughout the first quarter of 1995. While depressed levels indicate the successful removal of total fluids, it is not possible to estimate from this levels the total volume of fluids removed. Based on performance observations, the recovery of product may not be consistent from month to month. Because of this, an estimation of total product removed by simple discharge sample collection may not produce accurate data. A historical data table, Table F-1 (Appendix F) has been updated from the previous monitoring reports to indicate the product thicknesses data collected to date from the monitoring and recovery wells.

E-20

The following steps were used to calculate the total product volume for the ~~SubTest~~ area:

1. From a computer generated graph for the subtest area using the relative surface elevations of the recovery wells and recent gauging data, a scale of 1 inch=100 feet was used. Therefore, 1 sq. inch=10,000 sq. feet. The computer generated grid volume equal 2.43199 sq. inch feet. To convert this quantity to volume in cubic feet we use the conversion factor of 10,000 sq.feet/sq. inch.

(Total Volume (Cubic Feet)=2.43199 sq.inch feet * 10,000 sq. feet/sq. inch= 24319.9 cubic feet)

2. To convert total volume to total gallons we use the conversion factor of 7.48 gallons/cubic feet.

(Total gallons= 24319.9 cubic feet * 7.48 gallons/cubic feet=181912.85 gallons)

3. Assuming that 25% of the product plume contains porous soil.

(Total product Volume=gallons * 25%=45478.212 gallons)

TABLES

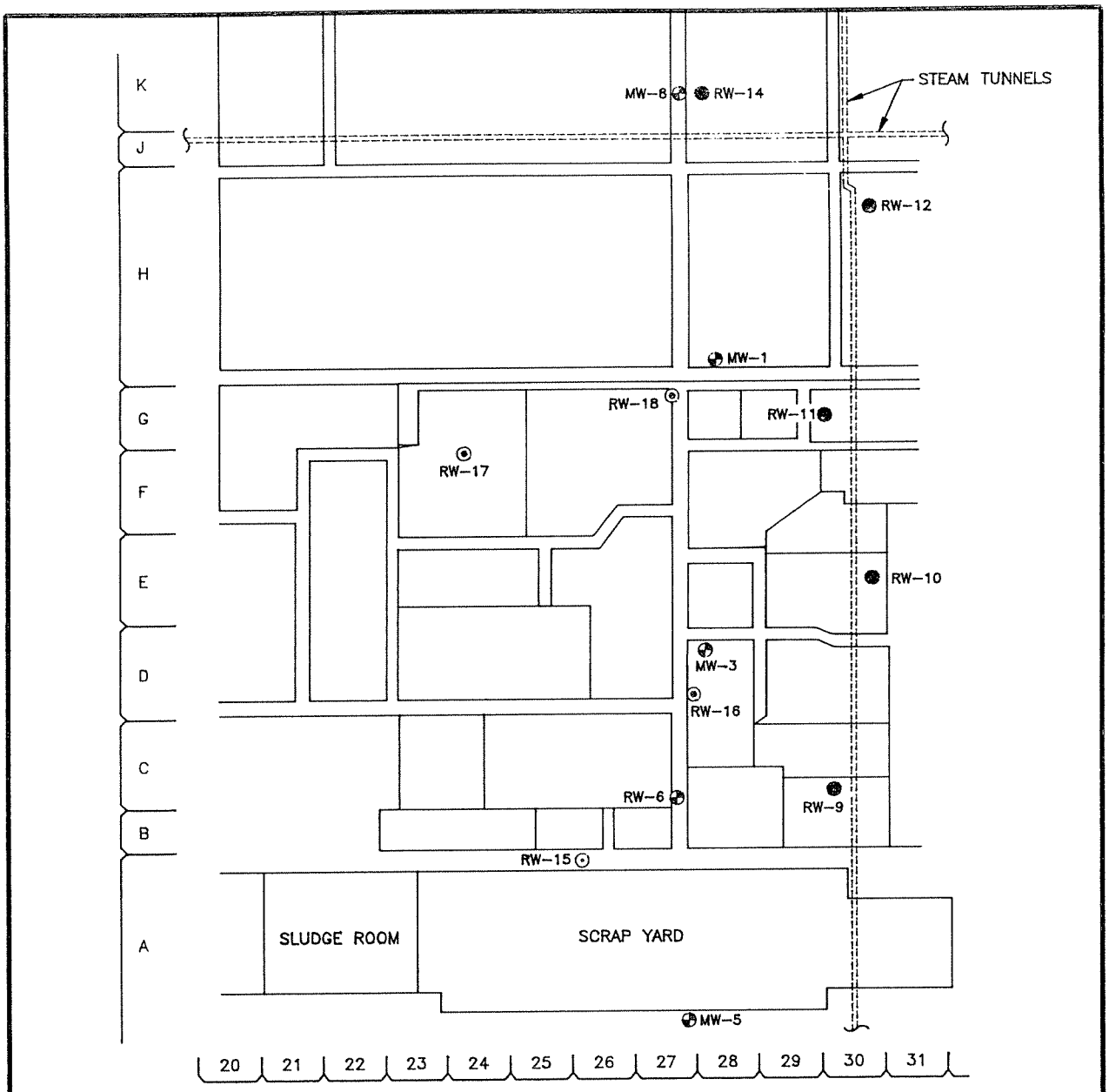
Table 1.0
Groundwater Analytical Data
GM-Powertrain/Willow Run Plant
Bay E-28

Sampling Location	Sampling Date	Total Petroleum Hydrocarbons Lube-Oil Range Organics (ppm)
MW-5	4/4/95	2.68
Analytical Method		8015M (Ca Luft)

Notes:

1. Samples analyzed by TolTest, Inc., of Toledo, Ohio.
2. Units: mg/l = parts per million (ppm).
3. -- = Not detected at or above the MDNR detection limits.

FIGURES



LEGEND

- ⊙ = 6" COMBINATION RECOVERY WELL
- ⊙ = 2" DRIVEPOINT RECOVERY WELL
- ● = 6" RECOVERY WELL
- ◔ = 2" MONITORING WELL
- ======== = STEAM TUNNELS

N

APPROXIMATE SCALE – FEET

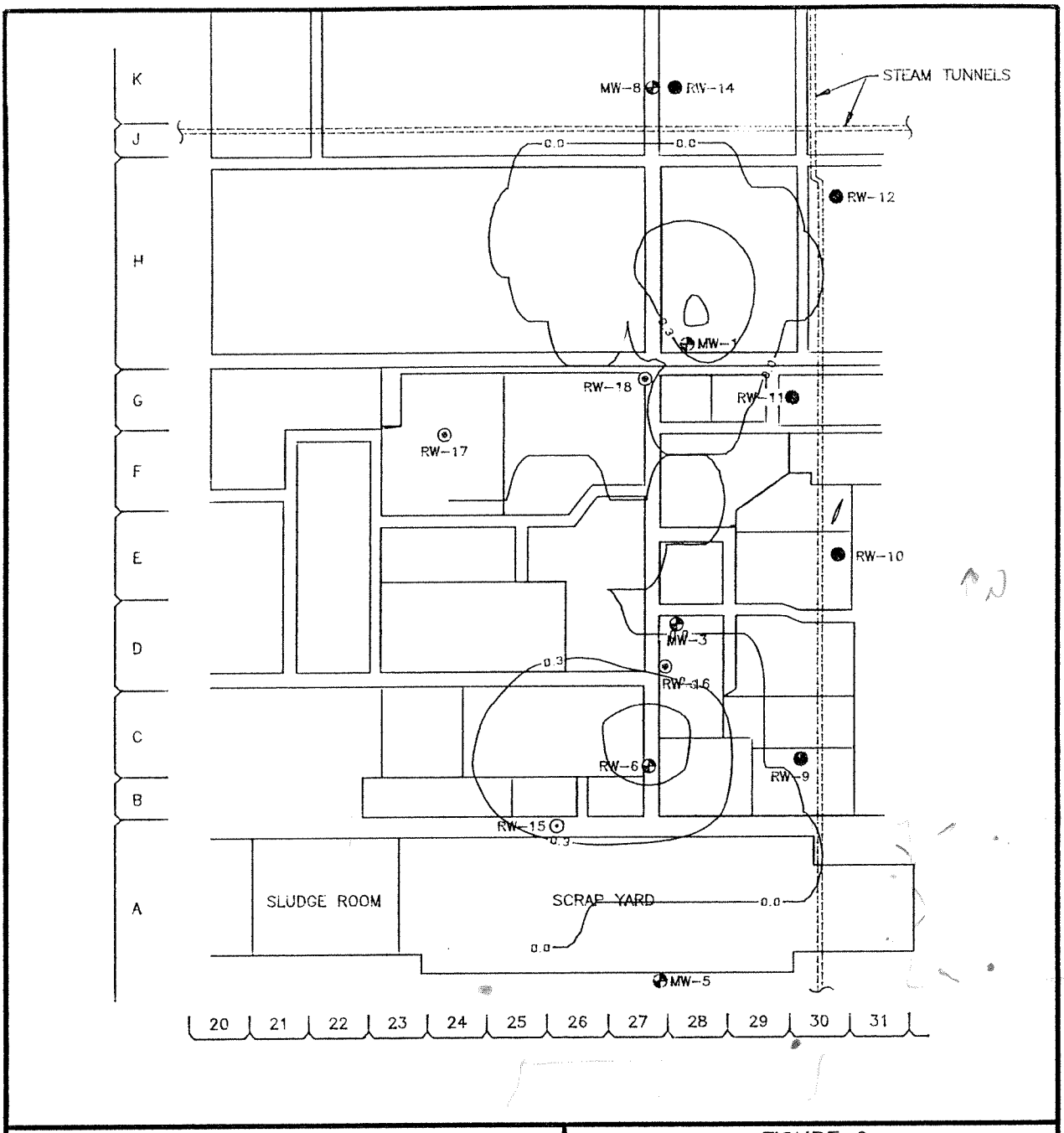
0 100 200

FIGURE 1
DETAILED SITE MAP
E-28 AREA – MARCH 1995
GENERAL MOTORS CORPORATION
GM POWERTRAIN PLANT
YPSILANTI, MICHIGAN

PREPARED FOR
GENERAL MOTORS CORPORATION
YPSILANTI, MICHIGAN

DRAWN SRS\ 6-9-95	
CHECKED	
APPROVED	
DRAWING NUMBER	
70003E28	

TOLTEST, INC.



LEGEND

- ⊙ = 8" COMBINATION RECOVERY WELL
- ⊙ = 2" DRIVEPOINT RECOVERY WELL
- ● = 6" RECOVERY WELL
- ◐ = 2" MONITORING WELL
- ======== = STEAM TUNNELS

N

APPROXIMATE SCALE – FEET

0 100 200

FIGURE 2
ISOCONTOUR MAP
E-28 AREA – MARCH 1995
GENERAL MOTORS CORPORATION
GM POWERTRAIN PLANT
YPSILANTI, MICHIGAN

PREPARED FOR
GENERAL MOTORS CORPORATION
YPSILANTI, MICHIGAN

DRAWN SRS\ 6-9-95	
CHECKED	
APPROVED	
DRAWING NUMBER	70003ECM

TOLTEST, INC.

