

Appendix H, Laboratory data. Volume 2

[s.l.]: [s.n.], [s.d.]

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Project No. RM82-1095

Nov. 82

D'APPOLONI

REFERENCE

Volume II - Appendix H, Laboratory Data

Soil Attenuation Study

STATE DOCUMENTS
DEPOSITORY

SEP 17 1984

University of Wisconsin, LRC
Stevens Point, Wisconsin

Crandon Project
Crandon, Wisconsin

Exxon Company
Rhinelander, Wisconsin

TD
194.66
.W62
C7102
v.2

15.

1944

ANTHONY ISLAND

TD
194.66
.W62
C7102
v.2

Volume II - Appendix H, Laboratory Data

Soil Attenuation Study

APPENDIX H

LABORATORY DATA

This appendix presents laboratory data from measurements or sample descriptions performed as part of the experimental program for the soil attenuation study. This appendix contains the following laboratory recorded data or sample descriptions:

- Data sheets of batch distribution ratio determinations.
- Column test flow monitoring data.
- Column test effluent chemistry monitoring data.
- Postcolumn test sample descriptions.
- Carbonate effervescence results.

DATA SHEETS OF BATCH DISTRIBUTION RATIO DETERMINATIONS

The following data sheets present the experimental data of the 19 batch distribution ratio tests discussed in Appendix E. Test procedures and results are presented in Appendix E.

By: ATDate 10-25-81

Exxon - Crandon Project

Chkd By: QINDate 11-3-81

RM81-444-AL

DATA SHEET

BATCH DISTRIBUTION RATIO DETERMINATIONS

Sample No. - Identification: #1Sediment Identification: COMPOSITE #1 (TILL)Weight of air-dried sediment sample (W_m): 225.08Leachate pH: 3.0Volume of leachate added to the sediment sample (V_1): 900 mlApproximate equilibration-residence time: 50:20hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	3:15	21:25	26:15	50:20	
pH	3.00	4.10	4.20	3.60	3.30	
pH if adjusted	-	3.00	2.90	2.70	-	
Approximate weight of CaCO_3 added (g)	-	-	-	-	-	
Drops concentrated H_2SO_4 added	-	4	5	4	-	
Eh (mV)	+576	-	-	-	+526	

By: AT Date 10-25-81

Exxon - Crandon Project

Chkd By: flw Date 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #2Sediment Identification: COMPOSITE #1 (TILL)Weight of air-dried sediment sample (W_m): 225.0 g

Leachate pH: 3.0

Volume of leachate added to the sediment sample (V_1): 400 ml

Approximate equilibration-residence time: 50:00hr

Approximate sample agitation-shaking time: 6 hr

Approximate temperature of equilibration: 23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	4:05	22:05	27:05	50:00	
pH	3.00	4.20	4.20	3.60	3.40	
pH if adjusted	—	3.00	2.90	2.80	—	
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	
Drops concentrated H_2SO_4 added	—	4	4	4	—	
Eh (mV)	+576	—	—	—	+496	

By: A Date 10-22-81

Exxon - Crandon Project

Chkd By: JCN Date 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: = 3 Sediment Identification: COMPOSITE = 2 (DRIFT)Weight of air-dried sediment sample (W_m): 225.0 gLeachate pH: 3.0Volume of leachate added to the sediment sample (V_1): mlApproximate equilibration-residence time: 9:00 hrApproximate sample agitation-shaking time: 5:00 hrApproximate temperature of equilibration: 23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	2:35	21:45	26:35	50:50	
pH	3.00	4.00	3.80	3.30	3.10	
pH if adjusted	—	3.00	2.90	2.70	—	
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	
Drops concentrated H_2SO_4 added	—	4	3	4	—	
Eh (mV)	+576	—	—	—	+536	

By: AT Date 10-28-81

Exxon - Crandon Project

Chkd By: FIN Date 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #4Sediment Identification: COMPOSITE #2 (DRIFT)Weight of air-dried sediment sample (W_m): 225.08Leachate pH: 3.0Volume of leachate added to the sediment sample (V_1): 900ml

Approximate equilibration-residence time: 50:10 hr

Approximate sample agitation-shaking time: 6 hr

Approximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	3:40	21:50	26:40	50:10	
pH	3.00	4.00	3.80	3.50	3.00	
pH if adjusted	—	2.95	3.00	2.85	—	
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	
Drops concentrated H_2SO_4 added	—	4	3	4	—	
Eh (mV)	+576	—	—	—	+576	

By: AT Date 10-22-81

Exxon - Crandon Project

Chkd By: FR Date 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONS

Sample No. - Identification: = 5

Sediment Identification: 4% BENTONITE / TILL ADMIXTURE

Weight of air-dried sediment sample (W_m): 225.08

Leachate pH: 3.0

Volume of leachate added to the sediment sample (V_1): 900 ml

Approximate equilibration-residence time: 50:00hr

Approximate sample agitation-shaking time: 6 hr

Approximate temperature of equilibration: 22.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	3:45	21:55	26:45	50:00	
pH	3.00	4.10	3.70	3.30	3.00	
pH if adjusted	—	3.05	3.00	2.70	—	
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	
Drops concentrated H_2SO_4 added	—	4	2	4	—	
Eh (mV)	+576	—	—	—	+546	

By: AT Date 10-28-81

Exxon - Crandon Project

Chkd By: LIN Date 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: =6Sediment Identification: 4% BENTONITE / TILL MIXTUREWeight of air-dried sediment sample (W_m): 225.08Leachate pH: 3.0Volume of leachate added to the sediment sample (V_1): 900 mlApproximate equilibration-residence time: 50:10 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	3:20	21:30	26:20	50:10	
pH	3.00	4.10	3.70	3.30	3.10	
pH if adjusted	—	3.00	2.90	2.65	—	
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	
Drops concentrated H_2SO_4 added	—	4	2	4	—	
Eh (mV)	+576	—	—	—	+556	

By: AT Date 10-28-81

Exxon - Crandon Project

Chkd By: JIN Date 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: = 7Sediment Identification: CONTROL SAMPLEWeight of air-dried sediment sample (W_m): 0.0 gLeachate pH: 3.0Volume of leachate added to the sediment sample (V_1): 1000 mlApproximate equilibration-residence time: 50:35 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	3:05	21:15	26:05	50:35	
pH	3.00	3.10	2.95	2.95	3.00	
pH if adjusted	—	—	—	—	—	
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	-576	+571	+646	+646	+546	

By: ACTDate 10-20-81

Exxon - Crandon Project

Chkd By: GINDate 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #8Sediment Identification: COMPOSITE #1 (TIL)Weight of air-dried sediment sample (W_m):225.08Leachate pH: 6Volume of leachate added to the sediment sample (V_1):900 ml

Approximate equilibration-residence time:

48:20 hr

Approximate sample agitation-shaking time:

6 hr

Approximate temperature of equilibration:

23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	5:05	6:10	22:30	27:25	48:20
pH	5.75	5.25	5.20	5.65	5.70	5.40
pH if adjusted	—	—	—	—	—	—
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	—
Drops concentrated H_2SO_4 added	—	—	—	—	—	—
Eh (mV)	+236	—	—	—	—	+276

By: AK Date 10-28-81

Exxon - Crandon Project

Chkd By: JLN Date 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #9Sediment Identification: COMPOSITE #1 (TW)Weight of air-dried sediment sample (W_m): 225.08Leachate pH: 6.0Volume of leachate added to the sediment sample (V_1): 400 mlApproximate equilibration-residence time: 49.00 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	4:45	5:50	22:10	27:05	49:00
pH	5.75	5.25	5.90	5.60	5.70	5.40
pH if adjusted	—	—	—	—	—	—
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	—
Drops concentrated H_2SO_4 added	—	—	—	—	—	—
Eh (mV)	+236	—	—	—	—	+316

By: ATDate 10-29-81

Exxon - Crandon Project

Chkd By: frnDate 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: # 10Sediment Identification: COMPOSITE # 2 (AZIFT)Weight of air-dried sediment sample (W_m): 225.0 gLeachate pH: 6.0Volume of leachate added to the sediment sample (V_l): 900 mlApproximate equilibration-residence time: 5:00 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	4:55	6:20	22:20	27:15	50:00
pH	5.75	5.45	5.90	5.70	5.75	5.40
pH if adjusted	-	-	-	-	-	-
Approximate weight of CaCO_3 added (g)	-	-	-	-	-	-
Drops concentrated H_2SO_4 added	-	-	-	-	-	-
Eh (mV)	+236	-	-	-	-	+296

By: AE Date 10-28-81
Chkd By: LN Date 11-3-81

Exxon - Crandon Project

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONS

Sample No. - Identification: 11

Sediment Identification: COMPOSITE = 2 (DRIFT)

Weight of air-dried sediment sample (W_m): 225.08

Leachate pH: 6.0

Volume of leachate added to the sediment sample (V_1): 900 ml

Approximate equilibration-residence time: 48:55 hr

Approximate sample agitation-shaking time: 6 hr

Approximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	5:15	6:40	22:40	27:35	48:55
pH	5.75	5.45	6.00	5.80	5.80	5.40
pH if adjusted	-	-	-	-	-	-
Approximate weight of CaCO_3 added (g)	-	-	-	-	-	-
Drops concentrated H_2SO_4 added	-	-	-	-	-	-
Eh (mV)	+236	-	-	-	-	+296

By: ATDate 10-28-81

Exxon - Crandon Project

Chkd By: J12Date 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: = 12Sediment Identification: CONTROL SAMPLEWeight of air-dried sediment sample (W_m): 0.0 gLeachate pH: 6.0Volume of leachate added to the sediment sample (V_1): 1000 mlApproximate equilibration-residence time: 49:05 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	4:35	6:00	22:00	26:55	49:05
pH	5.75	5.85	6.00	4.70	4.95	5.50
pH if adjusted	—	—	—	—	6.00	—
Approximate weight of CaCO_3 added (g)	—	—	—	—	4.2	—
Drops concentrated H_2SO_4 added	—	—	—	—	—	—
Eh (mV)	+236	+321	—	+446	+456	+316

By: AK Date 10-28-81

Exxon - Crandon Project

Chkd By: FIN Date 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #13Sediment Identification: COMPOSITE #1 (TLL)Weight of air-dried sediment sample (W_m): 225.0 gLeachate pH: 9.0Volume of leachate added to the sediment sample (V_1): 900 mlApproximate equilibration-residence time: 50:50 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	1:30	18:45	24:30	50:50	
pH	9.05	7.10	8.95	8.80	8.90	
pH if adjusted	—	8.60	—	—	—	
Approximate weight of CaCO_3 added (g)	—	UM ⁽¹⁾	—	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	+266	—	—	—	+356	

(1) "UM" INDICATES UNABLE TO MEASURE H_2 E.M.
WAS MAINTAINED OVER SAMPLE

By: AT Date 10-28-81

Exxon - Crandon Project

Chkd By: JN Date 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #14Sediment Identification: COMPOSITE #1 (TILL)Weight of air-dried sediment sample (W_m): 225.0gLeachate pH: 9.0Volume of leachate added to the sediment sample (V_l): 400 mlApproximate equilibration-residence time: 50.35hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	11:50	19:05	24:50	50:35	
pH	9.05	7.10	9.00	8.90	8.90	
pH if adjusted	—	9.20	—	—	—	
Approximate weight of CaCO_3 added (g)	—	UM ⁽¹⁾	—	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	+266	—	—	—	+356	

