

1513012003

LABORATORY ANALYSIS SHEET

ANVIL POINTS OIL SHALE RESEARCH CENTER

Date Sampled 3-23-67

Run No. START UP C1021

Sample Time: RS 0115; SS _____

FISCHER ASSAY

RETORT SHALE MOISTURE

PKM

RAW SHALE SPENT SHALE

25.8 _____ Gal/Ton

0.13 _____ S.G., g/ml

9.9 _____ Oil, wt %

1.8 _____ Water, wt %

86.6 _____ Sp. Shale, wt %

1.7 _____ Gas & Loss, wt %

Slight _____ COKING TENDENCY

P

RAW SHALE FISCHER ASSAY MOISTURE

0.72 wt %

MINERAL CO₂

PKA

17.4 _____ wt %

ASH (SHALE)

PKA

68.4 _____ wt %

MOISTURE

P

0.31 _____ wt %

CARBON

P

16.0 _____ wt %

HYDROGEN

P

1.66 _____ wt %

BENZENE EXTRACTABLES

_____ _____ wt %

SHALE RICHNESS DISTRIBUTION
(See attached graph)

SCREEN ANALYSIS
(See back of this sheet)

All results are "as received" unless noted. "Moisture" designates the moisture content of the -48 mesh material used for "Ash", "Mineral CO₂", "Carbon", and "Hydrogen". The "FA Moisture" is for the sample used for the Fischer Assay.

COMMENTS

DATE COMPLETED MAR 27 1967

CHECKED BY REP

LABORATORY ANALYSIS SHEET

ANVIL POINTS OIL SHALE RESEARCH CENTER

Date Sampled 3-23-67

Run No. STARTUP C1021

Sample Time: RS 0630; SS 0630

FISCHER ASSAY

RETORT SHALE MOISTURE

PKM RAW SHALE *PKM* SPENT SHALE

<u>25.3</u>	<u>0.4</u>	Gal/Ton
<u>.911</u>	<u> </u>	S.G., g/ml
<u>4.6</u>	<u>0.2</u>	Oil, wt %
<u>1.9</u>	<u>0.5</u>	Water, wt %
<u>26.9</u>	<u>99.3</u>	Sp. Shale, wt %
<u>1.6</u>	<u>0.0</u>	Gas & Loss, wt %
<u>SLIGHT</u>	<u>None</u>	COKING TENDENCY

R RAW SHALE FISCHER ASSAY MOISTURE
0.84 wt %

MINERAL CO₂

PKM 17.5 12.0 wt %

ASH (SHALE)

PKM 68.3 *PKM* 86.6 wt %

MOISTURE

R 0.33 *R* 0.16 wt %

CARBON

R 15.9 *R* 5.19 wt %

HYDROGEN

R 1.62 *R* 0.18 wt %

BENZENE EXTRACTABLES

 wt %

SHALE RICHNESS DISTRIBUTION
(See attached graph)

SCREEN ANALYSIS
(See back of this sheet)

All results are "as received" unless noted. "Moisture" designates the moisture content of the -48 mesh material used for "Ash", "Mineral CO₂", "Carbon", and "Hydrogen". The "FA Moisture" is for the sample used for the Fischer Assay.

COMMENTS

DATE COMPLETED MAR 27 1967

CHECKED BY REP
OSRC-12A

LABORATORY ANALYSIS SHEET

ANVIL POINTS OIL SHALE RESEARCH CENTER

Date Sampled 3-23-67

Run No. PT C1021

Sample Time: RS 1915; SS _____

FISCHER ASSAY

RAW SHALE SPENT SHALE

24.5 _____ Gal/Ton
5.912 _____ S.G., g/ml
9.4 _____
7.50 _____ Oil, wt %
1.8 _____ Water, wt %
86.8 _____ Sp. Shale, wt %
1.9 _____ Gas & Loss, wt %
Slight _____ COKING TENDENCY

RETORT SHALE MOISTURE
 _____ wt %

RAW SHALE FISCHER ASSAY MOISTURE
0.67 wt %

MINERAL CO₂

17.4 _____ _____ wt %

ASH (SHALE)