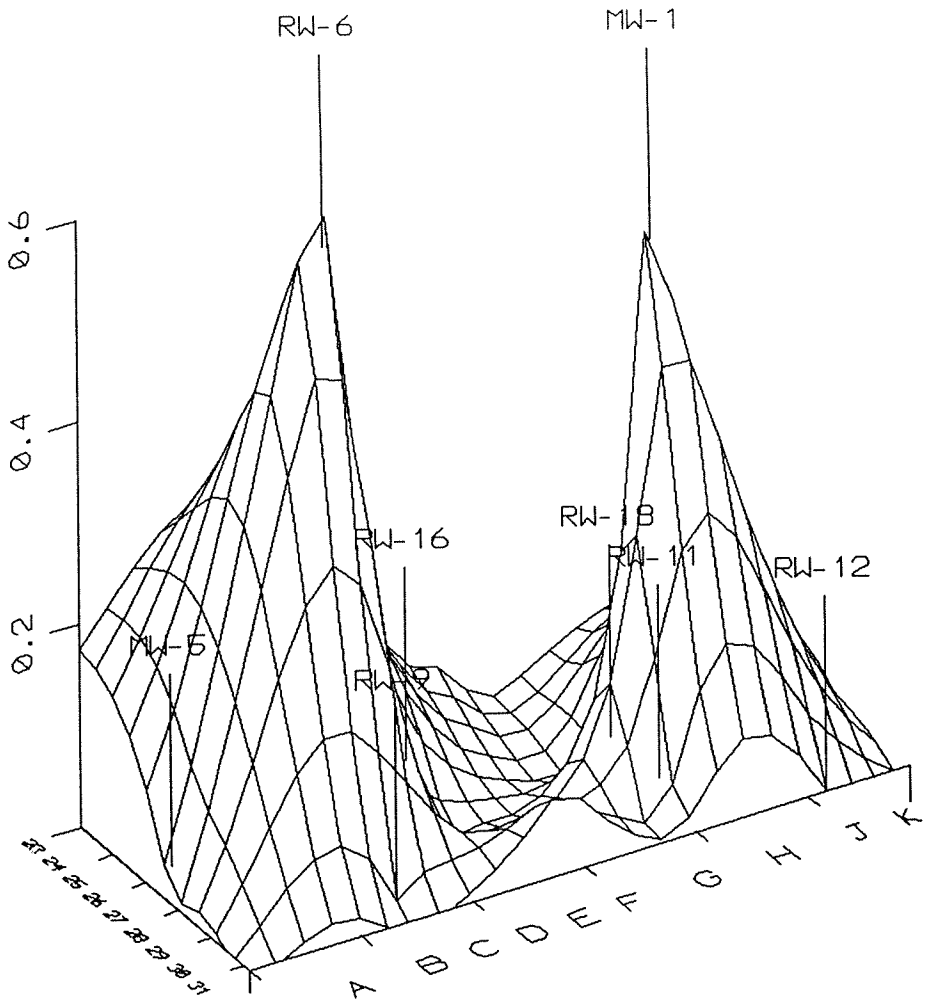


FIGURE 3

E-28 AREA - MARCH 1995
PRODUCT THICKNESS CONTOUR MAP

GENERAL MOTORS CORPORATION
GM POWERTRAIN PLANT
YPSILANTI, MICHIGAN

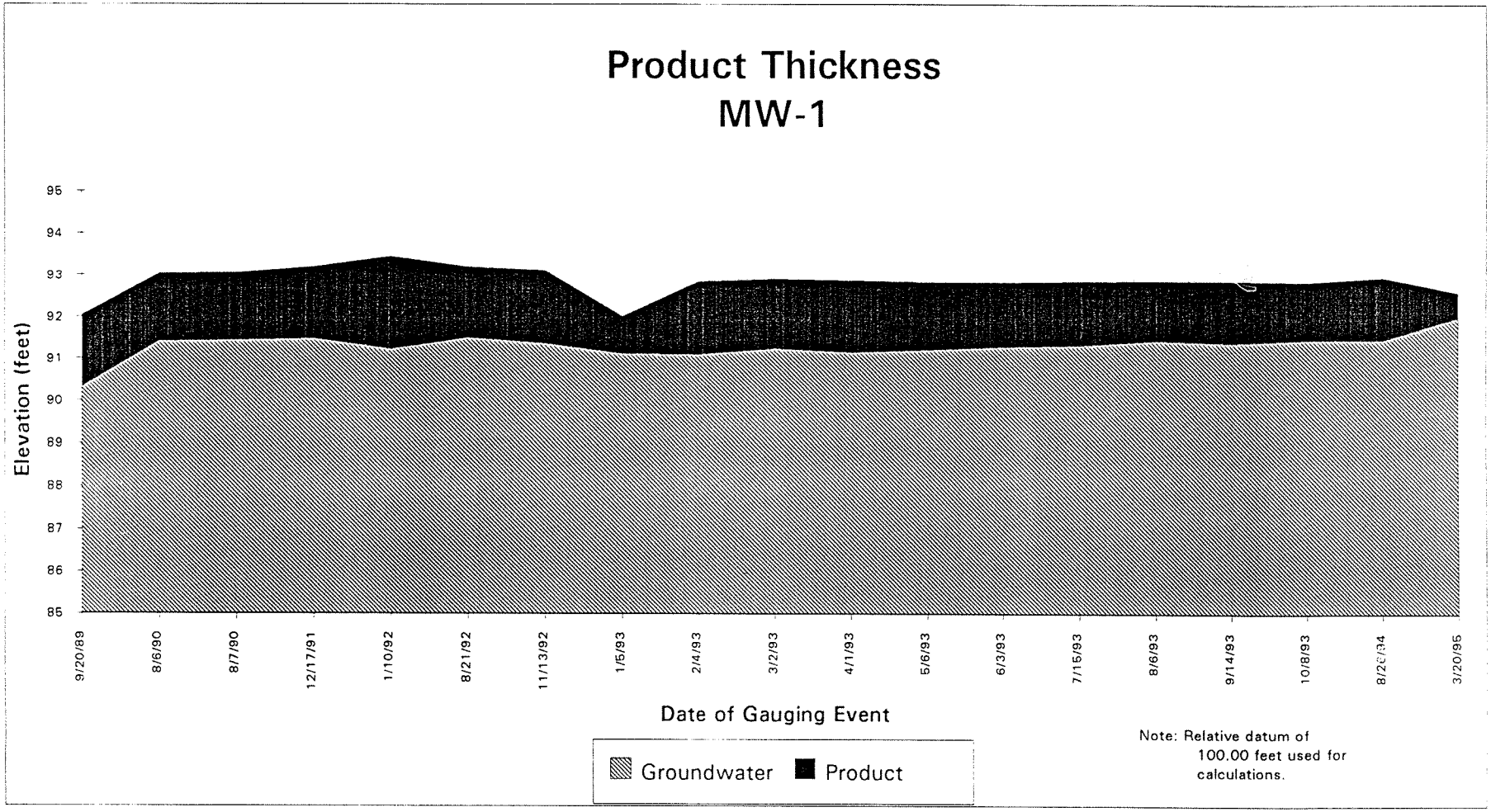
PREPARED FOR

GENERAL MOTORS CORPORATION
YPSILANTI, MICHIGAN

DRAWN SRS\ 6-9-95	
CHECKED	
APPROVED	
DRAWING NUMBER	
70003E-28	

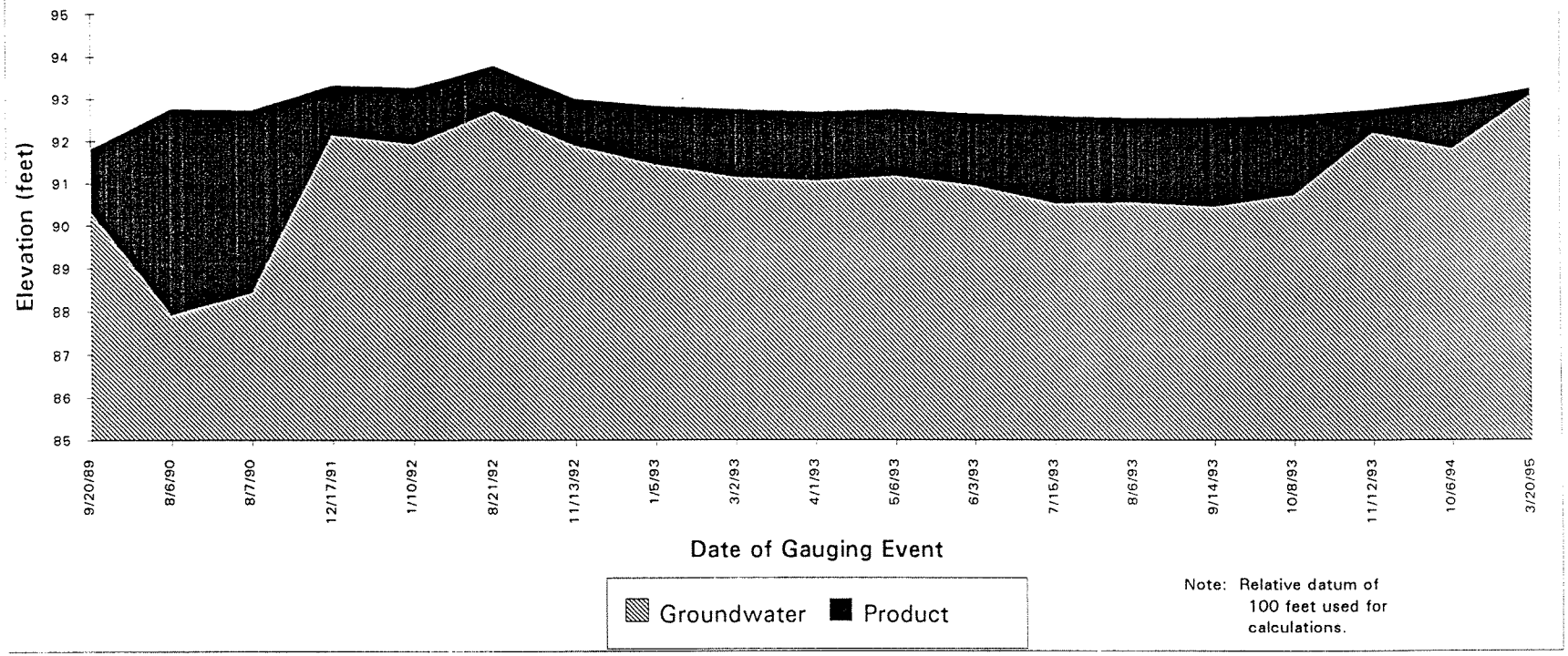
TOLTEST, INC.

