N00213.AR.000135
NAS KEY WEST
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LETTER OF TRANSMITTAL AND RESULTS OF BAIL DOWN TESTS CONDUCTED 11 AND 12 SEPTEMBER 1995 FOR FREE PRODUCT RECOVERY ASSESSMENT AT TRUMBO POINT FUEL FARM NAS KEY WEST FL

10/9/1995

BECHTEL ENVIRONMENTAL INC

0053
007208

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Do Not Remove
See Debbie Pyron or
Susan Collins

Bechtel

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Facsimile: (615) 220-2100

OCT 9 1995

Commanding Officer
Department of the Navy, Southern Division
Naval Facilities Engineering Command
Attention: Mr. Gabriel Magwood (1849GM)
2155 Eagle Drive, P. O. Box 190010
North Charleston, SC 29406-9010

SUBJECT: Bechtel Job No. 22567
Department of the Navy Contract No. N62467-93-D-0936
DO 0032, TASK 3, FREE PRODUCT RECOVERY AT TRUMBO POINT, NAS KEY WEST, FLORIDA
Subject Code: 5220

Dear Mr. Magwood:

Please find enclosed the results of the bail down tests that were conducted at Trumbo Point on September 11 and 12, 1995. The results include the field data and supporting calculations.

The product level measurements were consistent with the previous studies and show that recoverable amounts of product are available at TPFF.

If you have any questions or comments about this submittal, please feel free to give me a call at (423) 220-2745 or Roy Hoekstra at (423) 220-2271.

TtNUS
AIK

4210

Sincerely,

O. N. McNeil
Project Manager

REH:dcm:LR0397
Enclosures: As stated

cc: M. Ewing (ROICC) w/e
C. Kimbell (NASKW) w/e
J. Simmen (NASKW) w/e
R. Futch (ABB-ES) w/e
K. Walter (Brown & Root Environmental) w/e

Bechtel Environmental, Inc.

ACTION REQ'D [ ] YES [✓] NO DUE DATE _____
RESPONSE TO CHRON NO. _____

CALCULATION COVER SHEET

PROJECT	JOB NO.	CALC. NO.	SHEET 1
NAVYRAC	22567-322	322-G-002	

SUBJECT	DISCIPLINE
Evaluation of Fuel Tank Farm Bail Down Test Data	G&HES

CALCULATION STATUS DESIGNATION	PRELIMINARY	CONFIRMED	SUPERSEDED	VOIDED
		X		

COMPUTER PROGRAM / TYPE	SCP YES	SCP NO	MAINFRAME PC	PROGRAM NO.	VERSION / RELEASE NO.

NO.	REASON FOR REVISION	# OF SHEETS	LAST SHEET	BY	CHECKED	APPROVAL	DATE
0	Issued for Use	6	6	JSN	MAG	[illegible]	10/5/95

RECORD OF REVISIONS

I. PURPOSE

Evaluate bail down test data from wells at the Trumbo Point Fuel Tank. The data was manually recorded during bail down tests performed at Trumbo Point on September 11 and 12, 1995. The data will be used to determine the actual static water levels and product thicknesses at each well.

II. SOURCES OF DATA

(1) Bail down test data (Attachment 1)

III. REFERENCES

ABB, Inc. (1994). Preliminary Contamination Assessment Report, Trumbo Point Fuel Farm, Naval Air Station Key West, Trumbo Point Annex, Key West, Florida. April.

Bechtel Environmental, Inc. (1995). Instruction Guide for Liquid Petroleum Bail-Down Test for Monitoring Wells at the Trumbo Point Fuel Farm, NAS Key West, Florida. 22567-321-IG-001, Rev. 0.

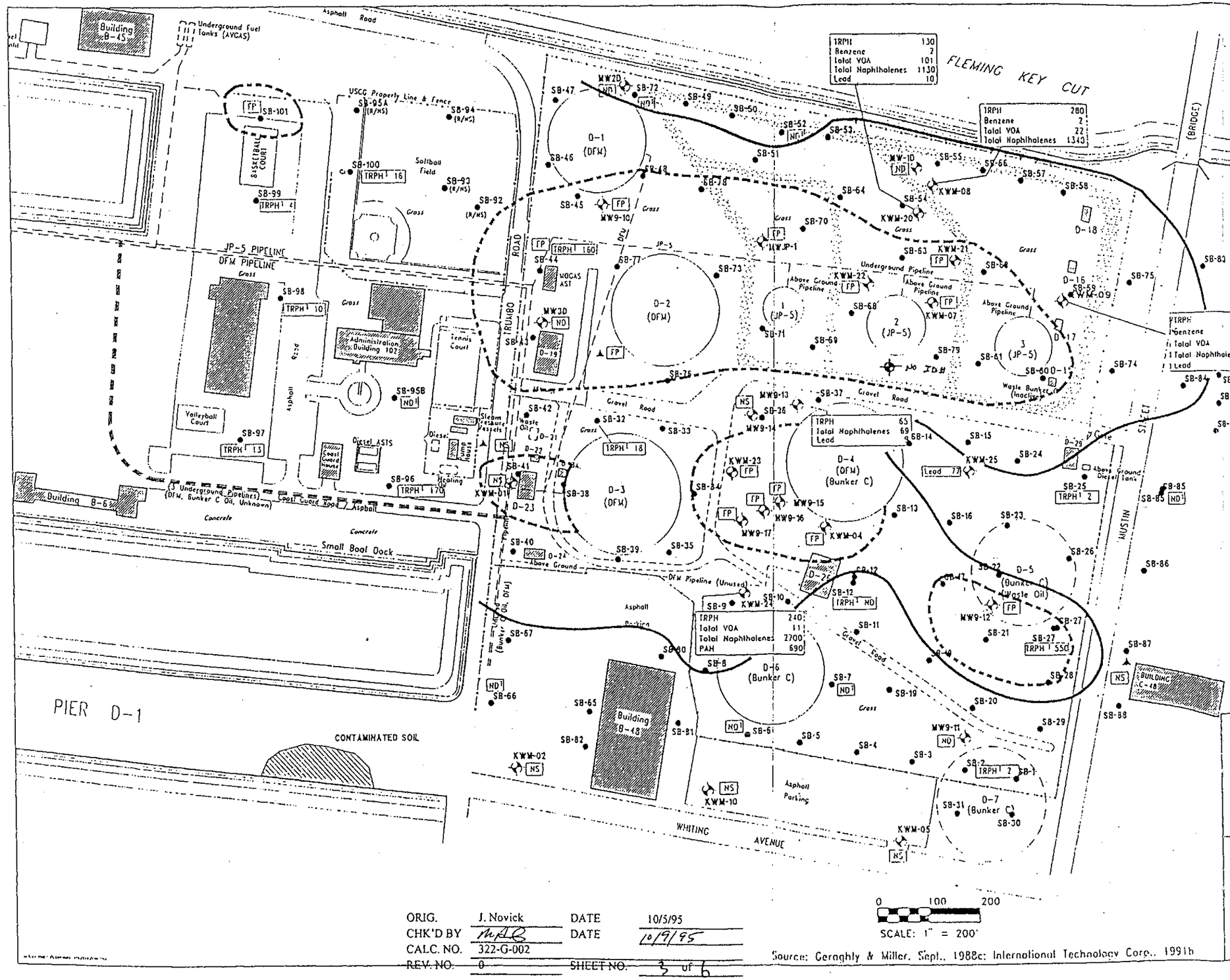
Hughes, J.P, C.R. Sullivan, and R.E.Zinner (198?). Two Techniques for Determining the True Hydrocarbon Thickness in an Unconfined Sandy Aquifer.