(1) "UM" INDICATES UNABLE TO MEASURE ITS H_2 ATM.
WAS MAINTAINED OVER SAMPLER

By: AT Date 10-28-81

Exxon - Crandon Project

Chkd By: JCN Date 11-3-81

RMS1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: = 15Sediment Identification: COMPOSITE = 2 (DRIFT)Weight of air-dried sediment sample (W_m): 228.0 gLeachate pH: 9.0Volume of leachate added to the sediment sample (V_1): 900 mlApproximate equilibration-residence time: 49:45 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5°C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	2:25	19:40	25:25	49:45	
pH	9.05	7.40	8.90	8.90	8.90	
pH if adjusted	—	8.80	—	—	—	
Approximate weight of CaCO_3 added (g)	—	um ⁽¹⁾	—	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	+266	—	—	—	+346	

(1) "um" INDICATES UNABLE TO MEASURE AS $1/2$ ATM WAS MAINTAINED OVER SAMPLE

By: AT Date 10-28-81

Exxon - Crandon Project

Chkd By: 1/2V Date 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: F-16Sediment Identification: COMPOSITE #2 (ARIFT)Weight of air-dried sediment sample (W_m): 225.0 gLeachate pH: 9.0Volume of leachate added to the sediment sample (V_1): 400 mlApproximate equilibration-residence time: 50.40 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	1:40	18:55	24:40	50:40	
pH	9.05	7.50	8.70	8.85	9.00	
pH if adjusted	—	8.50	8.90	—	—	
Approximate weight of CaCO_3 added (g)	—	um ⁽¹⁾	um	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	+266	—	—	—	+366	

(1) "um" INDICATES UNABLE TO MEASURE BE N_2 ATM.
WAS MAINTAINED OVER SAMPLE.

By: ATDate 10-28-81

Exxon - Crandon Project

Chkd By: JINDate 11-3-81

RMB1-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #17Sediment Identification: 4% BENTONITE / TILL ADMIXTUREWeight of air-dried sediment sample (W_m): 228.0 gLeachate pH: 9.0Volume of leachate added to the sediment sample (V_l): 900 mlApproximate equilibration-residence time: 50:15 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	11:55	19:10	24:55	50:15	
pH	7.05	6.90	8.00	8.90	8.85	
pH if adjusted	—	8.50	8.90	—	—	
Approximate weight of CaCO_3 added (g)	—	um ⁽¹⁾	um	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	+266	—	—	—	+356	

(1) "um" INDICATES UNABLE TO MEASURE H_2 ATM.
WAS MAINTAINED OVER SAMPLE

By: ATDate 10-28-81

Exxon - Crandon Project

Chkd By: FINDate 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: F-18Sediment Identification: 4% BENTONITE / ALL AMMONIUMWeight of air-dried sediment sample (W_m): 225.08Leachate pH: 9.0Volume of leachate added to the sediment sample (V_1): 900 mlApproximate equilibration-residence time: 49.55 hrApproximate sample agitation-shaking time: 6 hrApproximate temperature of equilibration: 23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	2:15	19:30	25:15	49:55	
pH	9.05	8.95	8.85	8.80	8.80	
pH if adjusted	—	8.70	9.00	—	—	
Approximate weight of $CaCO_3$ added (g)	—	um ⁽¹⁾	um	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	+260	—	—	—	+366	

(1) "um" INDICATES UNABLE TO MEASURE N_2 ATM. WAS MAINTAINED OVER SAMPLE.

By: FADate 10-28-81

Exxon - Crandon Project

Chkd By: 212Date 11-3-81

RM81-444-AL

DATA SHEET
BATCH DISTRIBUTION RATIO DETERMINATIONSSample No. - Identification: #19Sediment Identification: CONTROL SAMPLEWeight of air-dried sediment sample (W_m):

0.0 g

Leachate pH: 9.0Volume of leachate added to the sediment sample (V_1):

1000 ml

Approximate equilibration-residence time:

50:00 hr

Approximate sample agitation-shaking time:

6 hr

Approximate temperature of equilibration:

23.5 °C

pH/Eh MONITORING DATA

MONITORING DATA	MONITORING HOUR					
	0:00	2:05	14:20	25:05	50:00	
pH	9.05	9.00	9.00	9.00	9.00	
pH if adjusted	—	—	—	—	—	
Approximate weight of CaCO_3 added (g)	—	—	—	—	—	
Drops concentrated H_2SO_4 added	—	—	—	—	—	
Eh (mV)	+266	-154	+296	+266	+326	

COLUMN TEST FLOW MONITORING DATA

The following data sheets present the flow monitoring data of the ten column tests discussed in Appendix F. Column testing procedures and test conditions are presented in Appendix F.

By DE Date 12/10/81 Subject LONG TERM PERMEABILITY Sheet No. 1 of 3
 hkd. By E2 Date 5-3-82 EXXON Proj. No. RM81-44462

LONG TERM PERMEABILITY TEST

BORING NO.	PH 3.0
SAMPLE NO.	I-1
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	ACCUM. Time Hours	FLOW Reading (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. 0.50 KG BACK PR. KG REMARKS
12-10-81	344	16:05	0	50.0	0	START
12/11/81	345	09:05	17	35.5	14.5	0.85
12/11/81	345	16:15	24.17	27.7	22.3	1.05
12/12/81	346	13:30	45.42	9.4/47.5	40.6	0.85
12/14/81	348	10:30	90.42	3.5	84.6	0.98
12/14/81	349	13:30	93.42	0.6/48.3	57.5	0.97 SAMPLE 1
12/15/81	349	10:00	113.92	27.2/47.5	105.6	1.01 SAMPLE 2
12/16/81	350	08:45	136.67	24.4	131.7	1.02
12/16/81	350	11:00	138.92	22.3/47.2	133.8	↑ SAMPLE 3
12/17/81	351	13:00	164.12	27.8/	153.2	FLOW
12/17/81	351	15:15	167.17	26.2/48.8	154.8	RATES
12-18-81	352	15:30	171.42	28.7/47.2	174.9	INPUT TURNING SHOWN
12-19-81	353	14:00	213.92	29.0/47.2	194.1	SIGNS OF DISCOLORATION
12/21/81	355	9:15	257.17	13.8/48.1	229.6	(LT yellow to BROWN)
12/22/81	356	13:30	285.42	24.0/49.0	253.7	
12/23/81	357	14:00	309.42	25.2/49.2	274.4	
12/24/81	358	14:30	334.42	30.1/48.8	293.5	
12-25-81	360	12:00	380.92	10.7/48.5	331.6	
12/28/81	362	9:30	425.42	12.4/48.9	368.7	
12/29/81	363	13:45	453.67	26.7/48.2	390.9	
12/30/81	364	15:00	478.92	26.3/47.6	412.8	TURBID METER
12/31/81	365	14:00	501.92	33.4/48.6	427.0	
1-2-82	367	13:15	549.17	13.8/46.1	462.50	
1/4/82	369	09:45	591.17	16.5/48.5	502.1	POWER FAILURE FROM 15:00 → 17:30
1/5/82	370	9:30	614.92	27.4	523.2	
1/6/82	371	10:00	639.42	20.2/48.6	550.9	
1/8/82	373	10:30	687.92	21.4/48.2	598.9	
1/9/82	374	9:45	711.17	23.6/45.8	623.3	
1/11/82	376	10:30	759.42	24.0/43.3	669.3	
1/12/82	377	16:00	789.42	14.3/44.6	698.3	

By DB Date 5-3-82 Subject Exxon Sheet No. 2 of 3
 hkd. By EZ Date 5-3-82 Proj. No. RM81-44462

LONG TERM PERMEABILITY TEST

BORING NO	PH 3
SAMPLE NO	I-1
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	ACCUM. TIME HOURS	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. 0.50 KG BACK PR. N.A. KG REMARKS
1-13-82	378	6:00	813.42	10.9/48.0	722.0	
1/15/82	380	14:00	859.42	21.0/47.2	767.4	
1/16/82	381	9:30	878.92	28.13/48.7	786.3	
1/18/82	383	10:30	927.92	21.7/47.5	832.3	
1/19/82	384	10:00	951.42	25.9	853.9	
1/20/82	385	14:30	979.42	31.0/48.5	876.8	
1/22/82	387	11:00	1024.42	5.7/44.7	919.6	
1-23-82	388	10:30	1047.92	25.4/44.7	943.9	
1/25/82	390	11:00	1096.42	3.2/48.3	989.4	
1/26/82	391	11:30	1120.92	23.3/45.1	1014.4	SHUT DOWN 22
2/10/82	412	17:30	1120.92	48.8	1014.4	RESTART
2/18/82	414	14:30	1165.92	0+0.3/49.8	1063.5	1.09
2/19/82	415	12:00	1187.42	18.0	1095.3	1.48
2/20/82	416	10:00	1209.42	0+3.5/49.5	1116.8	↑ FLOW
2/22/82	418	13:30	1260.92	0.3/47.3	1166.0	RATES
2/24/82	420	11:45	1307.17	0.7/44.3	1212.6	
2/26/82	422	11:30	1354.92	3.9/	1258.0	SHUT DOWN TO INSTALL VALVES
2/26/82	422	15:30	1354.92	47.6	1258.0	RESTART
2/27/82	423	11:30	1374.42	40.3/50.0	1265.4	NO SAMPLE
3/1/82	425	13:00	1424.42	3.0/49.1	1311.8	
3-3-82	427	11:30	1470.92	4.10/	1370.9	STOPPED TO INSTALL 100ML BURET
3/3/82	427	14:30	1470.92	102.7	1370.9	RESTART
3/6/82	430	10:00	1538.42	29.2/49.4	1444.4	
3/8/82	432	16:30	1592.92	29.2/49.0	1514.6	
3/10/82	434	11:45	1636.17	13.9/73.8	1570.7	
3/12/82	436	11:30	1683.92	4.1/49.7	1635.1	
3/15/82	439	13:15	1757.67	2.4/80.4	1731.7	
3/17/82	441	11:00	1803.42	13.7/73.6	1798.4	
3/19/82	443	10:00	1850.42	7.2/99.2	1864.8	

By DB Date Subject Sheet No. 3 of 3
 kd. By 182 Date 5-3-82 EXXON Proj. No. PM52-10053

LONG TERM PERMEABILITY TEST

BORING NO	PH 3
SAMPLE NO	I 1
DEPTH	

[illegible]

By DB Date 12/10/81 Subject Sheet No. 1 of 3
 Chkd. By E2 Date 4-3-82 Exxon Proj. No. RMB1-444