Product Thickness
MW-1



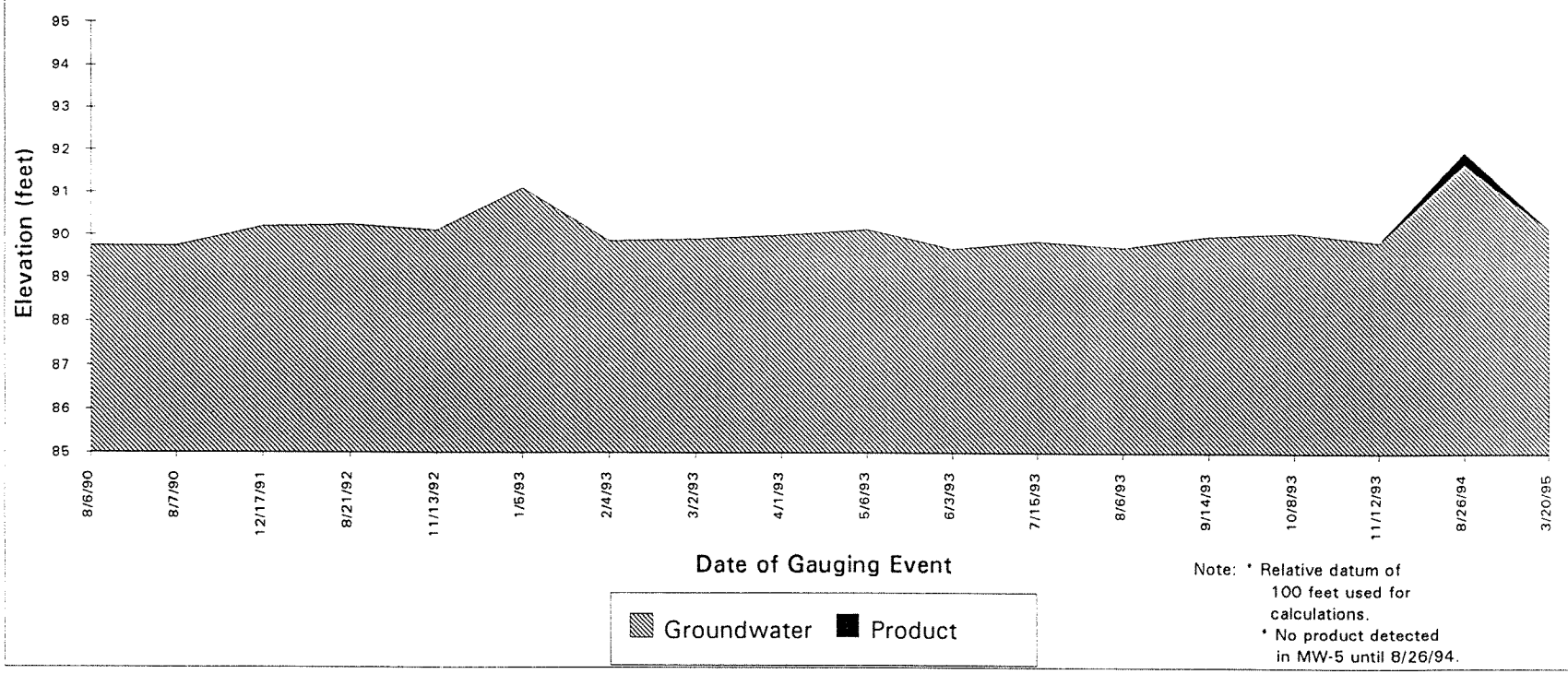
Note: Relative datum of 100.00 feet used for calculations.

Product Thickness
MW-3



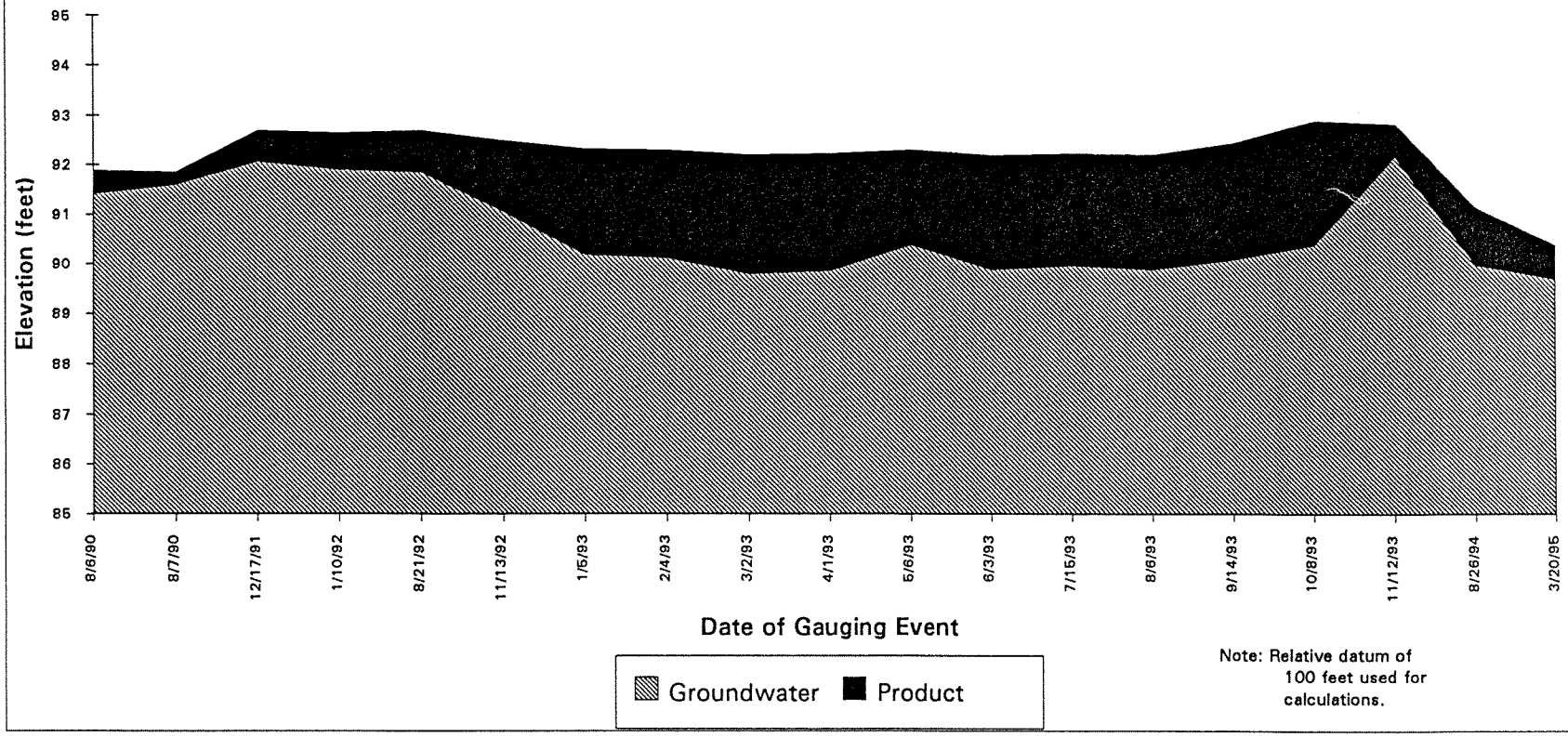
Note: Relative datum of 100 feet used for calculations.

Product Thickness
MW-5



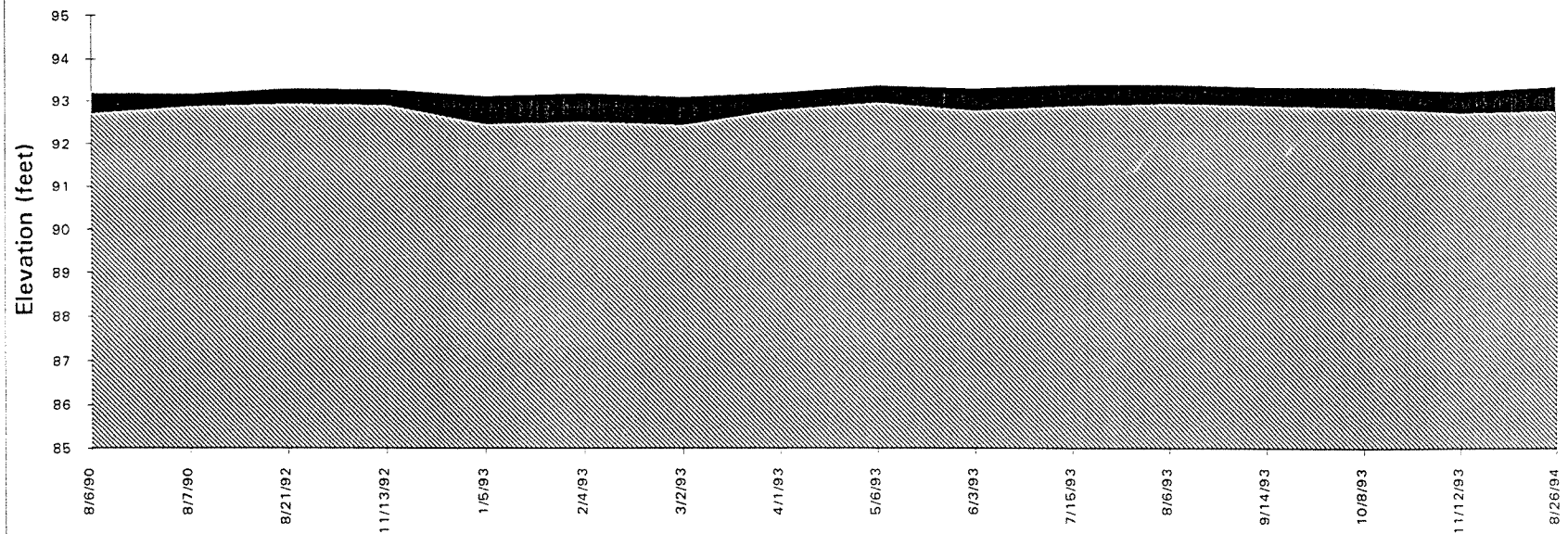
Note: * Relative datum of 100 feet used for calculations.
* No product detected in MW-5 until 8/26/94.