Reed, R.J. (1986). North American Combustion Handbook, Volume I: Combustion, Fuels, Stoichiometry, Heat Transfer, Fluid Flow. Third edition, North American Manufacturing Co., Cleveland, OH.

IV. CALCULATIONS

Introduction

Bail down tests were conducted on several wells at the Trumbo Point Fuel Farm at NAS Key West, Key West, Florida using the technique described in BEI (1995). The tests were performed by Bechtel personnel. Product was removed from the wells using a peristaltic pump and recovery was manually monitored using an ORS oil-water interface probe. Manual readings have been tabulated and are presented in Attachment 1. The locations of the wells which were tested are shown in Figure 1. The data was analyzed in the field using the technique described by Hughes, Sullivan, and Zinner (198?); time versus recovery data is graphed and the actual product thickness can be determined from the characteristics of the recovery curve.



Source: Geraghty & Miller, Sept., 1988c; International Technology Corp., 1991b

LEGEND

- Approximate area of free product contamination
- Approximate limit of groundwater contamination exceeding state target levels
- Monitoring well location
- SB-1 ● Soil boring sampling location
- FP Free petroleum product
- NA Not analyzed
- ND Not detected
- 1 Analyzed for TRPH only
- NS Not sampled
- Tank and designation, type of material in use.
- Former tank and underground tank designation
- Underground pipeline
- Building and designation
- Berm/gravel road
- Fire well
- AST Abandoned storage tank
- USCG U. S. Coast Guard
- DFM Diesel fuel marine
- JP-5 Jet propellant 5 jet fuel
- Fence

DEFINITIONS

TRPH - Total Recoverable Petroleum Hydrocarbons
Total VOA - Total Volatile Organic Aromatics
The sum of Benzene, Ethylbenzene, Toluene, and Xylenes
Total Naphthalenes - Sum of all Naphthalenes
PAH - Polynuclear Aromatic Hydrocarbons

CHEMICAL CONCENTRATION UNITS

Concentrations reported in parts per billion (ppb), except TRPH, which is reported parts per million (ppm)

FIGURE 3-3
FREE PRODUCT AND GROUNDWATER CONTAMINATION DISTRIBUTION MAP

PRELIMINARY CONTAMINATION ASSESSMENT REPORT
TRUMBO POINT FUEL FARM

NAVAL AIR STATION
KEY WEST, FLORIDA

ORIG.	J. Novick	DATE	10/5/95
CHK'D BY	MAG	DATE	10/9/95
CALC. NO.	322-G-002		
REV. NO.	0	SHEET NO.	3 of 6

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Assumptions

- Hydrocarbon/water interface is above the potentiometric surface
- Recharge rate of the hydrocarbon in the well is slow
- A drawdown cone is not created in the hydrocarbon layer
- Thickness of the hydrocarbon layer in the formation does not change during the test
- For water, the density is equal to the specific gravity

V RESULTS

The static water level from each well is determined from the product thickness and the specific gravity of the product using the equation (modified from Hughes, Sullivan, and Zinner (198?):

$$D_s = D_w - T_p s_p$$

Where D_s is the depth static water, D_w is the measured depth to water, T_p is the product thickness, and s_p is the specific gravity of the product. Table 1 contains the static water levels at each well.

The actual product thickness is determined from plots showing the recovery curve and the static product thickness. The product thickness can be read directly off the plot; it is the difference between the static product level and the point where the slope of the recovery curve starts to change after the initial readings are made. The point where the slope of the recovery curve changes therefore is the base of the product. Plots showing the product recovery curve and the static product level for each well are presented in Attachment 1 and the actual product thicknesses including the exaggeration are presented in Table 2.