LONG TERM PERMEABILITY TEST

BORING NO	P14 6.0
SAMPLE NO	I-2
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	ACCUM. TIME HOURS	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. KS BACK PR. KS REMARKS
12/12/81	344	16:05	0	19.2	0	START
12/11/81	345	9:05	17	36.6	12.7	0.75
12/11/81	345	16:15	24.17	31.0	18.3	0.77
12/12/81	346	13:30	45.42	14.1/49.1	35.2	0.80 DUMPED
12/14/81	348	10:30	90.42	10.0	24.1	0.86
12/14/81	348	13:30	93.42	7.4/47.3	76.7	0.87 SAMPLE #1
12/15/81	349	10:00	113.92	28.7/49.6	95.3	0.91 SAMPLE #2
12/15/81	350	08:45	136.67	28.5	115.4	0.88
12/16/81	350	11:00	138.92	26.3/48.6	117.6	SAMPLE #3 NOISE PROBLEM
12/17/81	351	13:00	164.92	32.0	134.2	
12/17/81	351	15:15	167.17	30.5/49.2	135.7	
12-18-81	352	15:30	191.42	31.8/24.7	153.1	
12-19-81	353	14:00	213.92	32.2/31.0	169.6	
12/21/81	355	9:15	257.17	20.2/46.8	200.4	
12/22/81	356	13:30	285.42	26.0/48.8	221.2	
12/23/81	357	14:00	309.92	31.2/48.7	238.8	INPUT TUBING SHOWS
12/24/81	358	14:30	324.42	32.1/48.3	255.4	SIGNS OF DISCOLORATION
12-26-81	360	13:00	350.92	15.2/44.2	288.4	(LY FOLLOWING TO SECTION)
12/28/81	362	9:30	425.42	17.5/47.8	320.1	BLACK DISCOLORATION OF
12/29/81	363	13:45	453.67	28.5/49.1	339.4	OUTPUT LINE FORMING ON INSIDE OF TUBING
12/30/81	364	15:00	478.92	30.2/48.9	358.3	TUBING ALLOWED
12/31/81	365	14:00	501.92	37.9/49.0	369.6	
1-2-82	367	13:15	549.17	23.0/48.6	395.6	
1/4/82	369	09:45	591.17	19.7/49.7	425.0	POWER FAILURE FROM 15:00 - 17:30
1/5/82	370	09:30	614.92	34.7	440.0	
1/6/82	371	10:00	639.42	14.6/47.6	460.1	
1/8/82	373	10:30	687.92	12.3/48.6	495.4	
1/9/82	374	9:45	711.17	30.5/48.8	513.5	
1/11/82	376	10:30	759.92	15.9/47.5	547.30	
1/12/82	377	16:00	789.42	26.0/46.2	568.8	

By DB Date 1 Subject EXXON Sheet No. 2 of 3
 Chkd. By EZ Date 5-3-82 Proj. No. PM81-44462

LONG TERM PERMEABILITY TEST

BORING No	PA 6
SAMPLE No	I 2
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	FLOW READING (CM ³)	Accum. FLOW (CM ³)	CELL PR. 0.50 KG BACK PR. N.A. KG REMARKS
1-13-82	378	6:00	813.42	28.4/49.8	586.6	
1-15-82	380	14:00	859.42	16.3/49.0	620.1	
1-16-82	381	9:30	878.92	34.9/48.4	634.2	25
1-18-82	383	10:30	927.92	14.6/48.8	668.0	26
1-19-82	384	10:00	951.42	31.1	685.7	
1-20-82	385	14:30	979.92	10.7/47.2	706.1	27
1-22-82	387	11:00	1024.42	9.3/49.2	744.0	28
1-23-82	388	10:30	1047.92	27.2/49.7	766.0	29
1-25-82	390	11:00	1096.42	9.9/47.6	806.8	PUMP SPEED CHANGE REASON UNKNOWN
1-27-82	392	10:30	1143.92	17.0/49.3	836.8	SPEED RESET
1-29-82	394	13:30	1194.92	11.6/48.3	874.5	YELLOWISH BROWN COLOR (OXIDATION)
1-30-82	395	10:00	1215.42	28.6/48.3	894.2	FORMING INSIDE BURST
2-1-82	397	10:30	1263.92	5.6/49.3	936.9	
2-2-82	398	13:00	1290.42	20.5/48.7	965.7	
2-4-82	400	15:00	1340.42	26.8/49.7	987.6	
2-6-82	402	11:30	1384.92	23.9/49.6	1013.4	
2-8-82	404	14:15	1435.67	20.0/48.7	1043.0	
2-10-82	406	15:30	1484.92	17.0/49.5	1074.7	
2-12-82	408	11:30	1528.92	20.9/48.0	1102.2	
2-13-82	409	11:20	1552.75	25.2/50.0	1121.0	
2-15-82	411	10:30	1599.92	23.5/49.7	1147.5	
2-16-82	412	9:00	1622.42	49.7	1147.5	NO FLOW
2-18-82	412	17:30	1622.42	51.2	1147.5	RESTART
2-18-82	414	14:30	1667.42	14.2/50.1	1184.5	0.822
2-19-82	415	12:00	1688.92	22.4	1212.2	0.615
2-20-82	416	10:00	1710.92	3.7/49.2	1230.9	^ FLOW
2-22-82	418	13:30	1762.42	6.7/49.4	1273.7	^ FLOW
2-24-82	420	11:45	1808.67	8.8/50.3	1314.3	
2-26-82	422	11:30	1856.42	11.1	1353.5	SHUT DOWN TO INSPECT VALVE

By DB Date — Subject — Sheet No. 3 of 3
 Chkd. By EZ Date 5-3-82 Proj. No. 100-4-2

LONG TERM PERMEABILITY TEST

BORING NO	
SAMPLE NO	<u>I 2</u>
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	Accum. Time Hours	FLOW READING (CM ³)	Accum. FLOW (CM ³)	REMARKS
2/26/82	422	15:30	1856.42	48.8	1353.5	RESTART
2/27/82	423	11:30	1876.42	22.5/49.7	1369.8	
3/1/82	425	13:00	1925.92	5.0/49.3	1414.5	
3-3-82	427	11:30	1972.42	43.7	1467.5	STOPPED TO INSTALL NORMAL BURET
3/3/82	427	14:30	1972.42	103.3	1467.5	RESTART
3/6/82	430	10:00	2039.92	34.3/100.3	1531.5	
3/8/82	432	16:30	2094.42	39.8/70	1592.0	
3/10/82	434	11:45	2137.67	21.2/82.0	1640.8	
3/12/82	436	11:30	2185.42	26.0/99.6	1696.8	
3/15/82	439	13:15	2251.17	16.2/80.6	1780.2	
3/17/82	441	11:00	2304.92	22.9/81.6	1837.9	
3/19/82	443	10:00	2351.92	24.0/99.0	1895.5	
3/22/82	446	13:00	2426.92	6.2/81.6	1988.3	162.4 ml/hr TURNING MOVED
3/24/82	448	11:45	2473.67	38.4/47.6	2031.5	0.924 TURNING MOVED
3/26/82	450	13:30	2523.42	48.0/99.2	2081.1	STOPPED TO ADJUST TIGHTEN IN CASE OF VALVE LEAK ALL WEEKEND
3/29/82	453	10:00	2523.42	99.0	2081.1	RESTART
3/31/82	455	13:30	2574.92	49.3/97.2	2130.3	
4/1/82	456	13:30	2598.92	77.2	2150.3	
4/2/82	457	11:45	2621.17	58.4/99.8	2169.1	
4/5/82	460	12:00	2693.42	34.2/63.7	2234.7	
4/7/82	462	14:30	2743.92	19.1/79.0	2279.3	
4/9/82	464	11:00	2788.42	41.0/99.6	2317.3	
4/12/82	467	16:00	2865.42	27.9/68.2	2389.1	
4-14-82	469	9:45	2907.17	26.1/99.2	2429.2	
4/16/82	471	9:30	2954.92	57.3/100.0	2471.1	
4-19-82	474	10:00	3027.42	43.0	2523.1	

By DB Date 12/10/81 Subject Sheet No. 1 of 3Chkd. By E2 Date 5-3-82 ExxonProj. No. RM81-4446

LONG TERM PERMEABILITY TEST

Boring No	P17 9.0
SAMPLE NO	I-3
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	ACCUM. TIME Hours	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. Kc	BACK PR. Kc	REMARKS
12/10/81	344	16:05	0	48.9	0			START
12/11/81	345	9:05	17	34.6	14.3	0.84		
12/11/81	345	16:15	24.17	35.2	20.7	0.88		
12/12/81	346	13:30	45.42	910/48.7	39.9	0.97		EXPERIMENT
12/14/81	348	10:30	90.42	5.3	83.3	0.96		
12/14/81	348	13:30	93.42	214/47.0	86.2	0.97		SHUTTER
12/15/81	349	10:00	113.92	262/48.7	107.0	1.01		SHUTTER
12/16/81	350	08:45	136.67	26.3	129.4	0.98		
12/16/81	350	11:00	138.92	24.9/48.3	130.8			SAMPLE NO. 3 NOT USED
12/17/81	351	13:00	164.42	25.2	153.9			
12/17/81	351	15:15	167.17	232/47.4	155.9			
12-18	352	15:30	191.42	22.5/47.3	180.8			
12-19-81	353	12:00	213.92	24.0/48.2	204.1			
12/21/81	355	9:15	257.17	10.0/48.2	242.7			
12/22/81	356	13:30	285.42	18.1/45.6	272.8			
12/23/81	357	14:00	303.92	20.6/46.2	297.8			
12/24/81	358	14:30	334.42	23.0/49.2	321.0			BLACK DISCOLORATION FORMING ON INSIDE OF OUT PUT LINE
12-25-81	360	13:00	330.92	3.5/49.4	366.7			
12/28/81	362	9:30	425.42	7.4/48.5	408.7			
12/29/81	363	13:45	453.67	21.8/47.7	435.4			
12/30/81	364	15:00	478.92	21.6/48.2	461.5			TURBID MUD
12/31/81	365	14:00	501.92	33.8/48.5	475.9			
1-2-82	367	13:15	549.17	13.0/49.0	511.4			
1/4/82	369	09:45	591.17	7.5/49.2	550.9			POWER FAILURE FROM 12:00 → 12:30
1/5/82	370	9:30	614.92	27.4	572.7			
1/6/82	371	10:00	639.42	11/48.7	600.0			
1/8/82	373	10:30	687.92	5.9/48.4	647.9			
1/9/82	374	9:45	711.17	24.1/48.6	672.2			
1/11/82	376	10:30	759.92	0.1/39.9	718.7			
1/12/82	377	16:00	789.42	10.8/32.3	747.8			

By DB Date 5-3-82 Subject EXXON Sheet No. 2 of 3
 hkd. By EL Date 5-3-82 Proj. No. RM81-4446L