Product Thickness
RW-6



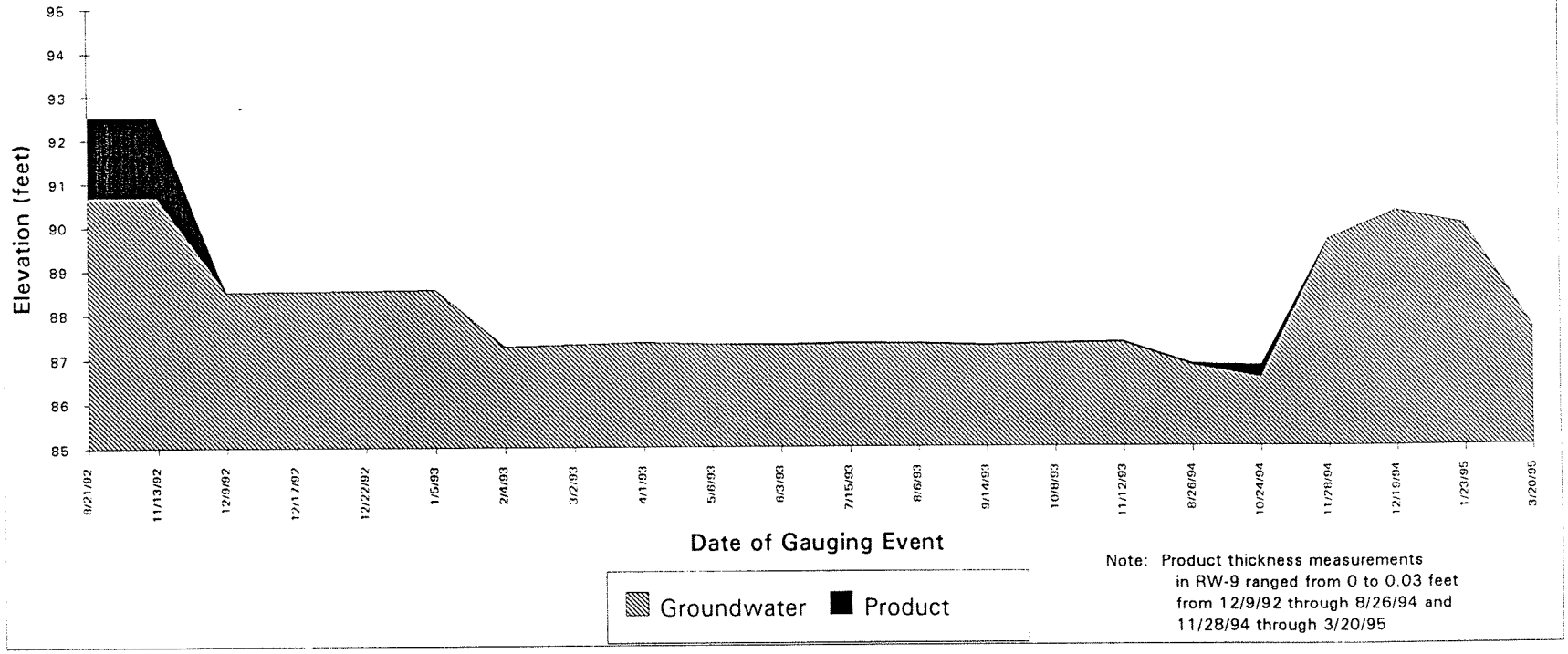
Note: Relative datum of 100 feet used for calculations.

Product Thickness
MW-8



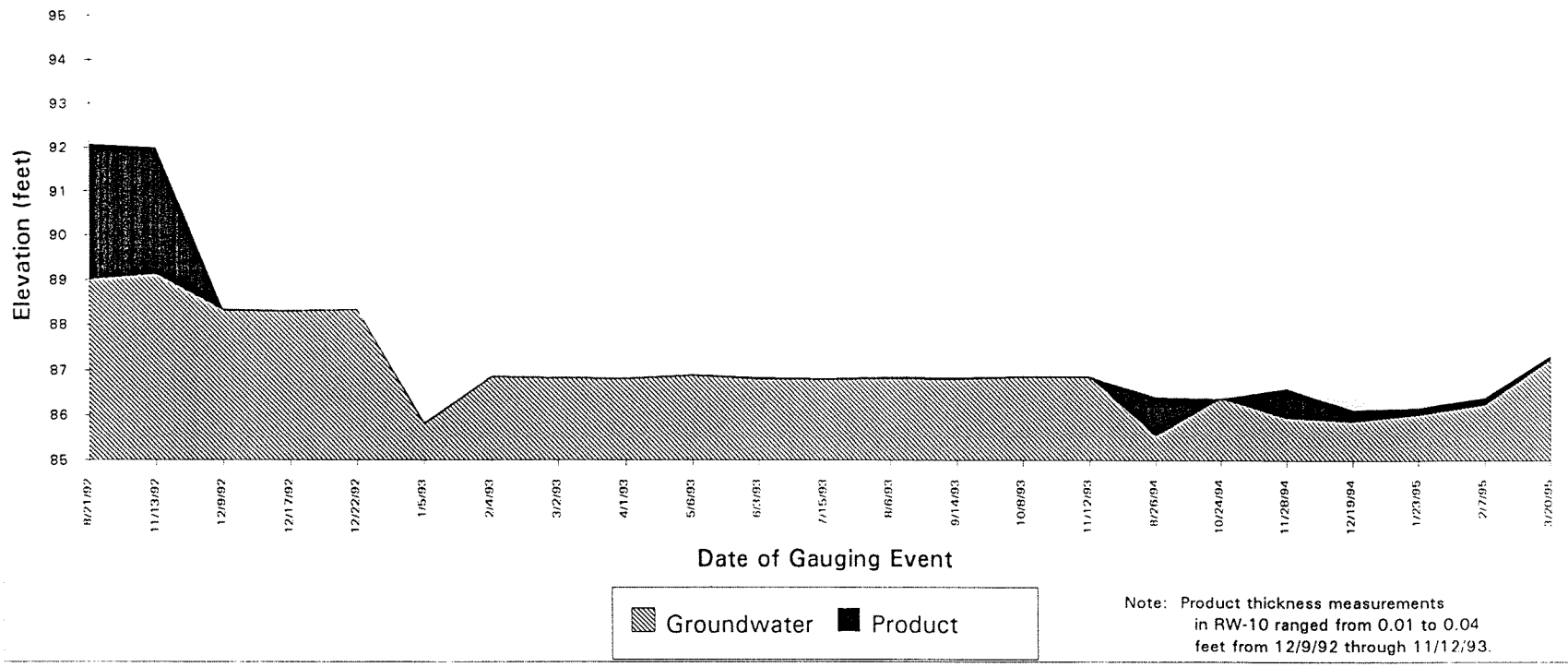
Note: Relative elevation of 100 feet used for calculations.

Product Thickness
RW-9



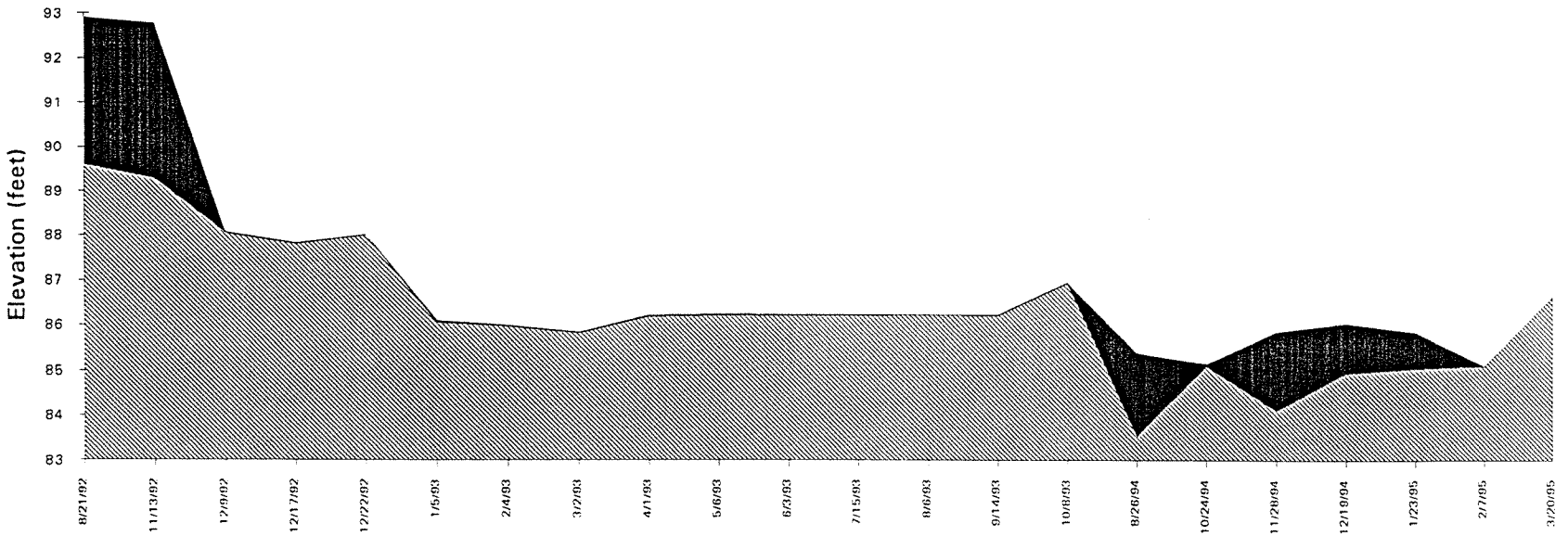
Note: Product thickness measurements in RW-9 ranged from 0 to 0.03 feet from 12/9/92 through 8/26/94 and 11/28/94 through 3/20/95