68.8 _____ _____ wt %

MOISTURE

0.32 _____ _____ wt %

CARBON

15.5 _____ _____ wt %

HYDROGEN

1.63 _____ _____ wt %

BENZENE EXTRACTABLES

_____ _____ wt %

SHALE RICHNESS DISTRIBUTION
 (See attached graph)

SCREEN ANALYSIS
 (See back of this sheet)

All results are "as received" unless noted. "Moisture" designates the moisture content of the -48 mesh material used for "Ash", "Mineral CO₂", "Carbon", and "Hydrogen". The "FA Moisture" is for the sample used for the Fischer Assay.

COMMENTS _____

DATE COMPLETED MAR 27 1967

CHECKED BY _____

REP
 OSRC-12A
 Revised 6/20/66

LABORATORY ANALYSIS SHEET

ANVIL POINTS OIL SHALE RESEARCH CENTER

Date Sampled 3-23-67

Run No. C 1021

Sample Time: RS _____; SS 2127

FISCHER ASSAY

RAW SHALE SPENT SHALE

_____ 0.5 Gal/Ton
 _____ .901 S.G., g/ml
 _____ 0.20 Oil, wt %
 _____ 0.4 Water, wt %
 _____ 99.1 Sp. Shale, wt %
 _____ 0.3 Gas & Loss, wt %
 _____ None COKING TENDENCY

RETORT SHALE MOISTURE
 _____ wt %

RAW SHALE FISCHER ASSAY MOISTURE
 _____ wt %

MINERAL CO₂ 13.6 wt %

ASH (SHALE) 84.5 wt %

MOISTURE 0.17 wt %

CARBON 5.80 wt %

HYDROGEN 0.19 wt %

BENZENE EXTRACTABLES
 _____ wt %

SHALE RICHNESS DISTRIBUTION
 (See attached graph)

SCREEN ANALYSIS
 (See back of this sheet)

All results are "as received" unless noted. "Moisture" designates the moisture content of the -48 mesh material used for "Ash", "Mineral CO₂", "Carbon", and "Hydrogen". The "FA Moisture" is for the sample used for the Fischer Assay.

COMMENTS _____

DATE COMPLETED MAR 27 1967

CHECKED BY REP

LABORATORY ANALYSIS SHEET

ANVIL POINTS OIL SHALE RESEARCH CENTER

Date Sampled 3-23-67

Run No. C1021 startup
0908

LIQUID PRODUCTS

D3 PUMPOUT

T3 PUMPOUT

PKH.

WATER, wt %

1 2 3 4

4.0 _____ _____ _____

1 2

_____ _____

GRAVITY, °API

19.2 _____ _____ _____

_____ _____

OIL ASH, wt %

DISTILLATION (See attached sheet - OSRC-24)

VENT PURGE PRODUCT

PKH.

OIL WT, g 1260.6

WATER VOL, ml 78.0

GRAVITY OIL, °API 39.9

VENT GAS

MAJOR COMPONENTS

CO₂ _____ vol %

O₂ _____ "

N₂ _____ "

CH₄ _____ "

CO _____ "

H₂ _____ "

Ar _____ "

Others _____ "

C₁ thru C₄, plus n-Pentane

CH₄ _____ vol %

C₂H₄-C₂H₆ _____ "

C₃H₈ _____ "

C₃H₆ _____ "

i C₄H₁₀ _____ "

n C₄H₁₀ _____ "

∅C₃H₆ _____ "

n C₅H₁₂ _____ "

CARBON, _____ lbs/MSCFDG

HYDROGEN, _____ lbs/MSCFDG

COMMENTS _____

DATE COMPLETED MAR 27 1967

CHECKED BY REP

LABORATORY ANALYSIS SHEET

ANVIL POINTS OIL SHALE RESEARCH CENTER

Date Sampled 3-23-67

Run No. C 1021 startup
090^b

LIQUID PRODUCTS

D3 PUMPOUT

T3 PUMPOUT

PKH.

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>
WATER, wt %	<u>4.0</u>					
GRAVITY, °API	<u>19.2</u>					

OIL ASH, wt %

DISTILLATION (See attached sheet - OSRC-24)

VENT PURGE PRODUCT

PKH.