LONG TERM PERMEABILITY TEST

BORING No	PH 9.0
SAMPLE NO	I 3
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	FLOW READING (CM ³)	Accum. Flow (CM ³)	CELL PR. 0.50 KG BACK PR. N.A. KG REMARKS
1-13-82	378	16:00	813.42	9.6/47.8	770.5	
1/15/82	380	14:00	859.42	11.9/44.7	816.4	
1/16/82	381	9:30	878.92	26.0/47.7	835.1	
1/18/82	383	10:30	927.92	11/47.7	881.7	
1/19/82	384	10:00	951.42	25.5	903.9	
1/20/82	385	14:30	979.92	3.2/49.1	926.2	
1/22/82	387	11:00	1024.42	7.3/48.3	968.0	
1-23-82	388	10:30	1047.92	24.2/48.4	992.1	
1/25/82	390	11:00	1096.42	3.6/48.7	1036.9	
1/26/82	391	11:30	1120.92	24.2/45.4	1061.4	SHUT DOWN 3'
2/16/82	412	17:30	1120.92	48.0	1061.4	RESTART
2/18/82	414	14:30	1165.92	3.0/48.4	1106.4	1100
2/19/82	415	12:00	1187.42	19.1	1136.2	0.662
2/20/82	416	10:00	1209.42	0.10.8/48.3	1156.1	A FLOW
2/22/82	418	13:30	1260.92	2.5/49.1	1201.9	RA-02
2/24/82	420	11:45	1307.17	5.6/50.2	1245.4	
2/26/82	422	11:30	1354.92	7.2/	1288.4	SHUT DOWN TO INSTALL VALVES
2/26/82	422	15:30	1354.92	49.0	1288.4	RESTART
2-27-82	423	11:30	1374.92	31.7/49.7	1305.7	
3/1/82	425	13:00	1424.42	1.8/49.2	1353.6	
3-3-82	427	11:30	1470.92	+10/	1412.8	STOPPED TO INSTALL 100ML BURET
3/3/82	427	14:30	1470.92	103.4	1412.8	RESTART
3/6/82	430	10:00	1538.42	33.6/49.8	1482.6	
3/8/82	432	10:30	1592.92	35.2/50.0	1547.2	
3/10/82	434	11:45	1636.17	18.0/77.4	1599.2	
3/12/82	436	11:30	1683.92	17.8/100.4	1658.8	
3/15/82	439	13:15	1757.67	11.2/80.2	1748.0	
3/17/82	441	11:00	1803.42	18.6/77.6	1809.6	
3/19/82	443	10:00	1850.42	16.0/100.6	1871.2	

By DR Date — Subject — Sheet No. 3 of 3
 .kd. By ER Date 5-3-22 EXXON Proj. No. RMBS-1095

Sheet No. 3 of 3

Proj. No. RM95-1091-3

LONG TERM PERMEABILITY TEST

BORING NO	PH 9
SAMPLE NO	I3
DEPTH	

[illegible]

By DB Date 12/10/81 Subject Sheet No. 1 of 2
 Chkd. By EZ Date 5-3-82 EXXON Proj. No. RMSI-444

LONG TERM PERMEABILITY TEST

BORING NO	PH 9.0
SAMPLE NO	I-4
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	ACCUM. TIME HOURS	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. KG BACK PR. KG REMARKS
12-10-81	344	16:05	0	49.1	0	START
12/11/81	345	9:05	17.0	32.6	16.5	0.97
12/11/81	345	16:15	24.17	25.3	23.8	1.01
12/12/81	346	13:30	45.42	4.5/48.9	44.3	0.96 DUMPED
12/14/81	348	10:30	90.42	2.5	90.7	1.03
12/14/81	348	13:30	93.42	0.0/47.2	92.8	1.03 SAMPLE =
12/15/81	349	10:00	113.92	24.7/47.7	116.4	1.10 SAMPLE =
12/16/81	350	08:45	136.67	23.6	140.5	1.06
12/16/81	350	11:00	138.92	21.0/47.2	143.1	↑ SAMPLE = 3
12/17/81	351	13:00	164.92	24.3/	164.0	FLOW
12/17/81	351	15:15	167.17	24.3/50.9	166.0	RATE =
12-18-81	352	15:30	191.42	42.7/51.0	174.2	TUBING PINCH
12-19-81	353	14:00	213.92	29.0/51.0	195.6	
12/21/81	355	9:15	257.17	10.7/47.1	235.4	
12/22/81	356	13:30	285.42	19.4/44.7	263.1	
12/23/81	357	14:00	309.92	22.4/47.6	285.7	
12/24/81	358	14:30	334.12	26.4/47.2	306.9	
12-26-81	360	13:00	380.72	4.4/41.8	349.2	
12/28/81	362	9:30	425.42	6.7/48.9	390.3	BLACK DISCOLORATION ON INSIDE OF OUTPUT LINE
12/29/81	363	13:45	453.67	24.1/47.8	415.1	
12/30/81	364	15:00	478.92	23.4/47.3	439.5	TUBING ABAND
12/31/81	365	14:00	501.92	35.0/48.6	451.8	
1-2-82	367	13:15	549.17	18.1/48.6	482.3	
1/4/82	369	9:45	591.17	15.0/49.2	515.9	POWER FAILURE FEELING 12:00 - 12:15
1/5/82	370	9:30	614.92	31.0	534.1	
1/6/82	371	10:00	639.42	7.5/48.3	557.6	
1/8/82	373	10:30	687.92	7.8/46.5	598.1	
1/9/82	374	9:45	711.17	25.4/46.0	618.7	
1/11/82	376	10:30	759.92	47.3/49.9	622.4	TUBING SLIPPER IN 3" GASKETS AND STOPPED FLOW
1/12/82	377	16:00	789.42	26.5/48.8	645.8	

FORMAL
LINE

By DB Date Subject Sheet No. 2 of 2
Chkd. By 52 Date 5-3-92 Exon Proj. No. RM81-4445

LONG TERM PERMEABILITY TEST

BORING NO	PH 9.0
SAMPLE NO	I-4
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	Flow Reading (CM ³)	Accum. Flow (CM ³)	CELL PR. 0.150 KG BACK PR. N.A. KG REMARKS
1-13-82	276	16 ⁰⁰	813.42	28.6/48.7	666.0	
1/15/82	380	14 ⁰⁰	859.42	10.2/47.5	704.5	
1/16/82	381	9:30	878.92	31.4/49.9	720.6	2C
1/18/82	383	10:30	927.92	10.9/48.3	759.6	
1/19/82	384	10:00	951.42	29.5	778.4	
1/20/82	385	14:30	979.92	9.3/47.9	798.6	
1/22/82	387	11:00	1024.42	10.6/46.4	835.9	
1-23-82	388	10:30	1071.92	27.2/49.6	855.1	
1/25/82	390	11:00	1096.42	9.6/48.2	895.1	
1/27/82	392	10:30	1143.92	18.2/49.7	925.1	
1/29/82	394	13:30	1194.92	11.9/47.8	962.9	
1/30/82	395	10:00	1215.42	28.0/48.3	982.7	
2/1/82	397	10:30	1263.92	5.4/50.2	1025.6	
2/16/82	412	17:30	1263.92	49.8	1025.6	RESTART
2/18/82	414	14:30	1308.92	10.2/51.0	1065.2	0.88
2/19/82	415	12:00	1330.42	26.8	1089.4	1/13
2/20/82	416	10:00	1352.42	10.4/49.2	1105.8	^ FLOW
2/22/82	418	13:30	1403.92	11.3/50.8	1143.7	2-1-1
2/24/82	420	14:45	1450.17	4.3/50.3	1180.2	
2/26/82	422	11:30	1497.92	15.0/	1215.5	SHUT DOWN TO INSTALL VALVES
2/26/82	422	15:30	1497.92	48.0	1215.5	RESTART
2-27-82	423	11:30	1517.92	34.7/47.7	1228.8	
3/1/82	425	13:00	1567.42	9.8/49.7	1268.7	
3-3-82	427	7:30	1611.92	3.9/	1314.5	Stopped at Fee

BORING NO	PH 3.0
SAMPLE NO	J-1
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	ACCUM. TIME HOURS	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. 0.50 KG BACK PR. NA KG REMARKS
12/15/81	344	16:55	0	19.0	0	START
12/11/81	345	09:05	17.0	32.4	16.6	0.98
12/11/81	345	16:15	24.17	25.3	23.7	0.95
12/12/81	346	13:30	45.42	41.6/49.7	44.4	0.97
12/14/81	348	10:30	90.42	2.8	91.3	1.04 mL/hr
12/14/81	348	13:30	93.42	0+0.3/47.3	94.4	1.02
12/15/81	349	10:00	113.92	24.6/43.5	117.1	1.11
12/16/81	350	05:45	136.67	24.0	141.6	1.08
12/16/81	350	11:00	138.92	21.3/47.6	144.3	1.07
12/17/81	351	12:00	164.92	27.2/-	154.7	
12/17/81	351	15:15	167.17	25.2/48.2	155.7	FLOW
12-18-81	352	15:30	191.42	24.0/49.2	186.9	REPAIRS
12-19-81	353	14:00	213.92	30.0/51.0	206.2	
12/21/81	355	9:15	257.17	14.2/49.2	242.6	INPUT TUBING SHOWS
12/22/81	356	13:30	285.42	23.0/48.2	268.8	SIGNAL OF INCOMPATIBILITY
12/23/81	357	14:00	307.92	21.4/49.2	289.9	(LIGHT YELLOW TO BROWN)
12/24/81	358	14:30	334.42	24.8/48.8	309.3	
12-25-81	360	12:00	330.42	10.0/40.0	347.5	
12/28/81	362	9:30	425.42	12.3/47.8	385.0	
12/29/81	363	13:45	453.67	25.1/48.7	407.7	
12/30/81	364	15:00	478.92	26.5/48.5	429.9	TUBING MOVED
12/31/81	365	14:00	501.92	33.7/49.0	444.5	
1-2-82	367	13:15	549.17	13.7/49.4	479.8	LIGHT BLACK CRYSTALS NOTICED
1/10/82	369	9:45	591.17	9.1/48.3	520.1	POWER FAILURE FROM 15:00 - 17:30
1/15/82	370	9:30	614.92	27.8	540.6	
1/16/82	371	10:00	639.42	6.0/48.9	568.4	
1/18/82	373	10:30	687.92	1.3/45.8	616	
1/19/82	374	9:45	711.17	24.8/45.7	640.0	
1/11/82	376	10:30	759.92	0.2/41.9	685.5	
1/12/82	377	16:00	789.42	12.1/31.2	715.3	

By DB Date Subject Sheet No. 27 of 3
 Chkd. By EL Date 5-3-82 Exon Proj. No. RM31-444-6C

LONG TERM PERMEABILITY TEST

BORING NO	PH 3.0
SAMPLE NO	J-1
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	ACCUM. TIME Hours	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. 0.150 KG BACK PR. 1.0 KG REMARKS
1/13/82	378	16:00	813.42	7.0/45.9	739.5	RUST COLORED FORMING
1/15/82	380	14:00	859.42	0.0/49.2	785.4	
1/16/82	381	9:30	878.92	23.1/41.7	811.5	
1/18/82	383	10:30	927.92	013.5/48.7	856.7	
1/14/82	384	10:00	951.42	25.1	880.3	
1/20/82	385	14:30	979.92	00+0.3/47.8	905.7	
1/22/82	387	11:00	1023.42	0.4/48.3	953.1	
1-23-82	388	10:30	1047.92	21.1/49.4	980.3	
1/25/82	390	11:00	1096.42	0+0.6/48.0	1030.3	PUMP SPEED CHANGE REDUCED FLOW RATE
1/27/82	392	10:30	1143.92	10.3/48.7	1068.0	SPEED RESET
1/29/82	394	13:30	1194.92	12/47.0	1115.5	
1/30/82	395	10:00	1215.42	23.0/45.6	1140.3	
2/1/82	397	10:30	1263.92	0+0.9/48.2	1191.9	
2/2/82	398	13:00	1290.42	13.7/49.3	1226.4	1.32
2/16/82	412	17:30	1290.42	49.5	1226.4	RESTART
2/18/82	414	14:30	1335.42	41.3/49.2	1271.6	1.004
2/19/82	415	12:00	1356.92	20.2	1299.6	1.33
2/20/82	416	10:00	1378.92	13/48.6	1318.5	FLOW
2/22/82	418	13:30	1430.42	51.8/50.3	1361.3	DATE
2/24/82	420	11:45	1476.67	18.8/50.0	1392.8	
2/26/82	422	11:30	1524.42	10.6/	1432.2	FLOW STOPPED TO INSTALL VALVE
2/26/82	422	15:30	1524.42	47.0	1432.2	RESTART
2-27-82	423	11:30	1549.42	30.5/49.7	1448.7	
3/1/82	425	13:00	1593.92	4.6/48.2	1493.8	
3-3-82	427	11:30	1640.42	4.7/	1546.7	STOPPED TO INSTALL 100ML BURET
3/3/82	427	14:30	1640.42	103.4	1546.7	RESTART
3/6/82	430	10:00	1707.92	37.8/49.8	1612.3	
3/8/82	432	16:30	1762.42	38.2/50.6	1673.9	
3/10/82	434	11:45	1805.67	20.8/51.0	1723.7	