Product Thickness
RW-10



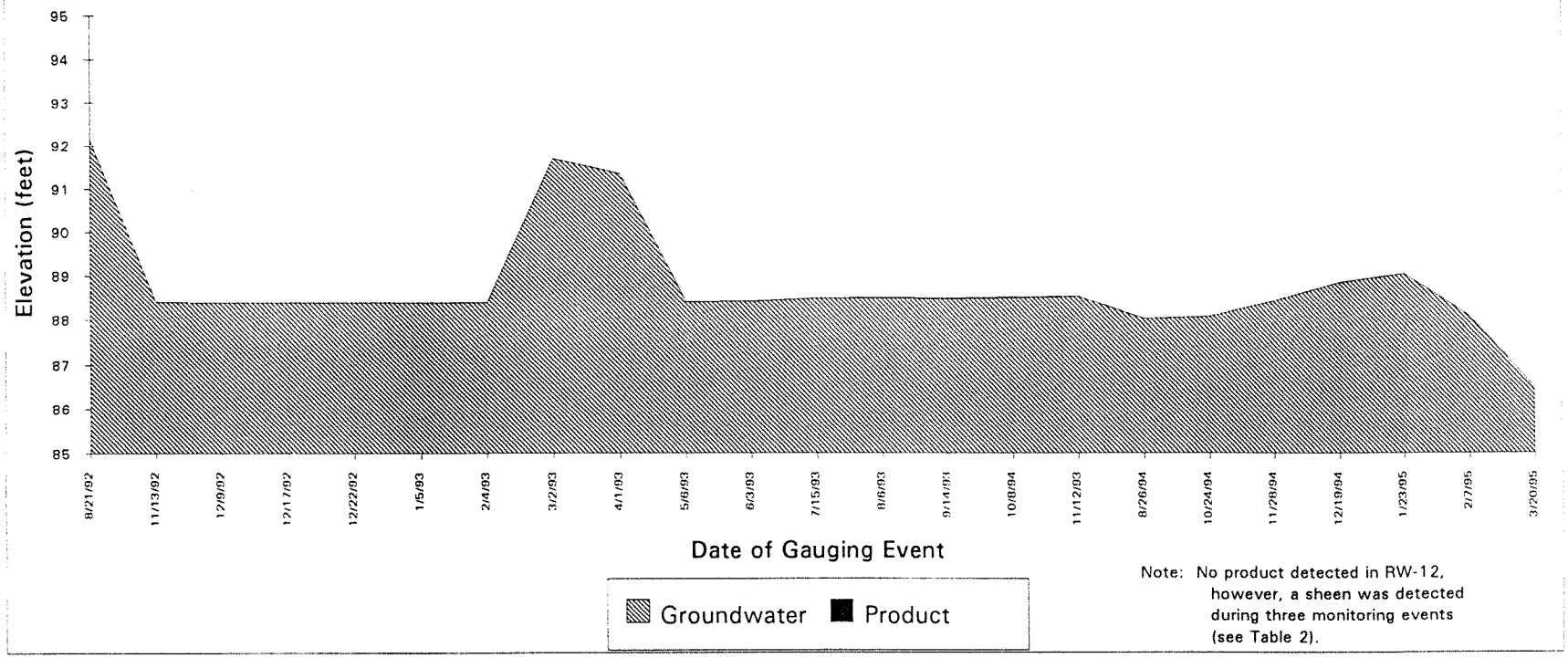
Note: Product thickness measurements in RW-10 ranged from 0.01 to 0.04 feet from 12/9/92 through 11/12/93.

Product Thickness
RW-11



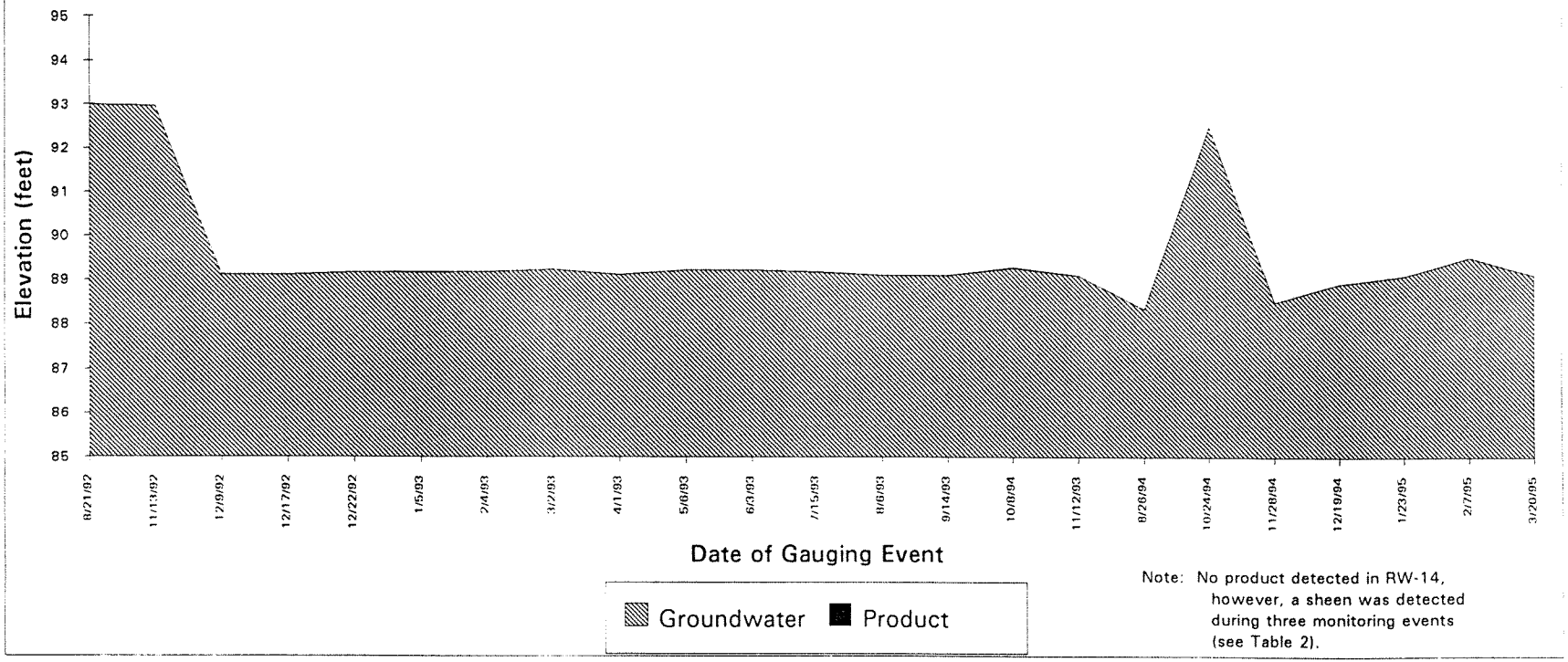
Note: Product Thickness measurements in RW-11 ranged from 0 to 0.03 feet from 12/9/92 through 10/8/93 and 2/7/95 through 3/20/95.

Product Thickness
RW-12



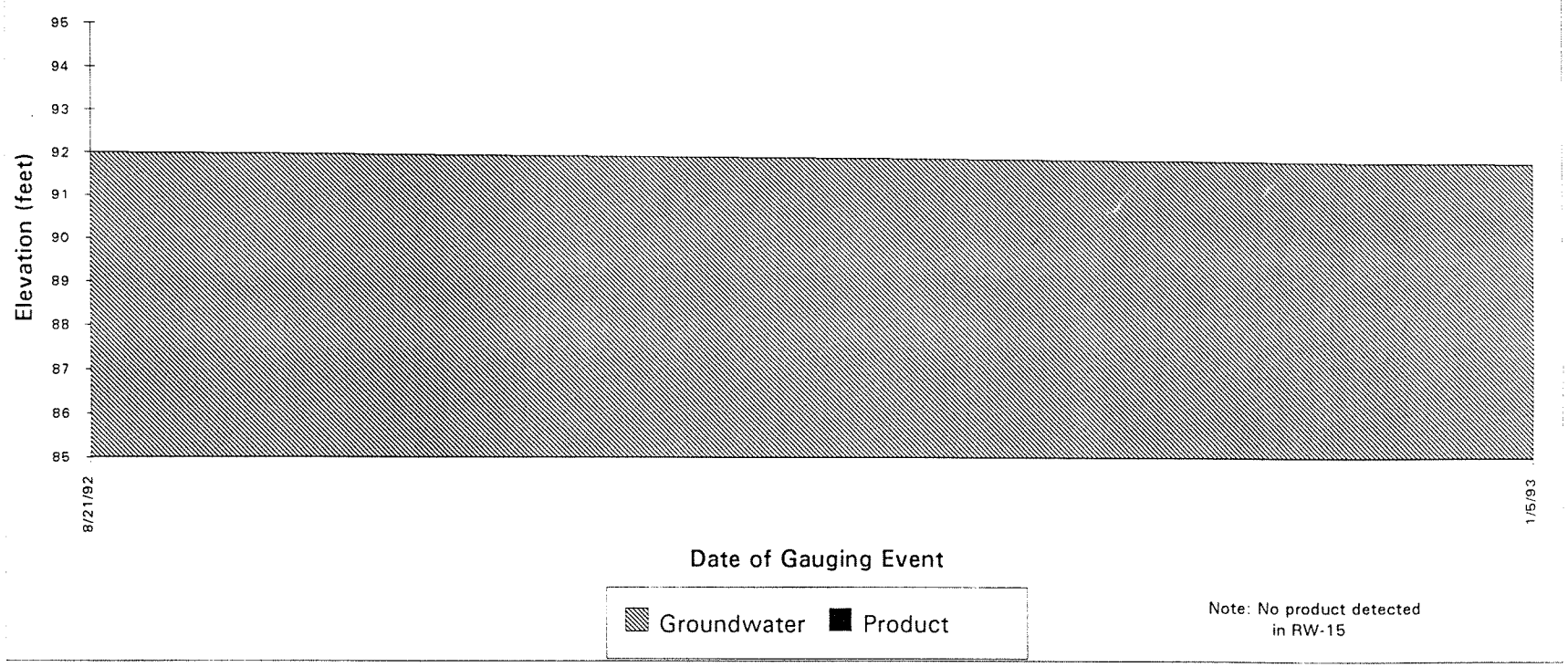
Note: No product detected in RW-12, however, a sheen was detected during three monitoring events (see Table 2).

Product Thickness
RW-14

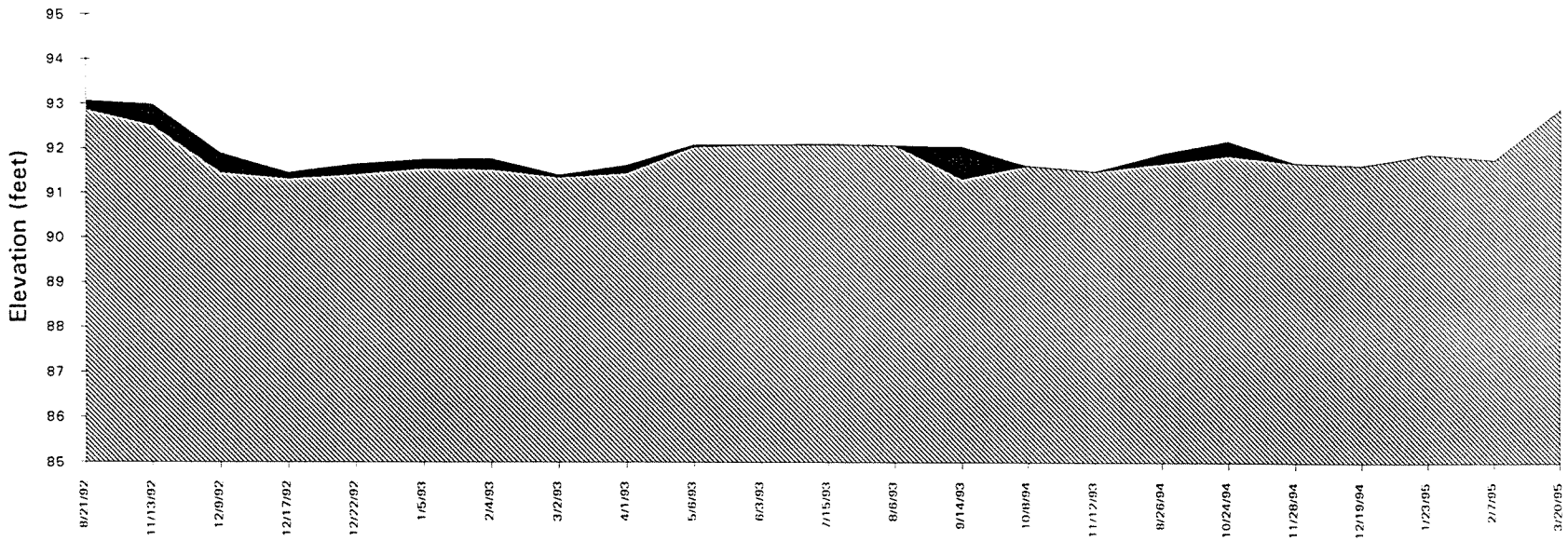


Note: No product detected in RW-14, however, a sheen was detected during three monitoring events (see Table 2).