Table 1. Static Water Levels

Well ID	Product[1]	Initial Measured Depth to Water (ft)	Product Thickness (ft)	Specific Gravity of Product	Static Water Depth (ft)
MWJP-1	JP-5	6.86	1.33	0.845[2]	5.74
No ID	JP-5	6.07	0.40	0.845[2]	5.73
KWM-22	JP-5	9.30	4.57	0.845[2]	5.44
MW9-15	DFM	11.56	8.05	0.845[3,4]	4.76
KWM23	DFM	5.18	2.09	0.845[3,4]	3.41
MW9-17	DFM	10.23	7.92	0.845[3,4]	4.07

1 ABB, Inc. (1994)
2 Reed (1986)
3 Personal communication, Manager, Trumbo Point Fuel Tank Farm, 10/5/95
4 Mean Value
DFM Diesel Fuel Marine

Table 2 Actual Product Thickness

Well ID	Measured Product Thickness (ft)	Depth to Static Product Level (ft)	Depth to Base of Product (ft)	Actual Product Thickness (ft)	Exaggeration
MWJP-1	1.33	5.53	5.70	0.17	8:1
No ID	0.40	5.67	5.79	0.12	3:1
KWM-22	4.57	4.73	5.65	0.92	5:1
MW9-15	8.05	3.51	4.00	0.49	16:1
KWM23	2.09	3.09	3.19	0.10	21:1
MW9-17	7.92	2.31	3.40	1.09	7:1