BORING No	Ph 3.0
SAMPLE No	J 1
DEPTH	

[illegible]

DB Date 12/10/81 Subject _____ Sheet No. 1 of 3
 hkd. By EZ Date 4-30-82 Exxon Proj. No. RMS1-4446

LONG TERM PERMEABILITY TEST

Boring No.	PH C.O.
SAMPLE NO	J-2
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	FLOW READING (CM ³)	Accum. FLOW (CM ³)	CELL PR. 0.50 KG BACK PR. NA KG REMARKS
12-10-81	344	16:05	0	49.0	0	START
12/11/81	345	9:05	17	35.9	13.1	0.77
12/11/81	345	16:15	24.17	26.7	22.3	1.27
12/12/81	346	13:30	45.42	14.2/48.2	34.8	0.50 DUMPED
12/14/81	348	10:30	90.42	11.2	71.8	0.82
12/14/81	348	13:30	93.42	8.6/46.4	74.4	0.97 SAMPLE #1
12/15/81	349	10:00	113.92	28.2/50.0	92.6	0.89 SAMPLE #2
12/16/81	350	08:45	136.67	30.3	112.3	0.87
12/16/81	350	11:00	138.92	28.2/49.4	114.4	SAMPLE #3 NEW RECORD
12/17/81	351	13:00	164.92	28.0	135.8	↑
12/17/81	351	15:15	167.17	26.1/47.8	137.7	Flow
12-17-81	352	15:30	191.42	25.3/47.1	160.2	22.27
12-19-81	353	14:00	213.92	26.4/47.4	181.2	
12/21/81	355	9:15	257.17	10.3/47.1	220.7	
12/22/81	356	13:30	285.42	19.1/45.6	248.7	
12/23/81	357	14:00	309.92	22.4/47.3	271.7	INPUT TUBING SHOWS SIGN
12/24/81	358	14:30	334.42	26.2/49.5	292.8	OF DISCOLORATION (LIGHT BROWN)
12-26-81	360	12:20	330.42	7.6/49.5	334.7	TO LIGHT BROWN)
12/28/81	362	9:30	425.42	8.3/47.5	375.9	
12/29/81	363	13:45	453.67	22.7/49.2	400.7	
12/30/81	364	15:00	478.92	25.1/48.4	424.8	TIME WORE
12/31/81	365	14:00	501.92	34.7/48.5	438.3	
1-2-82	367	13:15	549.17	16.3/49.0	470.5	
1/4/81	369	9:45	591.17	12.9/48.7	507.5	ROCK FAILURE FROM 15:10 - 17:30
1/5/81	370	9:30	614.92	29.9	536.3	
1/6/82	371	10:00	639.42	4.5/48.7	551.7	
1/8/82	373	10:30	687.92	5.2/47.8	595.2	
1/9/82	374	9:45	711.17	25.4/46.0	617.4	
1/11/82	376	10:30	759.92	4.5/45.3	658.9	
1/12/82	377	10:00	789.42	18.8/38.6	685.4	

By DB Date Subject Sheet No. 2 of 3
 hkd. By E2 Date 4-30-82 Exxon Proj. No. RM81-4446

LONG TERM PERMEABILITY TEST

BORING NO	PH 6.0
SAMPLE NO	J-2
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	ACCUM. Time Hours	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. 0.50 KS BACK PR. NA KS REMARKS
1/13/82	378	16:00	813.42	10.0/49.2	707.4	
1/15/82	380	14:00	859.42	7.1/46.3	749.5	
1/16/82	381	9:30	878.92	28.8/49.6	767.0	
1/18/82	383	10:30	927.92	8.1/48.7	808.5	
1/19/82	384	10:00	951.42	26.0	831.2	PULL TUBING
1/20/82	385	14:30	979.92	25.6/48.4	831.6	
1/22/82	387	11:00	1023.42	0.7/46.2	887.5	OVERFLOW
1-23-82	388	10:30	1047.92	15.7/48.4	918.0	
1/25/82	390	11:00	1096.42	0+8.0/48.3	974.4	PUMP SPEED CHANGED REASON UNKNOWN
1/27/82	392	10:30	1143.92	7.4/47.6	1015.8	SPEED RESET
1/29/82	394	13:30	1194.92	0+4.3/48.2	1067.7	YELLOWISH BROWN COLOR (OXIDATION)
1/30/82	395	10:00	1215.42	21.3/41.2	1094.6	FORMING INSIDE BURST
2/1/82	397	10:30	1263.92	0+7.9/47.5	1142.8	
2/2/82	398	13:00	1290.42	10.1/48.7	1180.2	1.41
2-3-82	400	15:00	1340.42	17.8/49.2	1211.0	
2-6-82	402	11:30	1384.92	13.6/50.2	1246.6	
2-8-82	404	14:15	1435.67	9.7/48.3	1287.4	
2/10/82	406	15:30	1484.92	4.6/46.2	1331.1	
2/12/82	408	11:30	1528.92	7.5/48.3	1369.8	
2-13-82	409	11:25	1552.84	21.8/50.0	1396.3	
2/15/82	411	10:30	1599.92	0+5.9/48.2	1451.9	
2/16/82	412	9:00	1622.42	22.2/	1477.9	
2-16-82	412	17:30	1622.42	51.0	1477.9	RESTART
2/18/82	414	14:30	1667.42	10.9/49.1	1518.0	0.891
2/19/82	415	12:00	1688.92	24.3	1542.8	1.18
2/20/82	416	10:00	1710.92	7.9/49.2	1559.2	
2/22/82	418	13:30	1762.42	11.7/50.7	1596.9	
2/24/82	420	11:45	1808.67	14.7/49.8	1633.4	
2/26/82	422	11:30	1856.42	15.5/	1667.7	SHUT DOWN TO INSTALL GAGE

By DB Date Subject Sheet No. 3 of 3
 Chkd. By EZ Date 4-30-82 Proj. No. Rm 3-4-82

LONG TERM PERMEABILITY TEST

BORING No	
SAMPLE No	J2
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	FLOW READING (CM ³)	Accum. FLOW (CM ³)	REMARKS
2/26/82	422	15:30	1856.42	49.8	1667.7	RESTART
2/27/82	423	11:30	1876.42	35.8/50.1	1681.7	
3/1/82	425	13:00	1925.92	10.5/49.7	1721.3	
3-3-82	427	11:30	1972.42	23/	1768.7	STOPPED TO INSTALL 100ML BURET
3/3/82	427	14:30	1972.42	104.0	1768.7	RESTART
3/6/82	430	10:00	2039.92	45.3/99.8	1827.4	
3/8/82	432	16:30	2094.42	45.8/99.6	1881.4	
3/10/82	434	11:45	2137.67	26.0/85.8	1925.0	
3/12/82	436	11:30	2185.42	55.8/99.3	1975.2	
3/15/82	439	13:15	2259.17	25.7/90.4	2049.8	
3/17/82	441	11:00	2304.92	28.4/87.8	2101.8	
3/19/82	443	10:00	2351.92	36.2/99.2	2153.4	
3/22/82	446	13:00	2426.92	17.7/79.6	2235.5	1.09 TUBING MOVED
3/24/82	448	11:45	2473.67	47.2/98.6	2267.9	0.69
3/26/82	450	13:30	2523.42	63.0/99.9	2303.5	
3/30/82	454	13:30	2619.42	47.0/56.2	2355.4	
3/31/82	455	13:30	2643.42	40.4/99.3	2371.3	
4/1/82	456	13:30	2667.42	34.4	2386.2	
4/2/82	457	11:45	2689.67	70.8/100.1	2399.8	
4/5/82	460	12:00	2761.92	51.8/66.6	2448.1	
4/7/82	462	14:30	2812.42	32.4/93.2	2482.3	
4/9/82	464	11:00	2856.92	64.4/100.0	2511.1	
4/12/82	467	16:00	2933.92	46.1/62.2	2565.0	
4-14-82	469	9:30	2975.42	38.2/99.2	2594.4	
4/16/82	471	9:30	3023.42	67.6/100.0		
4-17-82	474	10:00	3095.92	57.2		

by DB Date 12/10/31 Subject _____ Sheet No. 1 of 3
 hkd. By EZ Date 5-3-22 EXXON Proj. No. RM8144UG

LONG TERM PERMEABILITY TEST

Boring No.	P/H 9.0
SAMPLE NO	J-3
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	Flow Reading (CM ²)	Accum. Flow (CM ²)	CELL PR. O.150 KG BACK PR. NA KS REMARKS
12-10-81	344	16:05	0	49.9	0	START
12/11/81	345	9:05	17	33.6	16.3	0.96
12/11/81	345	16:15	24.17	26.7	23.2	0.95
12/12/81	346	13:30	45.42	65/49.4	43.4	0.95 DUNE 1400
12/14/81	348	10:30	90.42	3.4	89.4	1.02
12/14/81	345	13:30	93.42	0.2/47.0	92.6	1.07 SANDWICH #1
12/15/81	349	10:00	113.92	24.7/47.5	114.9	1.09 SANDWICH #2
12/16/81	350	08:45	136.167	23.5	135.9	1.05
12/16/81	350	11:00	138.92	21.0/46.5	141.4	↑ SANDWICH #3
12/17/81	351	13:00	164.92	28.7	159.5	
12/17/81	351	15:30	167.42	27.1/48.6	161.1	
12-18-81	352	15:30	191.42	28.5/47.7	180.9	↓ DUNE
12-19-81	353	14:00	213.92	20.5/51.0	199.3	↓ DUNE
12/21/81	355	9:15	257.17	15.3/48.1	234.0	
12/22/81	356	13:30	285.42	23.3/48.7	258.8	
12/23/81	357	14:00	309.92	25.5/48.1	279.0	
12/24/81	358	14:30	334.42	29.5/49.1	297.6	
12-26-81	360	12:30	350.42	12.1/49.8	334.16	
12/28/81	362	9:30	425.42	13.2/48.3	371.2	OUT PUT TUBING SHOW DISCOLORATION
12/29/81	363	13:45	453.67	26.3/49.3	393.2	
12/30/81	364	15:00	478.92	27.8/48.7	414.7	TUBING MOVED
12/31/81	365	14:00	501.92	32.2/49.3	431.2	
1-2-82	367	13:15	549.17	7.5/48.1	473.0	
1/4/82	369	09:45	591.17	0.9/48.0	520.2	POWER FAILURE FROM 15:00 - 17:30
1/5/82	370	9:30	614.92	23.2	545.0	TUBING MOVED TO THE TOWER
1/5/82	370	15:20	620.92	16.2/40.7	552.0	
1/6/82	371	10:00	639.42	21.0/48.8	571.7	
1/8/82	373	10:30	687.92	4.5/48.8	616.0	
1/9/82	374	9:45	711.17	25.5/45.8	637.0	
1/11/82	376	10:30	759.92	1.8/45.5	641.0	