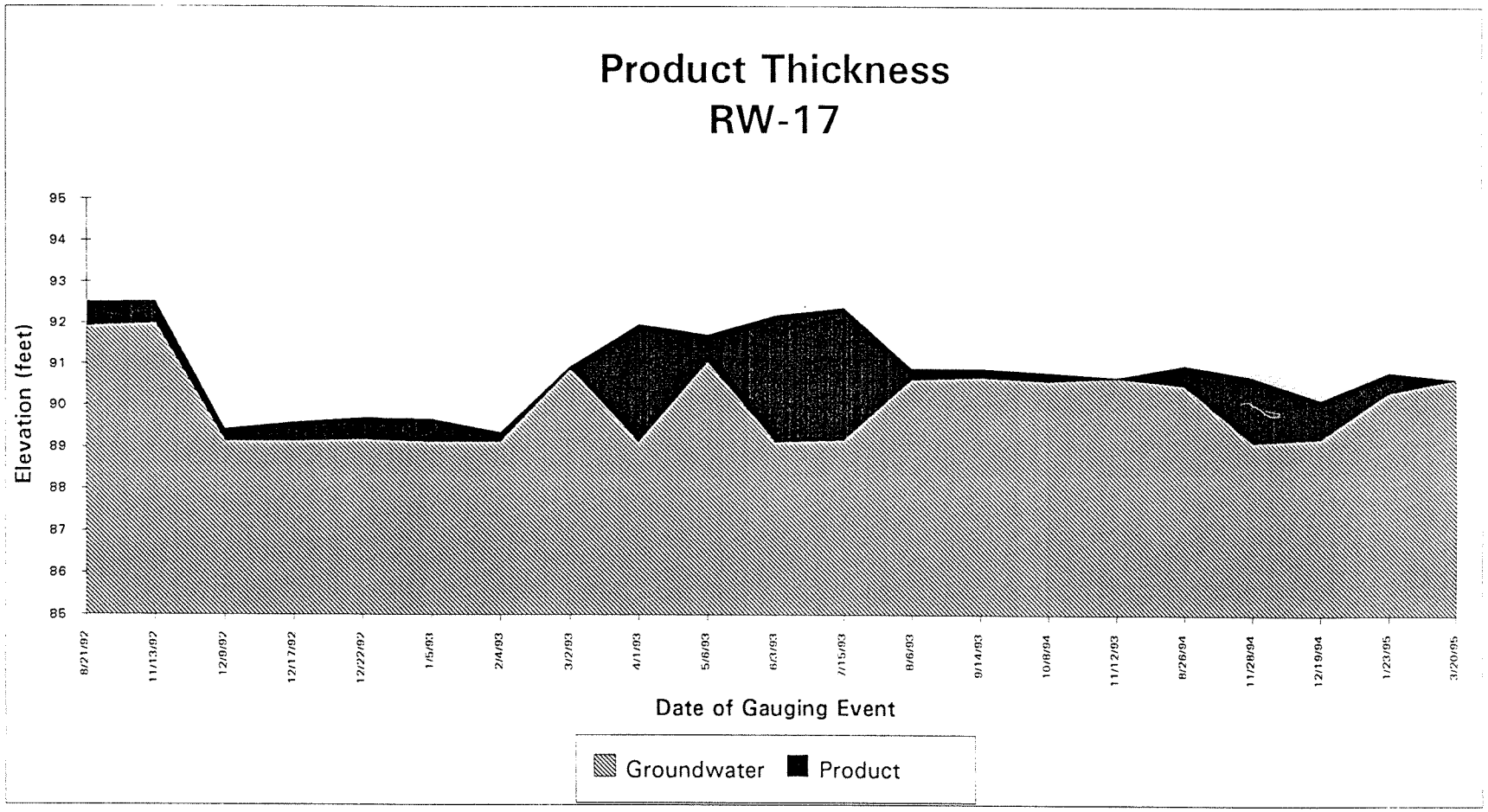
Product Thickness
RW-15



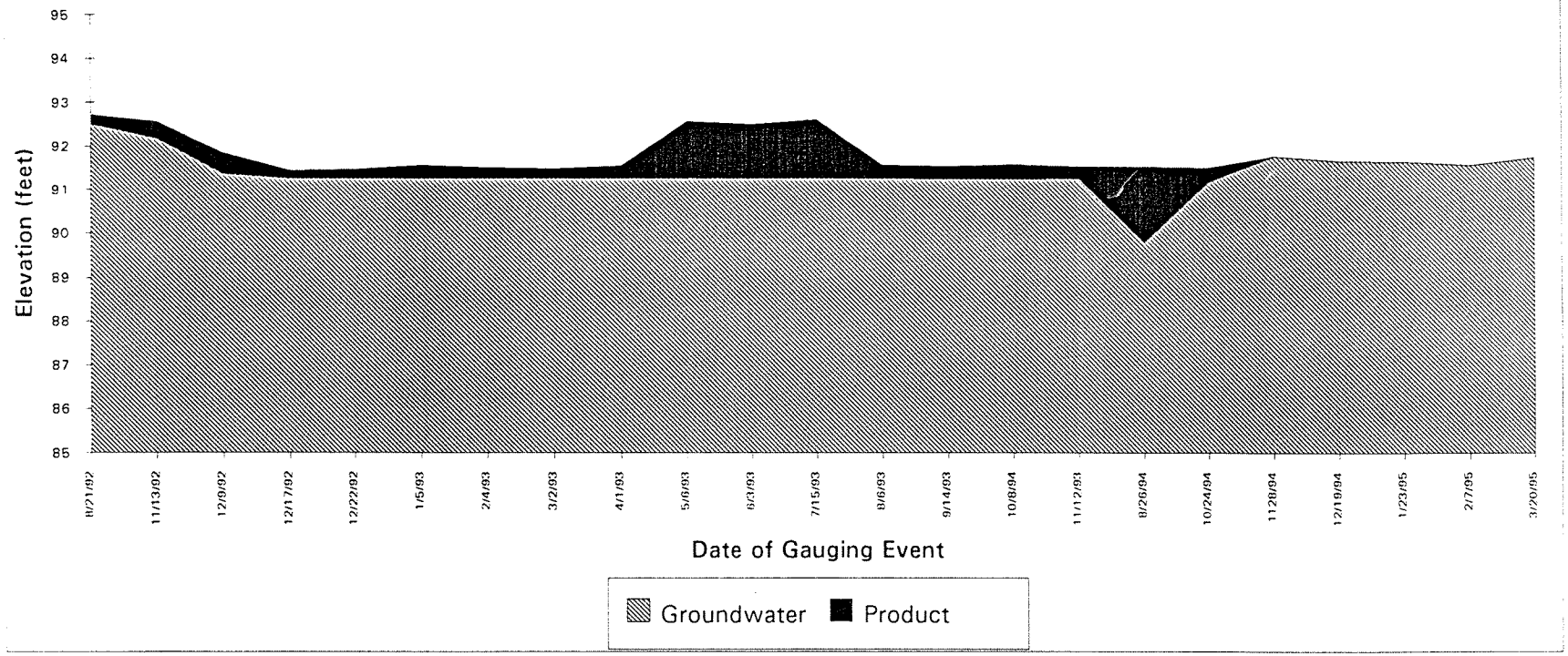
Product Thickness
RW-16



Note: Product thickness measurements in RW-16 ranged from 0 to 0.05 feet from 5/6/93 through 8/6/93, 10/8/93 through 11/12/93 and 11/28/94 through 3/20/95.


Product Thickness
RW-17
Elevation (feet)
95
94
93
92
91
90
89
88
87
86
85
8/21/92
11/13/92
12/9/92
12/17/92
12/22/92
1/5/93
2/4/93
3/2/93
4/1/93
5/6/93
6/3/93
7/15/93
8/6/93
9/14/93
10/8/94
11/12/93
8/26/94
11/28/94
12/19/94
1/23/95
3/20/95
Date of Gauging Event
Groundwater
Product

Product Thickness
RW-18



APPENDIX A

GROUNDWATER/PRODUCT GAUGING RECORD

GENERAL MOTORS CORPORATION

GM POWERTRAIN DIVISION, YPSILANTI, MICHIGAN

WILLOW RUN PLANT

GROUND WATER/PRODUCT GAUGING RECORD

Project No: 70172.04 Date: 01/23/95

Site Location: BAY E-28 AREA Field Personnel: JOSE CASTILLO

Well I.D.	Well Type	Inner Well			Outer Well			Comments
		Depth to Product	Depth to Water	Product Thickness	Depth to Product	Depth to Water	Product Thickness	
RW-6	SINGLE	10.75	10.85	0.01				
RW-9	SINGLE	----	9.56	0.0				
RW-10	SINGLE	13.55	13.71	0.16				
RW-11	SINGLE	13.90	14.70	0.8				
RW-12	SINGLE	----	10.20	0.0				
RW-14	SINGLE	----	10.81	0.0				
RW-16	COMBINED	8.76	8.90	0.14	----	8.05	0	
RW-17	COMBINED	10.39	12.44	2.05	8.89	9.40	0.51	
RW-18	COMBINED	7.57	7.89	0.32	----	8.12	0	

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION, YPSILANTI, MICHIGAN
WILLOW RUN PLANT
GROUND WATER/PRODUCT GAUGING RECORD

Project No: 70172.06
Site Location: BAY E-28 AREA

Date: 02/07/95
Field Personnel: JOSE CASTILLO

Well I.D.	Well Type	Inner Well			Outer Well			Comments
		Depth to Product	Depth to Water	Product Thickness	Depth to Product	Depth to Water	Product Thickness	
RW-9	SINGLE	12.65	12.7	0.05				
RW-11	SINGLE	----	14.65	0.0				
RW-12	SINGLE	----	11.15	0.0				
RW-14	SINGLE	----	10.4	0.0				
RW-10	SINGLE	13.33	13.50	0.17				
RW-6	SINGLE	9.80	10.85	1.05				
RW-16	COMBINED	7.85	8.00	0.15	----	8.16	0	
RW-18	COMBINED	----	8.45	0.0	----	8.20	0	
RW-17	COMBINED	NR	NR	NR	NR	NR	NR	NOT RECONDED. HEAVY MACHINERY OVER WELL