Attachment 1

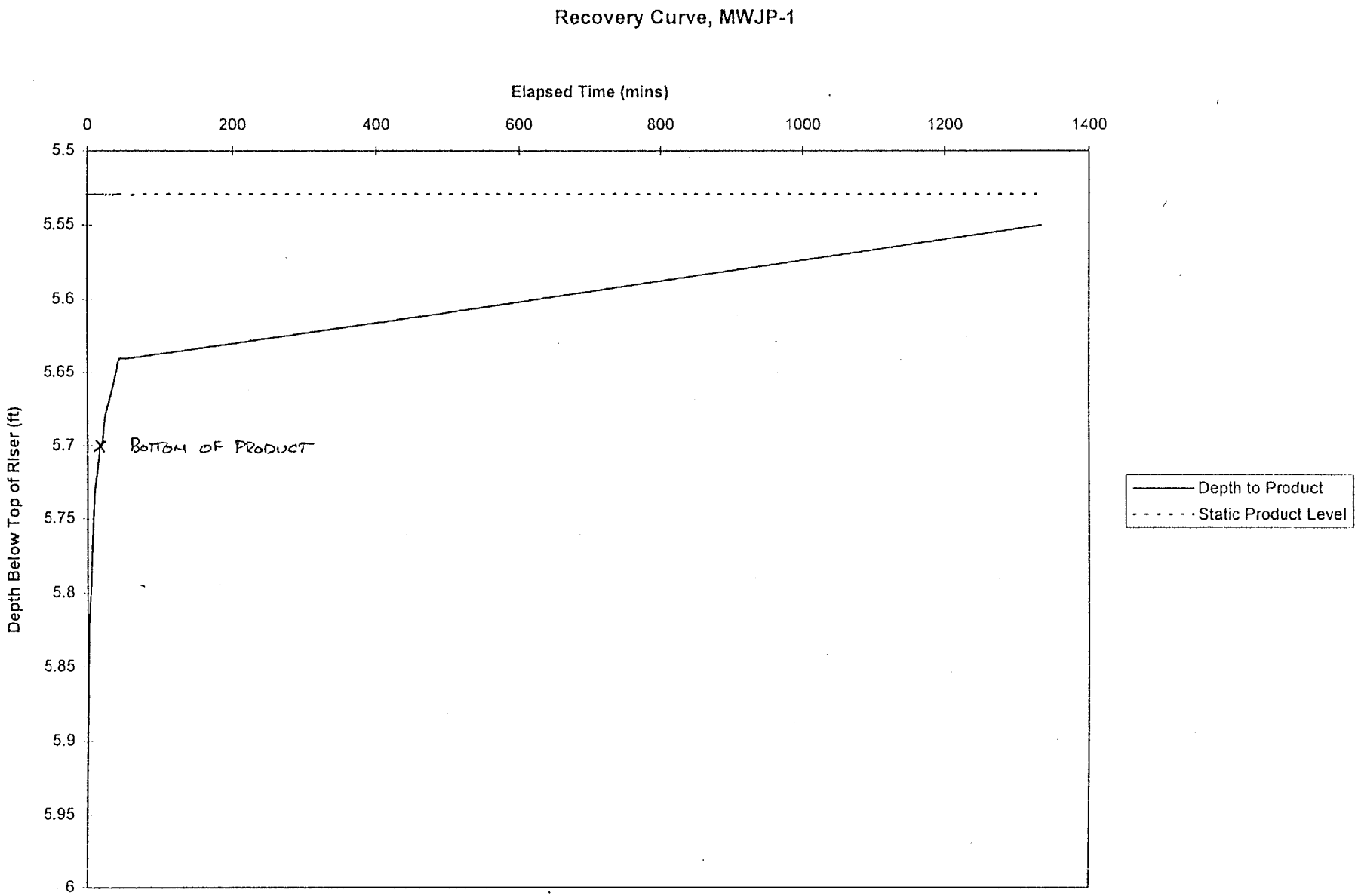
Bail Down Test Data

MWJP-1			
	Depth to		Product
Time	LPH	Water	Thickness
	5.53	6.86	1.33
0	5.96	6.12	0.16
0.17	5.95	6.09	0.14
0.34	5.9	6.08	0.18
0.5	5.9	6.07	0.17
0.67	5.88	6.06	0.18
0.83	5.88	6.05	0.17
1	5.88	6.06	0.18
1.25	5.87	6.06	0.19
1.5	5.86	6.07	0.21
1.75	5.84	6.07	0.23
2	5.84	6.05	0.21
2.25	5.83	6.06	0.23
2.5	5.82	6.05	0.23
3	5.82	6.05	0.23
3.5	5.81	6.07	0.26
4	5.8	6.08	0.28
4.5	5.8	6.08	0.28
5	5.79	6.09	0.3
6	5.77	6.11	0.34
7	5.76	6.11	0.35
8	5.75	6.12	0.37
9	5.74	6.12	0.38
10	5.73	6.12	0.39
12.5	5.72	6.12	0.4
15	5.71	6.12	0.41
17.5	5.7	6.12	0.42
20	5.7	6.12	0.42
25	5.68	6.13	0.45
30	5.67	6.12	0.45
35	5.66	6.12	0.46
40	5.65	6.12	0.47
45	5.64	6.11	0.47
60	5.64	6.11	0.47
1334	5.55	6.14	0.59

No ID#			
	Depth to		Product
Time	LPH	Water	Thickness
	5.67	6.07	0.40
0	5.98	5.98	0
0.17	5.82	5.82	0
0.34	5.81	5.81	0
0.5	5.8	5.8	0
0.67	5.79	5.79	0
0.83	5.79	5.79	0
1	5.79	5.79	0
1.25	5.79	5.79	0
1.5	5.79	5.79	0
1.75	5.78	5.78	0
2	5.78	5.78	0
2.25	5.76	5.76	0
2.5	5.75	5.75	0
3	5.74	5.74	0
3.5	5.74	5.74	0
4	5.74	5.74	0
4.5	5.74	5.74	0
5	5.74	5.74	0
6	5.71	5.72	0.01
7	5.72	5.73	0.01
8	5.71	5.72	0.01
9	5.7	5.72	0.02
10	5.7	5.72	0.02
12.5	5.69	5.73	0.04
15	5.69	5.74	0.05
17.5	5.69	5.75	0.06
20	5.69	5.75	0.06
25	5.69	5.76	0.07
30	5.69	5.77	0.08
35	5.69	5.77	0.08
40	5.69	5.77	0.08
45	5.69	5.77	0.08
60	5.69	5.78	0.09
380	5.65	5.71	0.06
1396	5.43	6.1	0.67

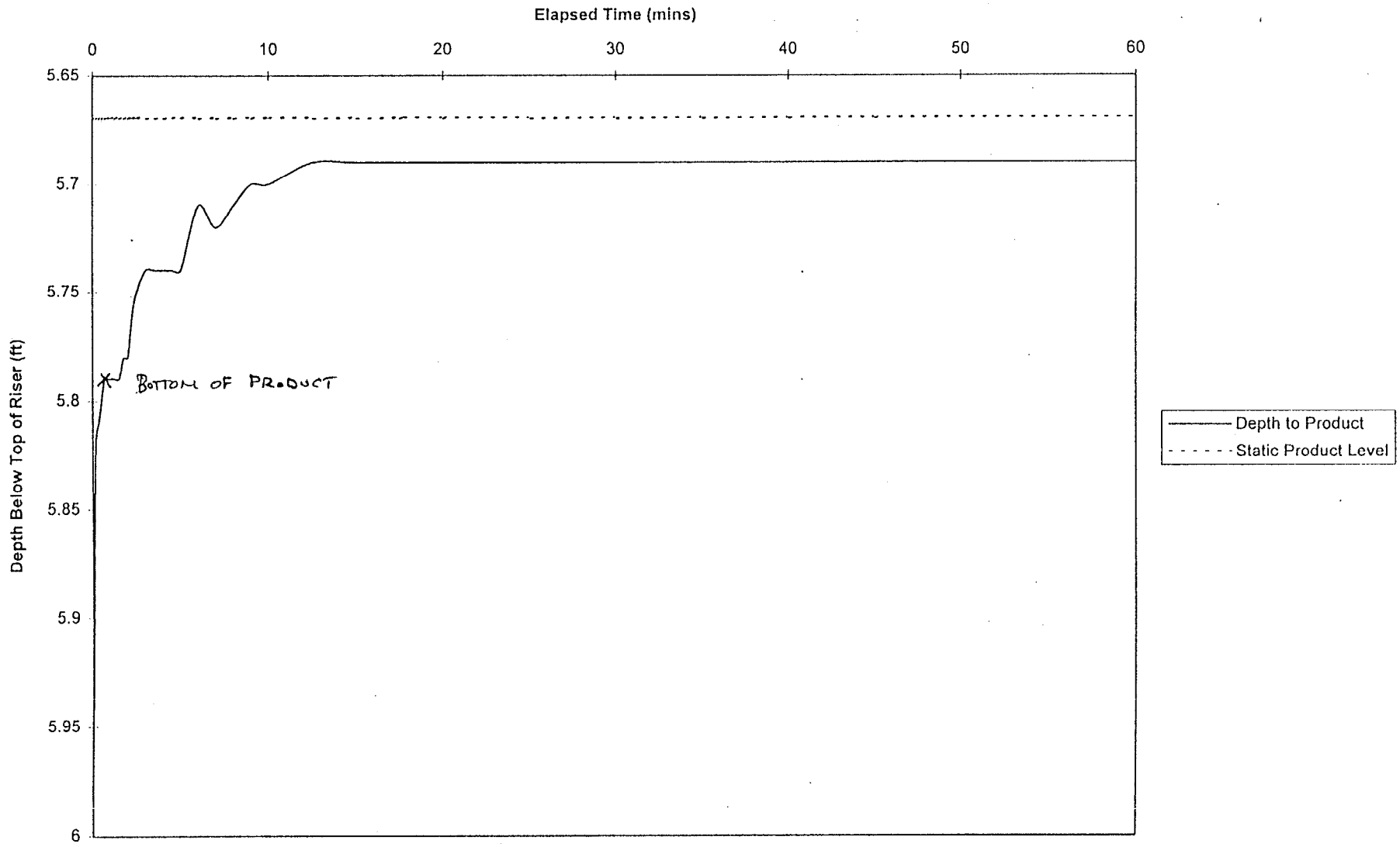
KWM-22			
	Depth to		Product
Time	LPH	Water	Thickness
	4.73	9.30	4.57
0	6.15	6.15	0
0.17	6.16	6.16	0
0.34	6.1	6.1	0
0.5	6.1	6.1	0
0.67	6.09	6.09	0
0.83	6.08	6.08	0
1	6.08	6.08	0
1.25	6.05	6.06	0.01
1.5	6.03	6.05	0.02
1.75	6.02	6.03	0.01
2	6	6.02	0.02
2.25	5.97	5.98	0.01
2.5	5.95	5.96	0.01
2.75	5.93	5.95	0.02
3	5.91	5.93	0.02
3.25	5.89	5.91	0.02
3.5	5.87	5.88	0.01
3.75	5.85	5.86	0.01
4	5.83	5.84	0.01
4.25	5.81	5.83	0.02
4.5	5.8	5.81	0.01
4.75	5.78	5.8	0.02
5	5.77	5.78	0.01
5.5	5.71	5.73	0.02
6	5.68	5.7	0.02
6.5	5.65	5.68	0.03
7	5.63	5.66	0.03
7.5	5.63	5.65	0.02
8	5.61	5.64	0.03
9	5.59	5.62	0.03
10	5.55	5.57	0.02
12.5	5.51	5.53	0.02
15	5.46	5.5	0.04
17.5	5.42	5.46	0.04
20	5.4	5.44	0.04
25	5.37	5.42	0.05
30	5.35	5.41	0.06
40	5.32	5.42	0.1
50	5.32	5.43	0.11
60	5.31	5.45	0.14
478	4.8	5.21	0.41
1498	5.84	6.01	0.17