OUT PUT TUBING SHOWS BLACK
DISCOLORATION

By DB Date Subject Sheet No. of hkd. By EZ Date 5-3-82 Exxon Proj. No. 591-4446

LONG TERM PERMEABILITY TEST

BORING No	PH 9.0
SAMPLE No	J 3
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	ACCUM. TIME Hours	FLOW READING (CM ²)	ACCUM. FLOW (CM ²)	CELL PR. 0.50 KG BACK PR. NA KG REMARKS
1/12/82	377	16:00	789.42	18.9/38.2	707.6	
1/13/82	378	16:00	813.42	16.2/48.7	729.6	
1/15/82	380	14:00	859.42	6.5/47.0	771.8	
1/16/82	381	9:30	878.92	21.5/48.4	789.3	
1/18/82	383	10:30	927.92	7.3/49.1	830.9	
1/19/82	384	10:00	951.42	27.3	852.7	
1/20/82	385	14:30	979.92	1.6/49.2	878.4	
1/22/82	387	11:00	1024.42	1.1/49.3	926.5	
1-23-82	388	10:30	1047.92	21.7/48.4	954.1	
1/25/82	390	11:00	1096.42	22.5/48.3	1005.0	PUMP SPEED CHANGED REASON UNKNOWN
1/27/82	392	10:30	1143.92	10.4/50.0	1043.4	SPEED RESET
1/29/82	394	13:30	1194.92	1.8/47.0	1091.6	
1/30/82	395	10:00	1215.42	21.8/44.6	1116.8	
2/1/82	397	10:30	1263.92	25.0/47.9	1169.4	
2/2/82	398	13:00	1290.42	12.0/47.6	1205.3	1.35
2/16/82	412	17:30	1290.42	49.3	1205.3	RESTART
2/18/82	414	14:30	1335.42	3.5/49.6	1251.10	1.02
2/19/82	415	12:00	1356.92	21.0	1279.7	1.33
2/20/82	416	10:00	1378.92	11.9/49.0	1298.8	
2/22/82	418	13:30	1430.42	5.3/49.3	1342.5	
2/24/84	420	11:54	1476.82	7.2/49.2	1384.6	
2/26/82	422	11:30	1524.42	5.2/	1425.6	SHUT DOWN TO INITIAL VALUE
2/26/82	422	15:30	1524.42	49.4	1425.6	RESTART
2-27-82	423	11:38	1544.42	32.0/49.9	1443.0	
3-1-82	425	13:00	1593.92	31.8/49.0	1489.1	
3-3-82	427	11:30	1640.42	45.3/	1543.9	STOPPED TO INITIAL FORM BURET
3/3/82	427	14:30	1640.42	103.6	1543.9	RESTART
3/6/82	430	10:00	1707.92	35.3/100	1612.2	
3/8/82	432	16:30	1762.42	37.3/10.4	1674.9	

By DB Date Subject Sheet No. 3 of 3
Chkd. By EL Date 5-2-82 Exxow Proj. No. RM182-1045

LONG TERM PERMEABILITY TEST

BORING NO	PH 9
SAMPLE NO	J3
DEPTH	

[illegible]

By DB Date Subject Sheet No. of
 Chkd. By EC Date 4-30-82 EXXON Proj. No. RTAI-100

LONG TERM PERMEABILITY TEST

BORING No	PH 4.0
SAMPLE No	J-4
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	ACCUM. TIME HOURS	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. DISO KG BACK PR. NA KG REMARKS
12-10-81	344	16:05	0	50.0	0	START
12/11/81	345	09:05	17	36.6	13.4	0.79
12/11/81	345	16:45	24.67	30.9	19.1	0.79
12/12/81	346	13:30	45.42	14.7/49.4	35.3	0.76 OUT PUT
12/14/81	348	10:30	90.42	12.2	72.5	0.83
12/14/81	348	13:30	93.42	9.7/45.1	75.0	0.83 SAMPLE #1
12/15/81	349	10:00	113.92	26.7/49.5	93.4	0.90 SAMPLE #2
12/16/81	350	08:45	136.67	30.0	112.9	0.86
12/16/81	350	11:00	138.92	27.9/49.5	115.0	SAMPLE #3
12/17/81	351	13:00	164.92	28.5/	125.9	
12/17/81	351	15:30	167.42	26.7/48.2	137.7	
12-18-81	352	15:30	191.42	26.7/49.0	159.2	Flow Rate
12-19-81	353	14:00	213.92	27.5/50.0	179.0	
12/21/81	355	9:15	257.17	12.7/48.0	216.3	
12/22/81	356	13:30	285.42	21.7/47.3	242.6	
12/23/81	357	14:00	309.92	25.5/48.8	264.4	OUT PUT TUBING SHUT DRAIN DISCHARGE FORMING
12/24/81	358	14:30	334.42	25.7/49.0	284.5	
12-26-81	360	12:30	350.42	9.0/49.9	324.5	
12/28/81	362	9:30	425.42	10.8/47.4	363.6	
12/29/81	363	13:45	453.67	23.7/48.8	387.3	
12/30/81	364	15:00	478.92	25.7/48.7	410.4	TUBING NOISE
12/31/81	365	14:00	501.92	37.9/48.8	421.5	
1-2-82	367	13:15	549.17	24.5/49.4	445.8	
1/4/82	369	09:45	591.17	21.7/48.4	473.5	POWER FAILURE FROM 15:00 — 17:50
1/5/82	370	9:30	614.92	34.5	487.4	
1/6/82	371	10:00	639.42	15.5/48.6	506.4	
1/8/82	373	10:30	687.92	16.2/49.0	538.8	
1/9/82	374	11:45	711.17	32.9/48.7	555.8	
1/11/82	376	10:30	759.92	17.9/49.1	586.7	
1/12/82	377	16:00	789.42	29.3/49.3	606.5	

By DB Date Subject Sheet No. 2 of 3
 hkd. By EE Date 4-30-82 EXXON Proj. No. PM31-4446L

LONG TERM PERMEABILITY TEST

BORING NO	PH 9.0
SAMPLE NO	J4
DEPTH	—

DATE	DAY OF YEAR	TIME (Hours)	ACCUM. Time Hours	FLOW READING (CM ²)	ACCUM. FLOW (CM ²)	CELL PR. 0.150 KG BACK PR. N.A. KG REMARKS
1/13/82	378	16:00	813.42	32.6/47.7	623.2	
1/15/82	380	14:00	859.42	16.2/49.3	654.7	
1/16/82	381	9:30	878.92	36.4/50.1	667.6	
1/18/82	383	10:30	927.92	19.0/48.8	698.7	
1/19/82	384	10:00	951.42	33.5	714.0	
1/20/82	385	14:30	979.92	12.3/48.9	735.2	
1/22/82	387	11:00	1024.42	9.4/49.2	774.5	
1-23-82	388	10:30	1047.92	26.4/48.6	797.3	
1/25/82	390	11:00	1096.42	7.4/47.8	838.5	PUMP SPEED CHANGED REASON UNKNOWN
1/27/82	392	10:30	1143.92	16.8/48.7	869.5	SPEED RESET
1/29/82	394	13:30	1194.92	9.7/48.1	908.5	
1/30/82	395	10:00	1215.42	27.3/47.1	929.3	
2/1/82	397	10:30	1263.92	0+6.0/50.5	982.4	36
2/2/82	398	13:00	1290.42	13.8/47.5	1019.1	1.91
2-4-82	400	15:00	1340.42	17.3/48.7	1049.3	
2-6-82	402	11:30	1384.92	13.9/49.4	1084.2	
2-8-82	404	14:15	1435.67	9.4/49.0	1124.2	
2/10/82	406	15:30	1484.92	4.4/45.0	1168.8	
2/12/82	408	11:30	1528.92	7.9/47.9	1205.9	
2-13-82	409	11:25	1552.82	22.3/48.9	1231.5	
2/15/82	411	10:30	1599.92	0+6.0/48.2	1286.4	
2/17/82	413	12:30	1599.92	50.2	1286.4	RESTART
2/18/82	414	14:30	1644.92	8.3/50.3	1328.3	0.931
2/19/82	415	12:00	1666.42	21.5	1357.6	1.355
2/20/82	416	10:00	1688.42	2.1/48.6	1377.0	1
2/22/82	418	13:30	1739.92	4.0/50.0	1421.6	
2/24/82	420	11:45	1786.17	6.1/50.2	1464.7	
2/26/82	422	11:30	1833.92	8.2/—	1506.7	SHUT DOWN VALVE
2/26/82	422	15:30	1833.92	48.9	1506.7	RESTART

By DB Date Subject Sheet No. 3 of 3
Chkd. By EZ Date 4-30-12 Proj. No. LM-1-2005

LONG TERM PERMEABILITY TEST

BORING NO	
SAMPLE NO	J4
DEPTH	

[illegible]

By DE Date 12/10/81 Subject Sheet No. 1 of 3
 hkd. By E2 Date 4-28-82 Exxon Proj. No. RM81-4443

CELL = 3.99
 BACK = 2.79
 LONG TERM PERMEABILITY TEST

Boring No.	PH 3.0
SAMPLE NO	K-1
DEPTH	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	FLOW READING (CM ³)	Accum. FLOW (CM ³)	CELL PR. 4.00 KG BACK PR. 3.00 KG REMARKS
12/10/81	344	16:05	0	49.3	0	START
12/11/81	345	09:05	17.0	43.2	6.1	0.36
12/11/81	345	16:15	24.17	40.3	9.0	0.40
12/12/81	346	13:30	45.42	32.6 48.5	16.7	0.36 SAMPLE
12/14/81	348	10:30	90.42	29.4	35.8	0.42
12/15/81	349	10:00	113.92	18.8 45.5	46.4	0.44 SAMPLE
12/16/81	350	08:45	136.67	34.1	57.8	0.50
12/16/81	350	11:00	138.92	33.4 49.1	58.5	SAMPLE
12/17/81	351	13:00	164.92	35.1	72.5	0.52
12-18-81	352	15:30	191.42	20.3 49.3	87.3	↑
12-19-81	353	14:00	213.92	34.8 49.7	93.8	FLOW RATE
12/21/81	355	9:15	257.17	25.7	122.8	
12/22/81	356	13:30	285.42	9.2 48.1	139.3	
12/23/81	357	14:00	309.92	34.2	153.2	
12/24/81	358	14:30	334.42	19.7 47.2	167.7	BLACK DISCOLORATION FORMING ON INSIDE OF OUT PUT LINE
12-26-81	360	12:30	380.42	20.4 49.3	194.5	
12/28/81	362	9:30	425.42	20.7 46.3	223.1	
12/30/81	364	15:45	479.67	14.0	255.4	
12/31/81	365	14:00	501.92	0.3 48.9	269.1	
1-2-82	367	13:15	549.17	20.7 49.3	297.8	
1/4/82	369	9:45	593.67	19.7 48.5	327.4	
1/5/82	370	9:30	617.42	32.7	343.0	
1/6/82	371	9:45	641.67	16.2 49.8	359.7	
1/8/82	373	10:30	690.42	19.0 47.5	390.5	
1/9/82	374	9:45	713.67	31.7 48.5	406.1	BACK PRESSURE OFF DURING WEEKEND DURATION UNKNOWN
1/11/82	376	10:30	762.42	33.2 46.7	421.4	
1/13/82	378	16:00	815.92	12.6 49.2	454.5	
1/15/82	380	14:00	861.92	16.4 49.5	485.3	
1/16/82	381	9:30	881.42	37.4 49.1	497.4	
1/18/82	383	10:30	930.42	17.3 49.4	529.2	