OIL WT, g 1260.6
 WATER VOL, ml 78.0
 GRAVITY OIL, °API 39.9

VENT GAS

MAJOR COMPONENTS

C₁ thru C₄, plus n-Pentane

CO₂ _____ vol %
 O₂ _____ "
 N₂ _____ "
 CH₄ _____ "
 CO _____ "
 H₂ _____ "
 Ar _____ "
 Others _____ "

CH₄ _____ vol %
 C₂H₄-C₂H₆ _____ "
 C₃H₈ _____ "
 C₃H₆ _____ "
 i C₄H₁₀ _____ "
 n C₄H₁₀ _____ "
 C₃H₆ _____ "
 n C₅H₁₂ _____ "

CARBON, _____ lbs/MSCFDG

HYDROGEN, _____ lbs/MSCFDG

COMMENTS _____

DATE COMPLETED MAR 27 1967

CHECKED BY PKH

LABORATORY ANALYSIS SHEET

ANVIL POINTS OIL SHALE RESEARCH CENTER

Date Sampled 3-23-67

Run No. PTC-1021

LIQUID PRODUCTS

D3 PUMPOUT

T3 PUMPOUT

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>
<input checked="" type="checkbox"/> WATER, wt %	<u>4.2</u>	<u>/</u>	<u>/</u>	<u>/</u>		
<input checked="" type="checkbox"/> GRAVITY, °API	<u>19.2</u>	<u>/</u>	<u>/</u>	<u>/</u>		
<input type="checkbox"/> OIL ASH, wt %						

DISTILLATION (See attached sheet - OSRC-24)

VENT PURGE PRODUCT

OIL WT, g _____

WATER VOL, ml _____

GRAVITY OIL, °API _____

VENT GAS

MAJOR COMPONENTS

CO ₂	<u>24.3</u>	vol %
O ₂	<u>0.3</u>	"
N ₂	<u>62.1</u>	"
CH ₄	<u>1.8</u>	"
CO	<u>3.0</u>	"
H ₂	<u>4.2</u>	"
Ar	<u>0.8</u>	"
Others	<u>3.5</u>	"

C₁ thru C₄, plus n-Pentane

CH ₄	_____	vol %
C ₂ H ₄ -C ₂ H ₆	_____	"
C ₃ H ₈	_____	"
C ₃ H ₆	_____	"
i C ₄ H ₁₀	_____	"
n C ₄ H ₁₀	_____	"
∅C ₃ H ₆	_____	"
n C ₅ H ₁₂	_____	"

CARBON, 12.2 lbs/MSCFDG

HYDROGEN, 0.72 lbs/MSCFDG

COMMENTS _____

DATE COMPLETED MAR 27 1967

CHECKED BY REP

OSRC-12B

SCREEN ANALYSIS DATA SHEET (TY-LAB)