ORIG. J. Novick DATE 10/5/95
CHK'D BY MKB DATE 10/9/95
CALC. NO. 322-G-002



ORIG. J. Novick DATE 10/5/95
CHK'D BY DATE
CALC. NO. 322-G-002

Recovery Curve, No ID#



ORIG. J. Novick DATE 10/5/95

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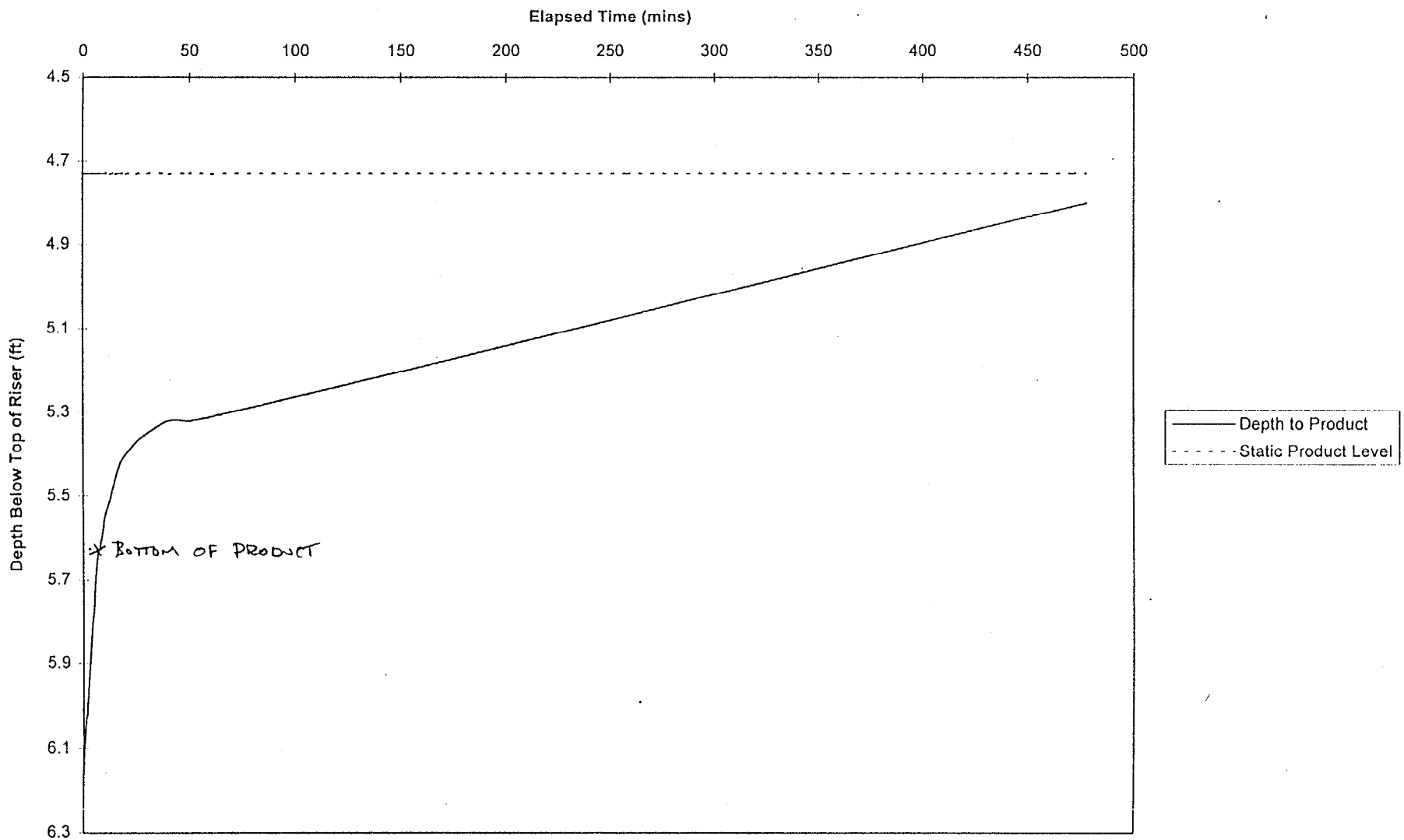
Recovery Curve, KWM-22