By DB Date Subject Sheet No. 2 of
 Chkd. By EZ Date 4-30-82 EXXON Proj. No. RM151-444

LONG TERM PERMEABILITY TEST

BORING NO	PH 3.0
SAMPLE NO	K-1
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	ACCUM. TIME HOURS	FLOW READING (CM ²)	ACCUM. FLOW (CM ²)	CELL PR. 4.00 KG BACK PR. 3.00 KG REMARKS
1/20/82	385	14:30	982.42	15.7/49.7	562.9	20
1/22/82	387	11:00	1026.92	19.9/48.3	592.7	
1-23-82	388	10:30	1050.42	33.7/49.7	607.3	
1/25/82	390	11:00	1098.92	18.4/48.9	638.4	
1/27/82	392	10:30	1146.42	20.3/49.8	667.0	
1/29/82	394	13:30	1197.42	27.3/48.8	689.5	
1/30/82	395	10:00	1217.92	35.3/49.6	703.0	
2/1/82	397	10:30	1266.42	16.7/49.2	735.9	
2-4-82	400	15:00	1342.92	0.3/49.4	784.8	
2-6-82	402	11:30	1387.42	21.7/49.6	813.4	
2-8-82	404	14:15	1438.17	17.2/48.0	845.8	
2/12/82	408	11:30	1531.42	0+1.0/48.9	894.8	
2/15/82	411	10:30	1602.42	4.2/49.0	939.5	
2/16/82	412	9:00	1624.92	33.9/	954.6	SHUT DOWN - PROBLEMS
2/16/82	412	10:30				START UP AGAIN
2/16/82	412	17:30	1624.92	52.5	954.6	
2/19/82	414	14:30	1669.92	22.7/49.7	954.4	0.662
2/19/82	415	12:00	1691.42	35.2	973.9	0.674
2/20/82	416	10:00	1713.42	21.3/49.6	1012.8	^
2/22/82	418	13:30	1764.92	16.3/49.2	1046.1	FLOW
2/24/82	420	11:45	1811.17	20.4/50.0	1074.7	RATES
2/26/82	422	11:30	1858.92	21.0/49.0	1103.7	
2-27-82	423	11:30	1882.42	33.7/49.7	1119.0	
3/1/82	425	13:00	1932.42	21.6/49.8	1147.10	
3-3-82	427	11:30	1978.92	20.7	1176.20	STOPPED (INSTALLED) 100ML BURET
3/3/82	427	14:30	1978.92	103.4	1176.20	RESTART
3/6/82	430	10:00	2046.42	56.4/99.8	1223.2	
3/10/82	434	11:45	2144.17	38.6/98.0	1284.4	
3/15/82	439	13:15	2265.67	25.2/10.2	1357.2	
3/17/82	441	11:00	2311.42	42.2/100.6	1385.2	25 = 0.62

3

BORING NO	
SAMPLE NO	K 1
DEPTH	

Flow
rates

DB Date 12/10/81 Subject _____ Sheet No. 1 of 3
 Chkd. By EZ Date 4-22-82 EXYON Proj. No. RM181-44-46

LONG TERM PERMEABILITY TEST

Boring No	PH 9.0
Sample No	A-2
Depth	

DATE	DAY OF YEAR	TIME (Hours)	Accum. Time Hours	Flow Reading (cm ³)	Accum. Flow (cm ³)	CELL PR. 4.00 KG BACK PR. 3.00 KG REMARKS
12/10/81	344	16:05	0	48.7	0	START
12/11/81	345	9:05	17	42.5	6.2	0.36
12/11/81	345	16:15	24.17	29.7	9.0	0.38
12/12/81	346	13:20	45.42	32.7/49.4	16.0	0.33 DUMPED
12/14/81	348	10:30	90.42	32.3	33.1	0.38 ml/hr
12/15/81	349	10:00	113.92	23.8/48.8	41.6	0.36 SAMPLE-1
12/16/81	350	08:45	136.67	39.3	51.1	0.42
12/16/81	350	11:00	138.92	38.7/49.3	51.7	SAMPLE-2
12/17/81	351	13:00	164.92	37.6	63.4	0.45
12-18-81	352	15:30	191.42	25.1/47.3	75.4	NO FLOW
12-19-81	353	14:00	213.92	37.7/49.7	85.0	12-25
12/21/81	355	9:15	257.17	29.7	105.0	
12/22/81	356	13:30	285.42	15.1/45.8	119.6	
12/23/81	357	14:00	309.92	36.9	131.5	
12/24/81	358	14:30	334.42	24.9/48.2	143.5	BLANK DISCOLORATION FORMING INSIDE OF OUTPUT LINE
12-26-81	360	12:30	380.42	25.6/47.8	166.1	
12/28/81	362	9:30	425.42	25.2/49.1	190.7	
12/30/81	364	15:45	479.67	20.7	219.1	
12/31/81	365	14:00	501.92	8.6/48.8	231.2	
1-2-82	367	13:15	549.17	23.2/49.6	256.7	
1/4/82	369	9:45	593.67	22.6/48.8	283.7	
1/5/82	370	9:30	617.42	34.7	297.3	
1/6/82	371	9:45	641.67	—	—	
1/6/82	371	10:00	641.92	19.2/49.0	312.8	
1/8/82	373	10:30	690.42	20.4/47.8	341.4	
1/9/82	374	9:45	713.67	33.7/49.3	355.7	BACK PRESSURE OFF
1/11/82	376	10:30	762.42	35.7/49.6	369.3	DURATION UNKNOWN
1/13/82	378	16:00	815.92	17.6/49.3	401.3	
1/15/82	380	14:00	861.92	19.8/49.0	430.8	
1/16/82	381	9:30	881.42	38.4/49.7	441.4	

By DB Date Subject Sheet No. 2 of 3
 Inkd. By E2 Date 4-27-82 EXXON Proj. No. RM81-4446

LONG TERM PERMEABILITY TEST

BORING NO	PH 9.0
SAMPLE NO	K 2
DEPTH	

DATE	DAY OF YEAR	TIME (HOURS)	ACCUM. TIME HOURS	FLOW READING (CM ³)	ACCUM. FLOW (CM ³)	CELL PR. 4.00 KS BACK PR. 3.00 KS REMARKS
1/18/82	383	10:30	930.42	17.9/48.6	473.2	
1/20/82	385	14:30	982.42	16.2/49.7	505.6	
1/22/82	387	11:00	1026.92	19.5/48.1	535.8	
1-23-82	388	10:30	1050.42	33.9/49.4	550.0	
1/25/82	390	11:00	1098.92	17.8/48.6	581.6	
1/27/82	392	10:30	1146.42	20.2/48.6	610.0	
1/29/82	394	13:30	1197.42	25.5/46.7	633.1	
1/30/82	395	10:00	1217.92	32.8/49.3	647.0	
2/1/82	397	10:30	1266.42	15.9/50.2	680.4	
2-4-82	400	15:00	1342.92	9/49.4	730.6	
2-6-82	402	11:30	1387.42	19.3/50.0	760.7	
2-8-82	404	14:15	1438.17	16.5/48.2	794.2	
2/12/82	408	11:30	1531.42	21.3/49.0	845.9	
2/15/82	411	10:30	1602.42	9.7/48.9	894.2	
2/16/82	412	9:00	1624.92	31.3/	911.8	SHUT DOWN
2/16/82	412	17:30	1624.92	46.2	911.8	RESTART
2/18/82	414	14:30	1669.92	15.3/49.8	942.7	0.687
2/19/82	415	12:00	1691.42	35.6	956.9	0.660
2/20/82	416	10:00	1713.42	21.2/49.6	971.3	↑
2/22/82	418	13:30	1764.92	24.4/49.4	996.5	FLOW
2/24/82	420	11:45	1811.17	26.3/50.2	1019.6	RATES
2/26/82	422	11:30	1858.92	21.3/48.9	1048.5	
2-27-82	423	11:30	1882.92	33.1/49.6	1064.3	
3/1/82	425	13:00	1932.42	20.6/49.7	1093.3	
3-3-82	427	11:30	1978.92	19.5/	1123.5	STOPPED TO INSTALL 100ML BURET
3/3/82	427	14:30	1978.92	102.6	1123.5	RESTART
3/6/82	430	10:00	2046.42	55.0/49.8	1171.1	
3/10/82	434	11:45	2144.17	37.0/97.2	1233.9	0.62
3/15/82	439	13:15	2265.67	21.8/70.1	1309.3	

[illegible][illegible][illegible][illegible]

COLUMN TEST EFFLUENT CHEMISTRY MONITORING DATA

The following data sheets present the effluent chemistry monitoring data of the ten column tests discussed in Appendix F. Column testing procedures and test conditions are presented in Appendix F. Analytical testing methods are presented in Appendix D. Samples used for sulfate analysis dated from December 14, 1981 through January 6, 1982 were inadvertently not stablized with iodine to prevent thiosulfate oxidation.