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION, YPSILANTI, MICHIGAN
WILLOW RUN PLANT
GROUND WATER/PRODUCT GAUGING RECORD

Project No: 70172.12 Date: 03/20/95

Site Location: BAY E-28 AREA Field Personnel: JOSE CASTILLO

Well I.D.	Well Type	Inner Well			Outer Well			Comments
		Depth to Product	Depth to Water	Product Thickness	Depth to Product	Depth to Water	Product Thickness	
RW-6	SINGLE	9.62	10.31	0.69				
RW-9	SINGLE	----	11.90	0.0				
RW-10	SINGLE	12.40	12.49	0.09				
RW-11	SINGLE	----	13.10	0.0				
RW-12	SINGLE	----	12.75	0.0				
RW-14	SINGLE	----	10.79	0.0				
RW-16	COMBINED	7.13	7.21	0.08	----	7.02	0	
RW-17	COMBINED	9.21	10.05	0.84	----	9.06	0	
RW-18	COMBINED	----	8.10	0.0	----	8.02	0	
MW-1	SINGLE	7.40	8.00	0.60				
MW-3	SINGLE	6.75	6.90	0.15				
MW-5	SINGLE	----	9.80	0.0				
MW-8	SINGLE	10.35	10.50	0.15				

APPENDIX B

OPERATION AND MAINTENANCE LOGS

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/23/95
Time of Visit: 0800
Well Number: RW-6

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	4 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		REGULATORS IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		FITTINGS AND TRANSFER LINES IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	40 PSI	
		Adjust to max product recovery		SAME AS PREVIOUS MONTH
	Fluid Flow Meter (Counter)	Check operation - record reading	156 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/23/95
Time of Visit: 0905
Well Number: RW-9

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	60 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	2 CYCLES/MIN 40 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/23/95
Time of Visit: 1015
Well Number: RW-10

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	3 CYCLES/MIN 46 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/23/95
Time of Visit: 1100
Well Number: RW-11

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	2 CYCLES/MIN 28 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/23/95
Time of Visit: 1245
Well Number: RW-12

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	1 CYCLE/MIN 35 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
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OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/23/95
Time of Visit: 0700
Well Number: RW-14

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	100 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		SCREEN WAS FULL OF BIOLOGICAL GROWTH AND BLACK PARTICULATE. CLEANED THOROUGHLY.

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GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/24/95
Time of Visit: 0730
Well Number: RW-16

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	3 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		REGULATORS IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		FITTINGS AND TRANSFER LINES IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	60 PSI	
		Adjust to max product recovery		SAME AS PREVIOUS MONTH
	Fluid Flow Meter (Counter)	Check operation - record reading	146 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

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GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/24/95
Time of Visit: 0845
Well Number: RW-17

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	5 CYCLES/MIN	
		Collection system hardware		GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		REGULATORS IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		FITTINGS AND TRANSFER LINES IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	40 PSI	
		Adjust to max product recovery	138 MIL/CYCLE	
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.04
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 01/24/95
Time of Visit: 0950
Well Number: RW-18

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD PRESSURE
		Pumping Rate	3 CYCLES/MIN	
		Collection system hardware		GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		REGULATORS IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		FITTINGS AND TRANSFER LINES IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	60 PSI	
		Adjust to max product recovery		SAME AS PREVIOUS MONTH
	Fluid Flow Meter (Counter)	Check operation - record reading	136 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

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GM POWERTRAIN DIVISION
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OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/10/95
Time of Visit: 0800
Well Number: RW-6

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	3 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		FITTINGS AND TRANSFER LINES IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	40 PSI	
		Adjust to max product recovery		PUMP REFILL: SET AT C PUMP DISCHARGE: SET AT C
	Fluid Flow Meter (Counter)	Check operation - record reading	125 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

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OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/07/95
Time of Visit: 0800
Well Number: RW-9

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	60 PSI	INCREASED PRESSURE TO 70 PSI
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments		IN GOOD CONDITION
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling	35 MI/CYCLE	
	Fluid Flow Meter (Counter)	Check operation - record reading		
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

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GM POWERTRAIN DIVISION
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OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/09/95
Time of Visit: 0915
Well Number: RW-10

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	129 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/08/95
Time of Visit: 0745
Well Number: RW-11

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	25 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
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OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/08/95
Time of Visit: 0850
Well Number: RW-12

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	35 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

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GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/08/95
Time of Visit: 1015
Well Number: RW-14

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	70 PSI	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments		IN GOOD CONDITION
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling	3 CYCLES/MIN 40 MIL/CYCLE	
	Fluid Flow Meter (Counter)	Check operation - record reading		
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

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GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/10/95
Time of Visit: 0915
Well Number: RW-16

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	3 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		CLEAN AND GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		FITTINGS AND TRANSFER LINES IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	60 PSI	
		Adjust to max product recovery		REFILL TIME: AT C DISCHARGE TIME: AT C
	Fluid Flow Meter (Counter)	Check operation - record reading		
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	300 MIL/CYCLE	
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

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OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.06
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 02/10/95
Time of Visit: 1000
Well Number: RW-18

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	2 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		CLEAN AND IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		FITTINGS AND TRANSFER LINES IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	60 PSI	
		Adjust to max product recovery		REFILL TIME: AT C DISCHARGE TIME: AT C
	Fluid Flow Meter (Counter)	Check operation - record reading	380 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/20/95
Time of Visit: 1000
Well Number: RW-6

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	3 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		CLEAN AND IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	40 PSI	IN GOOD CONDITION
		Adjust to max product recovery	132 MIL/CYCLE	
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

GENERAL MOTORS CORPORATION
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OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/20/95
Time of Visit: 1105
Well Number: RW-9

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	70 PSI	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments		IN GOOD CONDITION
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	50 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		DIRTY WITH SCUM AND BLACK PARTICULATE CLEANED THOROUGHLY

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/20/95
Time of Visit: 1230
Well Number: RW-10

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	141 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/21/95
Time of Visit: 0730
Well Number: RW-11

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	45 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		CLEAN AND IN GOOD CONDITION

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/21/95
Time of Visit: 0830
Well Number: RW-12

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	48 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		CLEAN AND IN GOOD CONDITION

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/20/95
Time of Visit: 0730
Well Number: RW-14

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure	N/A	N/A
		Pumping Rate	N/A	N/A
		Collection system hardware	N/A	N/A
	Recovery Pump Screen	Inspected for fouling and clean (monthly)	N/A	N/A
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators	N/A	N/A
		Inspect fittings for leaks (monthly)	N/A	N/A
		Inspect Pressure gauges and transfer lines	N/A	N/A
		Adjust to max product recovery	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	70 PSI	
	Pump Suction Lines	Check integrity and fouling		IN GOOD CONDITION
	Pump Discharge Lines	Check integrity and fouling		IN GOOD CONDITION
	Fluid Flow Meter (Counter)	Check operation - record reading	95 MIL/CYCLE	
	Recovery Pump Screen	Inspect for fouling and clean (monthly)		CLEAN AND IN GOOD CONDITION

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/20/95
Time of Visit: 0905
Well Number: RW-16

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	3 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		FULL OF BIOLOGICAL GROWTH AND BLACK PARTICULATE. CLEANED THOROUGHLY
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	60 PSI	IN GOOD CONDITION
		Adjust to max product recovery	PRODUCT REFILL: SET AT C PRODUCT DISCHARGE: SET AT C	
	Fluid Flow Meter (Counter)	Check operation - record reading	290 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/21/95
Time of Visit: 0845
Well Number: RW-17

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	5 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		FULL OF SCUM AND BLACK PARTICULATE CLEANED THOROUGHLY
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	40 PSI	
		Adjust to max product recovery		SAME AS PREVIOUS MONTH
	Fluid Flow Meter (Counter)	Check operation - record reading	150 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

GENERAL MOTORS CORPORATION
GM POWERTRAIN DIVISION
YPSILANTI, MICHIGAN

OPERATIONS AND MAINTENANCE LOG

Project No.: 70172.12
Site Location: E-28 Area
Field Personnel: Jose Castillo

Date: 03/20/95
Time of Visit: 0815
Well Number: RW-18

	EQUIPMENT TYPE	PARAMETERS	MEASUREMENTS (UNITS)	COMMENTS
PULSE PUMP SYSTEM	Recovery Pump	Supply pressure		GOOD AND STEADY
		Pumping Rate	3 CYCLES/MIN	
		Collection system hardware		IN GOOD CONDITION
	Recovery Pump Screen	Inspected for fouling and clean (monthly)		CLEAN AND IN GOOD CONDITION
	Collection Tank	Inspect for fluid levels (monthly), check level (monthly)	N/A	N/A
	Recovery Pump Controller	Check pressure regulators		IN GOOD CONDITION
		Inspect fittings for leaks (monthly)		IN GOOD CONDITION
		Inspect Pressure gauges and transfer lines	60 PSI	TRANSFER LINES IN GOOD CONDITION
		Adjust to max product recovery	PRODUCT REFILL:SET AT C PRODUCT DISCHARGE:SET AT C	
	Fluid Flow Meter (Counter)	Check operation - record reading	410 MIL/CYCLE	
SOLO PUMP SYSTEM	Float Control Dial	Maximize adjustments	N/A	N/A
	Pump Suction Lines	Check integrity and fouling	N/A	N/A
	Pump Discharge Lines	Check integrity and fouling	N/A	N/A
	Fluid Flow Meter (Counter)	Check operation - record reading	N/A	N/A
	Recovery Pump Screen	Inspect for fouling and clean (monthly)	N/A	N/A

APPENDIX C

FLUID COLLECTION RATES, VOLUMES, AND DESCRIPTIONS FROM RECOVERY WELL LOCATIONS

TABLE 1
FLUID COLLECTION RATES, VOLUMES, AND DESCRIPTIONS
FROM SINGLE RECOVERY WELL LOCATIONS
BAY E-28 AREA
GM POWERTRAIN
WILLOW RUN PLANT

January, 1995

WELL	VOLUME COLLECTED (GALLONS)	ELAPSED TIME (MINUTES)	NO. OF PUMP CYCLES	FLUID DESCRIPTION
RW-6	0.824	5	20	Groundwater, Product, Biological growth, Black Particulate
RW-9	0.106	5	10	Groundwater, Black Particulate, Strong Odor
RW-10	0.182	5	15	Groundwater, Product, Scum and Black Particulate
RW-11	0.074	5	10	Groundwater, Product, Black Particulate, Strong Odor
RW-12	0.046	5	05	Groundwater, Biolaogical Growth, Black Particulate
RW-14	0.264	5	10	Groundwater, Black Particulate, Scum, Strong Odor
RW-16	0.578	5	15	Groundwater, Product, Black Particulate
RW-17	0.911	5	25	Groundwater, Product, Black Particulate
RW-18	0.540	5	15	Groundwater, Product, Black Particulate