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CALC. NO. 322-G-002

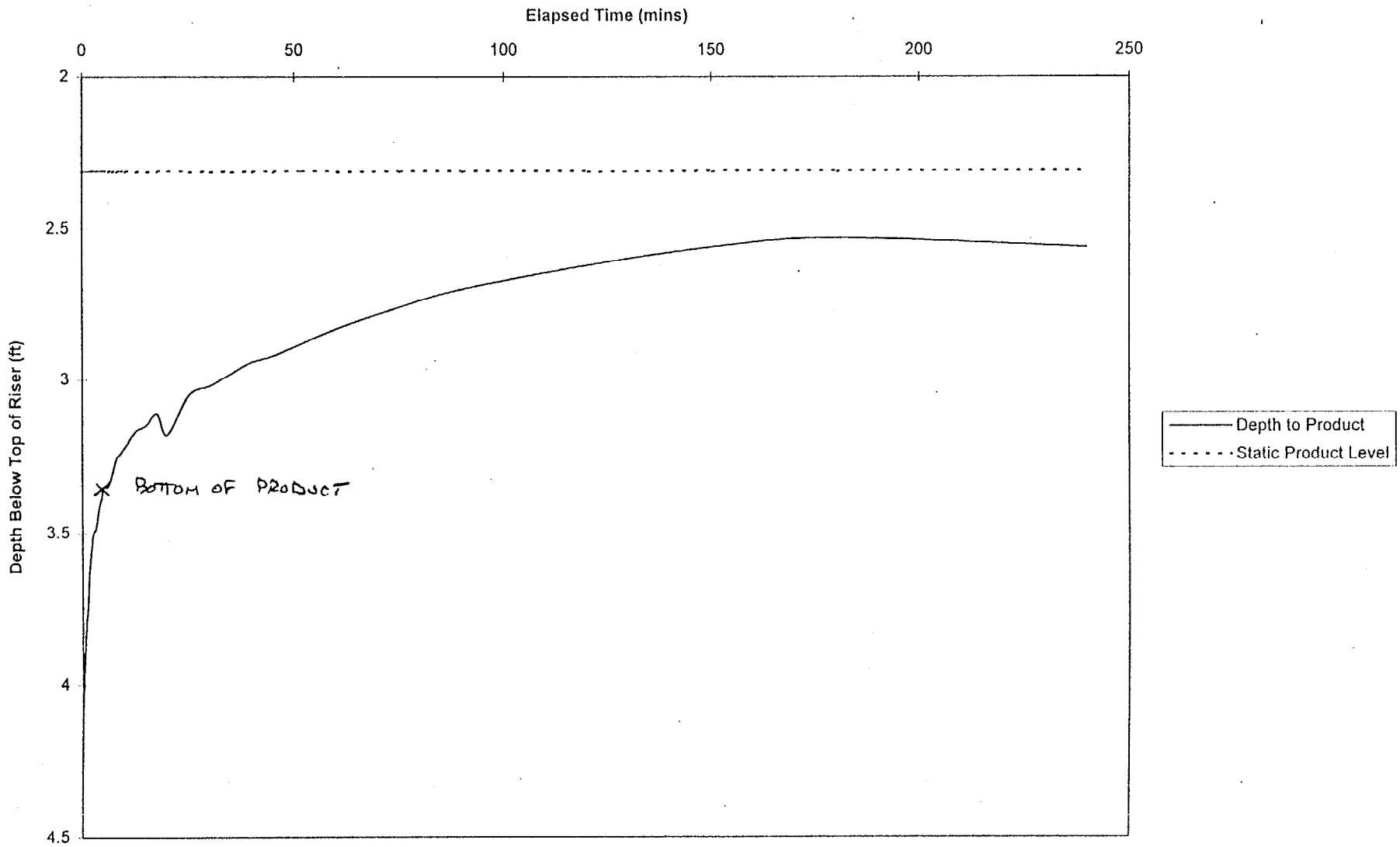
MW 9-17			
	Depth to		Product
Time	LPH	Water	Thickness
	2.61	10.23	7.92
0	4.32	4.34	0.02
0.17	4.04	4.11	0.07
0.34	4.01	4.05	0.04
0.5	3.95	3.98	0.03
0.67	3.88	3.93	0.05
0.83	3.82	3.88	0.06
1	3.78	3.84	0.06
1.25	3.74	3.8	0.06
1.5	3.65	3.74	0.09
1.75	3.61	3.7	0.09
2	3.57	3.71	0.14
2.25	3.54	3.67	0.13
2.5	3.5	3.63	0.13
3	3.49	3.64	0.15
3.5	3.46	3.62	0.16
4	3.41	3.57	0.16
4.5	3.39	3.55	0.16
5	3.35	3.54	0.19
6	3.35	3.55	0.2
7	3.31	3.53	0.22
8	3.26	3.51	0.25
9	3.24	3.5	0.26
10	3.22	3.49	0.27
12.5	3.17	3.51	0.34
15	3.15	3.53	0.38
17.5	3.11	3.56	0.45
20	3.18	3.59	0.41
25	3.05	3.69	0.64
30	3.02	3.78	0.76
35	2.98	3.86	0.88
40	2.94	3.96	1.02
45	2.92	4.05	1.13
60	2.83	4.33	1.5
75	2.76	4.55	1.79
90	2.7	4.75	2.05
120	2.62	5.04	2.42
150	2.56	5.31	2.75
180	2.53	5.49	2.96
240	2.56	5.85	3.29
1115	2.98	7.34	4.36
1569	2.42	7.14	4.72
2572	2.91	7.51	4.6