By AT Date 1/1/82 Subject SUMMARY
Chkd. By LL Date 1/1/82

Sheet No. 20 of 30
Proj. No. RM 81-444
0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

SAMPLE No.	DATE	Q _E /P _V	EH (mV)	pH	ACIDITY-ALKALINITY (mg/l CaCO ₃)	SODIUM CONCENTRATION (mg/l Na)	Cl ⁻ (mg/l)	SO ₄ ⁻² (mg/l)	TOTAL SULFATE (mg/l SO ₄)	PERMEANT pH		COLUMN No.	
										As (mg/l)	Fe (mg/l)	Zn (mg/l)	F ⁻ (mg/l)
1	12-14		+ 491	6.69	290	2500	16						
2	12-15		+ 412	7.00		4890	54	2600					
3	12-16		+ 327	6.38	280	4900	73	3200	3700				
4	12-17		+ 340	6.20		5460	95	3200	4000	0.002			
5	12-18		+ 375	6.05		5340	110	4100	3900				
6	12-19		+ 260	5.95		5830	100	3600	850				
7	12-21		+ 435	5.95		6360	130/120	4200	4800				
8	12-22		+ 340	5.90	630	6380	120	3800	4200				
9	12-23		+ 310	6.10		6220	90	4200		10.001			
10	12-24		+ 287	5.85		6700	90	4100	5200				
11	12-26		+ 258	5.95	410	6470	130	5400	6000				
12	12-28		+ 262	6.01		6520	110/130/140	5700		10.001	200	120	
13	12-29		+ 230	6.09		6510	130	5900					
14	12-30		+ 261	6.21	310	6640	130	5900	6300				
15	12-31		+ 273	7.10		6660	190	6100					
16	1-2		+ 211	5.79		6100	130	6100		10.001	390	150	
17	1-4		+ 231	6.10	410	6500	130	6200	7600				
18	1-6		+ 184	5.75		6710	130	6300		10.001	470	190	
19	1-8		+ 211	6.25	400	7340	140	5900					
20	1-9		+ 265	5.65		7340		6100					
21	1-11		+ 271	5.71	380	7660		6600	7100				
22	1-12		+ 279	5.63		7770		6300					
23	1-13		+ 253	5.71		7780		6400					
24	1-15		+ 281	5.62		7820		6500		0.020	690	320	
25	1-16		+ 282	5.66	430	7900		6800					

0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

191181-444-154

[illegible]

COLUMN TEST MONITORING DATA

EXXON RM82-1095 AL

PERMEANT pH	3.0
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Column No. I - 1

[illegible]

0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

PERMEANT pH		C.O.D	
COLUMN No.		I-Z	
As (mg/l)	Fe (mg/l)	Zn (mg/l)	F ⁻ (mg/l)
10.001			
		1.54	
10.001			
10.001	5.1	0.54	
10.001	3.3	0.46	
0.001	5.5	0.37	
10.001	55	0.38	

SO₄ VALUE RETURN

By AT Date 1/7/92 Subject Summary Sheet No. 4 of 20
Chkd. By KE Date 2/15/92 Proj. No. RM 81-494
0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

SAMPLE No.	DATE	Q _E /P _V	Eh (mV)	pH	ACIDITY- ATTENUATION (mg/l CaCO ₃)	SODIUM CONCENTRATION (mg/l Na)	Cl ⁻ (mg/l)	SO ₄ ⁻² (mg/l)	TOTAL SULFATE (mg/l SO ₄)	PERMEANT pH		COLUMN No.	
										As	Fe	Zn	F ⁻
26	1-18		+ 186	6.59	170	6820		5600	6500				
27	1-20		+ 221	6.53		6860		5600		0.001	73	0.22	
28	1-22		+ 203	6.46	180	6880		6450					
29	1-23		+ 211	6.51		6960						0.23	
30	1-25		+ 191	6.41	180	6930				10.001	97		
31	1-27		+ 183	6.32		7010		6900					
32	1-29		+ 176	6.37		7150							
33	1-30		+ 198	6.27		7200							
34	2-1		+ 226	6.11		6360							
35	2-2		+ 212	6.07		6540		6600					
36	2-4		+ 261	6.09	200/610 ⁽²⁾	6610							
37	2-6		+ 247	6.11		6720							
38	2-8		+ 229	6.07		6690							
39	2-10		+ 267	5.99		6690							
40	2-12		+ 279	6.13		6730							
41	2-13		+ 243	6.09		6870							
42	2-15		+ 271	5.98		6850							

COLUMN TEST MONITORING DATA

EXXON RM82-1095 AL

PERMEANT pH	6.0
COLUMN NO.	I-2

[illegible]

By AT Date 1/7/02 Subject SUMMARY Sheet No. 5 of 20
 Chkd. By JF Date 1/16/02 Proj. No. RM81-444
 0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

PERMEANT pH		9.0	
COLUMN No.		I-3	
As (mg/l)	Fe (mg/l)	Zn (mg/l)	F ⁻ (mg/l)
0.002			
0.004			
0.001	2.0	0.37	
0.001	2.0	0.27	
0.001	2.3	1.39	
			0.20
0.001	1.5	0.06	

COLUMN TEST MONITORING DATA SUMMARY

[illegible]

By AT Date 1/7/82 Subject Summary
Chkd. By KG Date 3/16/82 EX-02

Sheet No. 7 of 20
Proj. No. RM 81-444-

0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

										PERMEANT PH		7.0	
										COLUMN No.		I-4	
SAMPLE No.	DATE	Q _E /P _V	E _H (mV)	pH	ACTIVITY ALKALINITY (mg/l CaCO ₃)	SPECIFIC CONCENTRATIONS (mg/l CaCO ₃)	Cl ⁻ (mg/l)	SO ₄ ⁻² (mg/l)	TOTAL SULFUR (mg/l SO ₄)	As (mg/l)	Fe (mg/l)	Zn (mg/l)	F ⁻ (mg/l)
1	12-14		+471	6.92		870	16						
2	12-15		+453	7.46		1300	44	500	1700				
3	12-16		+341	6.83	210	2600	140	600					
4	12-17		+411	7.20		3150	100	600/11 650					
5	12-18		+416	7.45		3220	75	600	1900				
6	12-19		+274	6.60		3620	180	1100/11 1800					
7	12-21		+472	6.55	190	3770	180	4800					0.07
8	12-22		+272	6.80	230	4200	210	1400/11 1800	3100				
9	12-23		+233	7.00		4420	220	2400				0.48	
10	12-24		+256	6.85		4040	290	2800/11 3200					
11	12-26		+194	6.80		4110	320	3800	3900				
12	12-28		+207	6.59		3980	300	3700					0.04
13	12-29		+212	6.71		4070	330	3600		10.001		0.93	
14	12-30		+207	6.81	260	4310	340	3900					
15	12-31		+183	7.40		4120	320	4100	4000				
16	1-2		+211	7.16	380	6500	340	4300					
17	1-4		+183	6.90		6400	300	4400					0.10
18	1-6		+192	7.35		6600	300	4700		0.001	3.4	1.21	
19	1-8		+211	7.14		4860	350	3500					0.09
20	1-9		+194	7.20		4700		3600					
21	1-11		+199	7.16		5000		3700	4300				
22	1-12		+186	7.04		4980		3800					
23	1-13		+181	7.11	400	5150		3800					
24	1-15		+192	7.21		5220		3800					
25	1-16		+208	7.18		5110		3900					

WXXX

0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

[illegible]

EXXON RM82-1095 AL

[illegible]

Y AT Date 1/7/82 Subject Summary
Chkd. By SOT Date 3/5/82 EXCISE

Sheet No. 9 of 20
Proj. No. RM81-444-
0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

SAMPLE No.	DATE	RE/PV	Eh (mV)	pH	ACIDITY- ALKALINITY (mg/l CaCO ₃)	SPECIFIC CONDUCTANCE (microhm/cm)	Cl ⁻ (mg/l)	SO ₄ ⁻² (mg/l)	TOTAL SULFATE (mg/l SO ₄)	PERMEANT pH			
										COLUMN No. J-1			
										As (mg/l)	Fe (mg/l)	Zn (mg/l)	F ⁻ (mg/l)
1	12-14		+481	8.22	220	326	42.3						
2	12-15		+484	7.98		326	4.7	1000	1900	0.001			
3	12-16		+501	7.50	240	365	42.3	1000					
4	12-17		+426	7.50		928	29	1000 ⁽ⁿ⁾ 1000					
5	12-18		+447	7.05		2730	51	1600	2400				
6	12-19		+254	6.80		5340	170	2200 ⁽ⁿ⁾ 3900					
7	12-21		+510	6.60	370	5670	200/210	2200		0.001		0.07	
8	12-22		+254	7.05	620	7330	140	3800 ⁽ⁿ⁾ 4200	4300				
9	12-23		+206	6.90		7620	220	4400		0.001			
10	12-24		+239	6.90		7420	220	4300 ⁽ⁿ⁾ 5100					
11	12-26		+164	6.85	610	7240	210	5600	5900				
12	12-28		+232	6.56		7250	224/260	5900		0.003	140	2.30	
13	12-29		+193	6.61		7300	210	5900					
14	12-30		+211	6.37	550	7550	200	6000	6100				
15	12-31		+169	6.05		7220	220	6100					
16	1-2		+190	6.00		6700	180	6200		0.003	710	83	
17	1-4		+210	6.30	1090	7380	140	6500	7000				
18	1-6		+183	7.35		7360	140	4900		0.003	765	240	
19	1-8		+189	7.26	760	7550	240	5300					
20	1-9		+245	5.80		7550		5400					
21	1-11		+271	5.81	760	7820		6250	7100				
22	1-12		+264	5.68		8230		5900					
23	1-13		+291	5.51		8300		6100					
24	1-15		+289	5.39		8340		6100		0.003	840	140	
25	1-16		+338	5.24	880	8440		6200					

1) SOT VALUE 1.000

0.5cm. X 0.5cm.

COLUMN TEST MONITORING DATA SUMMARY

[illegible]

COLUMN TEST MONITORING DATA

EXXON RM82-1095 AL

PERMEANT pH

3.0

Column No.

5-1

[illegible]

COLUMN TEST MONITORING DATA SUMMARY

11101-444-112

SAMPLE No.	DATE	Q _E /P _V	E _h (mV)	pH	ACIDITY- ALKALINITY (mg/L CaCO ₃)	SOLUBLE CONCENTRATIONS (mg/L Ca)	Cl ⁻ (mg/L)	SO ₄ ⁻² (mg/L)	TOTAL SULFATE (mg/L SO ₄)	PERMEANT pH		6.0	
										COLUMN No.		J-2	
										As (mg/L)	Fe (mg/L)	Zn (mg/L)	F ⁻ (mg/L)
1	12-14		+465	8.16		326	9.4						
2	12-15		+484	8.05		326	<2.3		1400				
3	12-16		+497	7.73		313	<2.3						
4	12-17		+433	7.50		406	9.5	2000 SP					
5	12-18		+449	7.45		808	33	200	1900				
6	12-19		+280	7.10		2130	57	8500 950		20.001			
7	12-21		+527	7.05	300	2590	140	2800					
8	12-22		+237	6.35	460	6310	230	1000 1100	2300	20.001		1.55	
9	12-23		+217	6.15		6530	370	1900		0.002			
10	12-24		+222	5.90		6920	370	2100 2400					
11	12-26		+153	6.05	520	6920	370	2700	3000				
12	12-28		+222	6.15		6390	333/360	3000		0.001	3.4	2.11	
13	12-29		+196	6.10		6570	340	3600					
14	12-30		+173	6.45	390	6620	350	3800	5200				
15	12-31		+133	7.21		6640	360	4100					
16	1-2		+151	7.22		5500	350	4500		0.001	6.4	3.32	
17	1-4		+147	7.00	270	6370	320	4700	7400				
18	1-6		+162	6.75		6360	320	5500		0.002	39	6.0	
19	1-8		+190	7.01	220	6310	380	5700					
20	1-9		+166	6.75		5130		5800					
21	1-11		+171	6.69		5830		6000	7400				
22	1-12		+170	6.61		6360		6000					
23	1-13		+189	6.56	270	6410		6100					
24	1-15		+188	6.61		6470		6700		0.001	140	2.07	
25	1-16		+207	6.42		6490		6500					

UW-STEVENSON POINT



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