RUN NO. C-1921-STARTUP SAMPLE NO. _____ DATE 3-23-67

UNIT #3 DESCRIPTION TY-Lab

APPROX. SHALE SIZE 1/4" - 1" SHAKING TIME 10 MIN ANALYSIS BY Boyer E Keithley

TOTAL SAMPLE WT. GROSS 100.0 - TARE 6.0 = NET 94.0

SCREEN SIZE			WEIGHTS								
SCREENS REQD.	OPENING SIZE	MESH	GROSS LBS.	TARE LBS.	NET WT. RETAINED	SCREEN SIZE	Di *	1/Di	% RETAINED	CUM. % RETAINED	% PASSING
	4.25					4.25					90.32
	3.00					3.00	(3.125)	(0.3200)			48.34
	2.50					2.50	(2.625) 2.750	(0.3809) 0.3636			24.44
	2.00					2.00	2.250	0.4444			14.24
	1.50					1.50	1.750	0.5714			4.78
	1.05		28.3	19.2	9.1	1.05	(1.087) 1.275	(0.9199) 0.7843	9.67		1.38
	0.742		60.0	20.5	39.5	0.742	0.896	1.116	41.98		0.85
	0.525		40.9	18.4	22.5	0.525	0.634	1.577	23.91		0.74
	0.371		28.9	19.3	9.6	0.371	0.448	2.232	10.20		0.64
	0.263	3	27.2	18.3	8.9	0.263	0.317	3.154	9.46		
	0.185	4	22.6	19.4	3.2	0.185	0.224	4.464	3.40		
	0.131	6	19.8	19.3	.5	0.131	0.158	6.329	0.53		
	0.093	8	20.3	20.2	.1	0.093	0.112	8.928	0.11	99.26	
	0.065	10	19.3	19.2	.1	0.065			0.11		
	PAN		21.5	20.9	.6	PAN			0.64		
TOTAL ON SCREENS AND PAN					24.1	LOSS					
LOSS (BY DIFFERENCE)					7.7	TOTAL			100.01		
TOTAL SAMPLE WEIGHT					94.0						

* NUMBERS IN PARENTHESES SHOULD BE USED WHEN THESE SCREEN SIZES REPRESENT THE TOP OF THE SHALE SIZE RANGE.

REMARKS: _____

$\sum_{+8m} D_i$	0.71710	$\sum_{+8m} X_i$	
$1/\sum_{+8m} D_i$	1.65568	$\sum_{+8m} X_i / D_i$	
D_a	0.59951	$\sum_{+8m} X_i D_i$	
D_v	0.72246		

SCREEN ANALYSIS DATA SHEET (TY-LAB)

RUN NO. C-1021 *startup* SAMPLE NO. 1 DATE 3/23/67

UNIT #3 DESCRIPTION Ty Lab

APPROX. SHALE SIZE 1/2" to 1" SHAKING TIME 10 min ANALYSIS BY KEITHLEY & BOYCE

TOTAL SAMPLE WT. GROSS 85.8 - TARE 5.8 = NET 80.0

SCREEN SIZE			WEIGHTS								
SCREENS REQD.	OPENING SIZE	MESH	GROSS LBS.	TARE LBS.	NET WT. RETAINED	SCREEN SIZE	D _i *	1/D _i	% RETAINED	CUM. % RETAINED	% PASSING
	4.25					4.25					
	3.00					3.00	(3.125)	(0.3200)			
	2.50					2.50	(2.625) 2.750	(0.3809) 0.3636			
	2.00					2.00	2.250	0.4444			
	1.50					1.50	1.750	0.5714			
	1.05		24.1	19.2	34.9	1.05	(1.087) 1.275	(0.9199) 0.7843	6.11		93.88
	0.742		53.9	20.5	33.4	0.742	0.896	1.116	41.65		52.23
	0.525		39.1	18.5	20.6	0.525	0.634	1.577	25.69		26.54
	0.371		27.5	19.3	8.2	0.371	0.448	2.232	10.22		16.32
	0.263	3	26.5	18.3	8.2	0.263	0.317	3.154	10.22		6.10
	0.185	4	22.8	19.4	3.4	0.185	0.224	4.464	4.24		1.86
	0.131	6	19.8	19.3	.5	0.131	0.158	6.329	0.62		1.24
	0.093	8	20.4	20.2	.2	0.093	0.112	8.928	0.25	99.00	0.99
	0.065	10	19.3	19.2	.1	0.065			0.12		0.87
	PAN		21.6	20.9	.7	PAN			0.87		0.00
TOTAL ON SCREENS AND PAN					80.2	LOSS			←	-	-
LOSS (BY DIFFERENCE)					7.2	TOTAL			99.99	-	-
TOTAL SAMPLE WEIGHT					80.0				-	-	-

* NUMBERS IN PARENTHESES SHOULD BE USED WHEN THESE SCREEN SIZES REPRESENT THE TOP OF THE SHALE SIZE RANGE.

REMARKS: _____

$\sum_{+8m}^m D_i$	2.69141	$\sum_{+8m}^m X_i$	
$1/\sum_{+8m}^m D_i$	7.2743	$\sum_{+8m}^m X_i / D_i$	
D _a	0.57310	$\sum_{+8m}^m X_i D_i$	
D _v	0.69839		