KWM-23			
	Depth to		Product
Time	LPH	Water	Thickness
	3.09	5.18	2.09
0	3.91	3.91	0
0.17	3.56	3.56	0
0.34	3.5	3.53	0.03
0.5	3.47	3.49	0.02
0.67	3.43	3.45	0.02
0.83	3.41	3.46	0.05
1	3.39	3.43	0.04
1.25	3.37	3.41	0.04
1.5	3.35	3.36	0.01
1.75	3.33	3.37	0.04
2	3.31	3.34	0.03
2.25	3.28	3.32	0.04
2.5	3.27	3.31	0.04
3	3.24	3.31	0.07
3.5	3.23	3.28	0.05
4	3.2	3.22	0.02
4.5	3.18	3.21	0.03
5	3.18	3.22	0.04
6	3.16	3.21	0.05
7	3.16	3.23	0.07
8	3.15	3.21	0.06
9	3.15	3.21	0.06
10	3.14	3.22	0.08
12.5	3.13	3.17	0.04
15	3.13	3.18	0.05
17.5	3.12	3.17	0.05
20	3.12	3.17	0.05
25	3.12	3.17	0.05
30	3.12	3.18	0.06
35	3.12	3.18	0.06
40	3.12	3.18	0.06
45	3.12	3.18	0.06
60	3.13	3.2	0.07
75	3.13	3.21	0.08
90	3.13	3.21	0.08
120	3.14	3.24	0.1
150	3.15	3.25	0.1
1090	3.43	3.72	0.29
1545	3.3	3.63	0.33
2559	3.5	3.9	0.4

MW9-15			
	Depth to		Product
Time	LPH	Water	Thickness
.	3.51	11.56	8.05
0	4.5	4.5	0
0.17	4.3	4.35	0.05
0.34	4.26	4.34	0.08
0.5	4.23	4.33	0.1
0.67	4.16	4.41	0.25
0.83	4.13	4.41	0.28
1	4.08	4.41	0.33
1.25	4.01	4.31	0.3
1.5	4	4.26	0.26
1.75	4.01	4.42	0.41
2	3.97	4.26	0.29
2.25	3.93	4.22	0.29
2.5	3.91	4.21	0.3
3	3.88	4.1	0.22
3.5	3.85	4.05	0.2
4	3.82	4.02	0.2
4.5	3.81	4.01	0.2
5	3.8	4.01	0.21
6	3.8	4.35	0.55
7	3.75	4.15	0.4
8	3.75	4.25	0.5
9	3.72	4.35	0.63
10	3.7	4.11	0.41
15	3.65	4	0.35
20	3.64	3.99	0.35
25	3.62	3.91	0.29
30	3.56	3.85	0.29
45	3.52	3.95	0.43
60	3.52	3.87	0.35
75	3.48	3.81	0.33
90	3.45	3.8	0.35
105	3.43	3.8	0.37
120	3.41	3.95	0.54
150	3.32	3.76	0.44
1320	3.83	4.8	0.97
1773	3.17	4.12	0.95
2773	3.71	4.91	1.2

ORIG.	J. Novick	DATE	10/5/95
CHK'D BY	MAL	DATE	10/9/95
CALC. NO.	322-G-002		

Product Recovery, MW9-17



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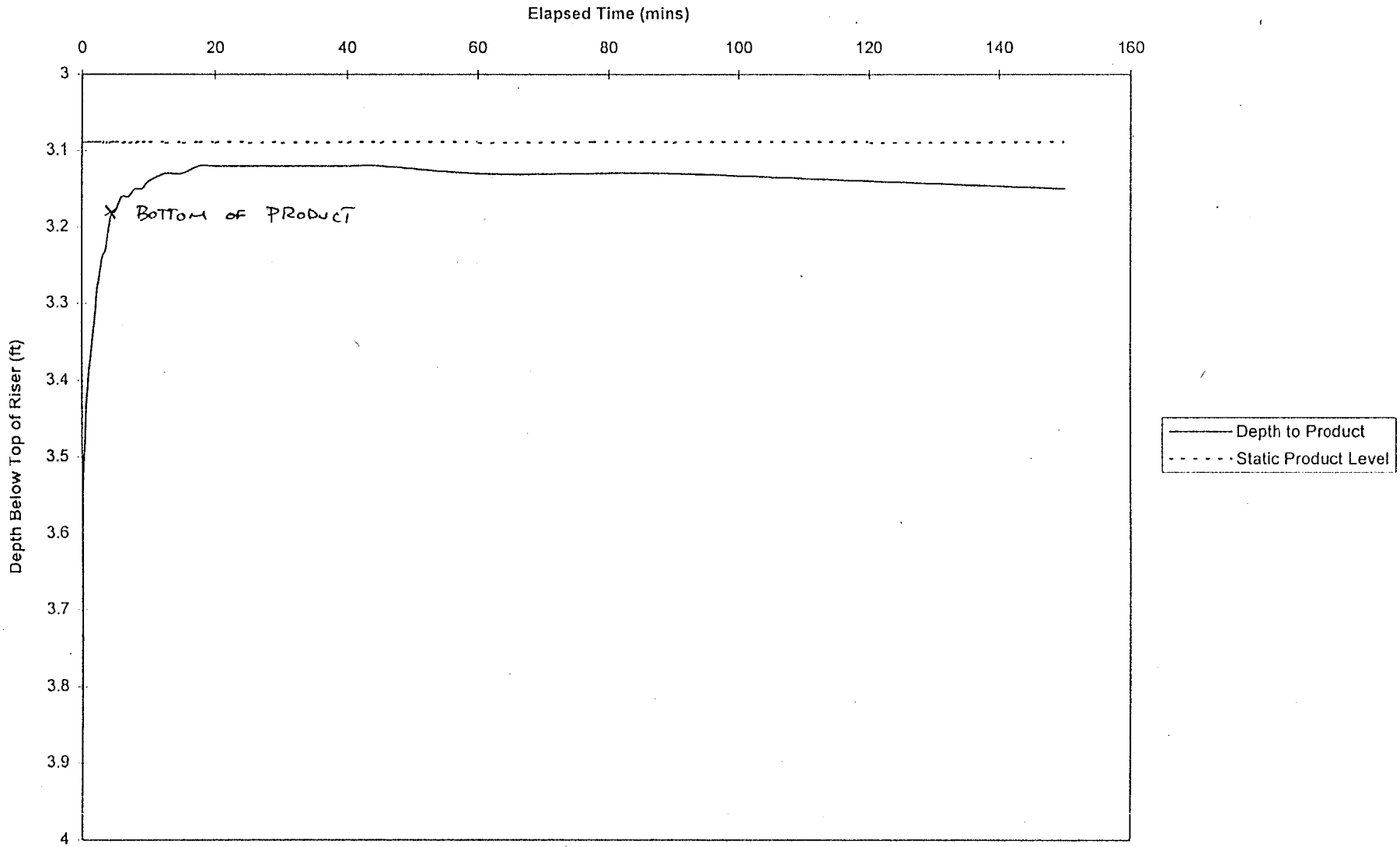
Recovery Curve, KWM-23