TABLE 1
FLUID COLLECTION RATES, VOLUMES, AND DESCRIPTIONS
FROM SINGLE RECOVERY WELL LOCATIONS
BAY E-28 AREA
GM POWERTRAIN
WILLOW RUN PLANT

February, 1995

WELL	VOLUME COLLECTED (GALLONS)	ELAPSED TIME (MINUTES)	NO. OF PUMP CYCLES	FLUID DESCRIPTION
RW-6	0.496	5	15	Groundwater, Product, Biological Growth, Black Particulate
RW-9	0.092	5	10	Groundwater, Product, Black Particulate, Odor
RW-10	0.341	5	10	Groundwater, Product, Scum, Black Particulate
RW-11	0.100	5	15	Groundwater, Black Particulate, Strong Odor
RW-12	0.092	5	10	Groundwater, Product, Biological Growth
RW-14	0.158	5	15	Groundwater, Black Particulate, Scum, Odor
RW-16	0.200	5	15	Groundwater, Product, Black Particulate
RW-17	NR	NR	NR	SEE Groundwater/Product gauging record for February
RW-18	0.740	5	10	Groundwater, Black Particulate

TABLE 1
FLUID COLLECTION RATES, VOLUMES, AND DESCRIPTIONS
FROM SINGLE RECOVERY WELL LOCATIONS
BAY E-28 AREA
GM POWERTRAIN
WILLOW RUN PLANT

March, 1995

WELL	VOLUME COLLECTED (GALLONS)	ELAPSED TIME (MINUTES)	NO. OF PUMP CYCLES	FLUID DESCRIPTION
RW-6	0.523	5	15	Groundwater, Product, Black Particulate, Odor
RW-9	0.132	5	10	Groundwater, Biological Growth, Black Particulate
RW-10	0.372	5	10	Groundwater, Product, Black Particulate
RW-11	0.120	5	10	Groundwater, Black Particulate, Odor
RW-12	0.127	5	10	Groundwater, Black Particulate, Scum, Strong Odor
RW-14	0.251	5	10	Groundwater, Black Particulate, Scum, Strong Odor
RW-16	1.149	5	15	Groundwater, Product, Black Particulate
RW-17	0.991	5	25	Groundwater, Product, Black Particulate, Scum
RW-18	1.625	5	15	Groundwater, Black Particulate, Strong Odor

APPENDIX D

ANALYTICAL DATA AND CHAIN OF CUSTODY

TOLTEST, INC.

Founded in 1927
Toledo, Ohio • Detroit, Michigan • Monroe, Michigan • Pittsburgh, Pennsylvania

TEST REPORT

CLIENT: TolTest, Inc.
44191 Plymouth Oaks Blvd #1200
Plymouth, Michigan 48170

DATE: April 12, 1995

ATTN: Mr. Joe Cook

Job No.: 70172.14

Lab Receiving No.: 9504000048

Date Received: April 5, 1995

Date Sampled: April 4, 1995

Project Location: GM Powertrain
Willow Run Plant

Sample Point(s): MW-5, Field Blank

Analysis Performed: TPH (8015M) Lube Oil

Reviewed and Approved by: Bruce P. DeMaine Date: 4/12/95
Manager, Analytical Services

ANALYTICAL NARRATIVE

The note(s) below pertain to the sample(s) and analytical data reported herein:

The sample(s) received by the laboratory under chain of custody met EPA guidelines for container type, labeling and preservation technique.

ANALYTICAL DATA

TOTAL PETROLEUM HYDROCARBONS
ANALYTICAL RESULTS

JOB NUMBER: 70172.14
METHOD NO.: 8015M (Ca Luft)
UNITS: mg/l
BATCH NO.: 1GCS016595

SAMPLE ID:		MW-5	Field Blank
TTL SAMPLE No.:		16706	16707
PARAMETERS	METHOD BLANK		
Lube-Oil Range Organics	<1.00	2.68	<1.00

QUALITY CONTROL DATA

The laboratory is accredited or approved by the following agencies:

State of Ohio; Certification No.: 7016
American Industrial Hygiene Association
Food and Drug Administration
U.S. Army Corps of Engineers
City of Toledo

REPORT KEY

BTU/lb	=	British Thermal Units per pound
CV	=	Conventionals
Deg. C	=	Degrees Celsius
EP TOX	=	Extraction Procedure Toxicity
GC	=	Gas Chromatograph Instrument
GC/MS	=	Gas Chromatography/Mass Spectrometer Instrument
gm/cc	=	grams per cubic centimeter
IR	=	Infrared Instrument
mE/100grams	=	milliequivalant/100 grams soil
mg/m^3	=	milligram per 1000 liters of air
mg/kg	=	milligram per kilogram (ppm)
mg/l	=	milligram per liter (ppm)
mg/W	=	milligram per wipe
MTM	=	Michigan Test Method
mV	=	milliVolts
n/a	=	not applicable
PCB	=	Polychlorinated Biphenyls (PCBs)
pCi/l	=	picocurie per liter
ppb	=	parts per billion
ppm	=	parts per million
RCRA	=	Resource Conservation and Recovery Act
SM	=	Standard Method, 17th Edition
std	=	result is relative to standard pH units
TCLP	=	Toxicity Characteristic Leaching Procedure
µg/kg	=	microgram per kilogram (ppb)
µg/l	=	microgram per liter (ppb)
µg/S	=	microgram per sample
µg/W	=	microgram per wipe
>	=	greater than
<	=	less than
%	=	percent

EA	=	Elaine Ault
AAI	=	Analytical Associates, Inc.
OHM	=	OHM Corporation
ATE	=	Aqua Tech Environmental Laboratories, Inc.
BEC	=	Biological Environmental Control Laboratories, Inc.
BD	=	Bruce DeMaine
GE	=	Greg Eppink
JF	=	Jeff Fesko
BG	=	Barb Gould
PM	=	Patricia McElroy
SL	=	Steve Lambright
SP	=	Susan Pellitieri
RR	=	Ron Recknagel
TMA	=	Thermal Analytical
LW	=	Lorene Watts
TH	=	Tracy Howard
PG	=	Paul Genzman
DG	=	Diann Gillette

BATCH QC SUMMARY

BATCH No.	DATE EXTRACTED	DATE ANALYZED	ANALYST	TOTAL PETROLEUM HYDROCARBONS PARAMETERS	% RECOVERY METHOD SPIKE	% RECOVERY MATRIX SPIKE	MATRIX DUPLICATE	% RPD
1GCS016595	04/06/95	04/11/95	TH	Lube-Oil Range Organics	105	110	99	11

CHAIN OF CUSTODY

TOLTEST, INC.

44191 Plymouth Oaks Blvd., Suite 1200, Plymouth, MI 48170; Phone (313) 455-8600, FAX (313) 455-8608

Chain of Custody Record

NO 10959 Page 1 of 1

Job No.: 70172.14	Client: TOLTEST INC.		
P.O. No.:	Project/Location: GM-Powertrain/Willow Run Plant		
Project Mgr.: Jose Castillo	TAT: 5	Sampler's Name:	
Phone No.: 800-487-8475		Sampler's Signature:	

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	TPH 8015	Parameters	Preserved Yes/No	Remarks
1	MW-5	4/4/95	PM	G	H_2O	Monitoring Well N° 5	1	✓			16706
2	FB	4/4/95	PM	G	H_2O	Field Blank	1	✓			16707
3											
4											
5											
6											
7											
8											
9											
10											

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
1-2	Deborah Lundy	4/4/95 PM	Christine Bittenbinder	4/5/95 7:00
	Relinquished By:	Date / Time	Received By:	Date / Time
	Relinquished By:	Date / Time	Received By:	Date / Time
	Relinquished By:	Date / Time	Received By:	Date / Time

LAB USE ONLY

Were samples delivered ___ in person ✓ by courier

Were samples preserved ___ in field ___ in lab ✓ N/A

Temp inside cooler 22 °C

Did samples arrive intact and sealed? ✓ yes ___ no ___ N/A

Were proper containers used? ✓ yes ___ no

Comments: _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

APPENDIX E

HISTORICAL PRODUCT THICKNESS

TABLE F-1
HISTORICAL APPARENT PRODUCT THICKNESS
GM-POWERTRAIN/WILLOW RUN PLANT
BAY E-28 AREA

WELL I.D.	DATE	APPARENT PRODUCT THICKNESS
MW-1	08/26/94	1.49
	03/20/95	0.60
MW-3	08/26/94	1.13
	03/20/95	0.15
MW-5	08/26/94	0.30
	03/20/95	0.0
RW-6	08/26/94	1.17
	10/24/94	0.30
	11/28/94	0.35
	12/19/94	0.16
	01/23/95	0.01
	02/07/95	0.05
	03/20/95	0.69
RW-9	08/26/94	0.03
	10/24/94	0.28
	11/28/94	0.0
	12/19/94	0.0
	01/23/95	0.0
	02/07/95	0.05
	03/20/95	0.0
RW-10	08/26/94	0.89
	10/24/94	0.0
	11/28/94	0.68
	12/19/94	0.27
	01/23/95	0.16
	02/07/95	0.17
	03/20/95	0.09
MW-11	08/26/94	1.87
	10/24/94	0.05
	11/28/94	1.75
	12/19/94	1.10
	01/23/95	0.80
	02/07/95	0.0
	03/20/95	0.0
RW-12	08/26/94	0.0
	10/24/94	0.0
	11/28/94	0.0
	12/19/94	0.0
	01/23/95	0.0
	02/07/95	0.0
	03/20/95	0.0

TABLE F-1
HISTORICAL APPARENT PRODUCT THICKNESS
GM-POWERTRAIN/WILLOW RUN PLANT
BAY E-28 AREA

WELL I.D.	DATE	APPARENT PRODUCT THICKNESS
RW-14	08/26/94	0.0
	10/24/94	0.0
	11/28/94	0.0
	12/19/94	0.0
	01/23/95	0.0
	02/07/95	0.0
	03/20/95	0.0
RW-16	08/26/94	0.24
	10/24/94	0.35
	11/28/94	0.0
	12/19/94	0.0
	01/23/95	0.0
	02/07/95	0.0
	03/20/95	0.0
RW-17	08/26/94	0.51
	10/24/94	NR
	11/28/94	1.60
	12/19/94	0.96
	01/23/95	0.51
	02/07/95	NR
	03/20/95	0.0
RW-18	08/26/94	1.78
	10/24/94	0.35
	11/28/94	0.0
	12/19/94	0.0
	01/23/95	0.0
	02/07/95	0.0
	03/20/95	0.0