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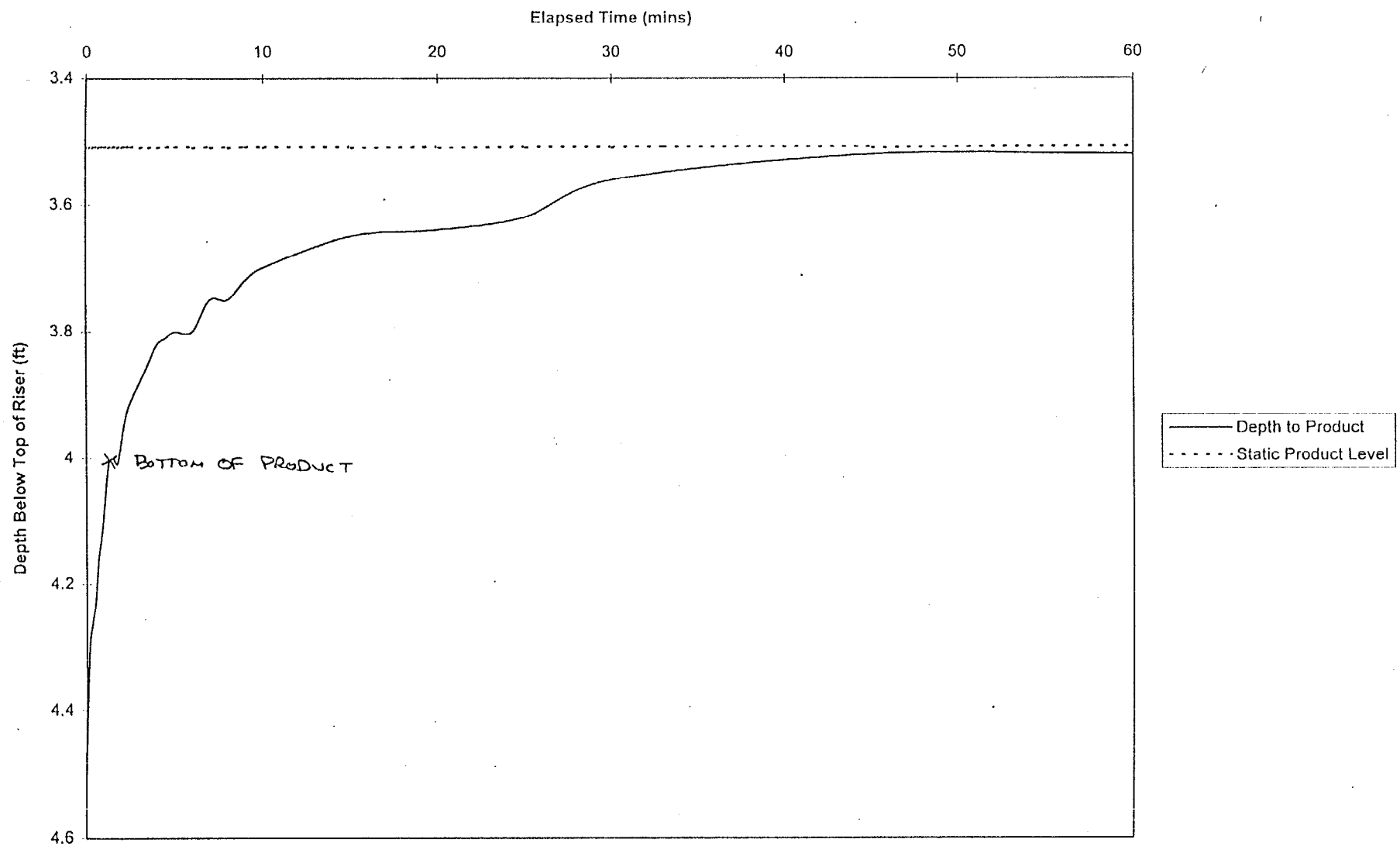
CALC. NO. 322-G-002

Recovery Curve, MW9-15



ORIG. J. Novick DATE 10/5/95

CHK'D BY [signature] DATE 10/5/95

CALC. NO. 322-G-002