T-103

ORYX

Oryx Energy Company
13155 Noel Road
Dallas TX 75240-5067
PO Box 2880
Dallas TX 75221-2880
214 715 4000

June 2, 1993

U S G S Research Center
Bldg. 810 Door # S30
Denver Federal Center
Lakewood, Colorado 80225

Re: Core for Big Sky #1
Sec.2-30N-58E Surface
Sec. 11-30N-58E Bottom Hole

Dear Sir:

This is in reply to our telephone conversation of June 2, 1993 regarding this core. Per your request listed below is the data you requested be set forth in letter form:

Operator.....Oryx Energy Company

Well Name & No.....Big Sky #1 (well was a horizontal drill, dry hole, and has been plugged)

Location.....Sec 2-30N-58E Surface
Sec 11-30N-58E Bottom Hole
Roosevelt County, Montana

Depth of Core Interval.....See attached completion reports (back)

Formation of Core.....See attached completion reports

TD of Hole.....TMD 12195
TVD 10088

Ground Elevation.....GR 2171'

Additionally, I am attaching some Mineralogical Analyses on the cores to provide further information. I hope these items meet your data request.

Since I am sending this core to you in lieu of core chips to the State of Montana, they have requested that you send them some sort of notification or call upon receiving the core. By phone, you can call Mr. Tom Richmond (406) 656-0040.

Please advise if you need further information or documentation.

Sincerely,

Peggy Snyder

Peggy Snyder
Proration Analyst
Oryx Energy Company

KEN KOBELL

Subject MINERALOGICAL ANALYSIS - BIG SKY #1
WILDCAT, ROOSEVELT COUNTY MONTANA
BAKKEN SHALE FORMATION
MID-CONTINENT REGION

Interoffice
Correspondence

Date September 27, 1990

Location Technology Center

From Richard Stallings, Production Service Laboratory

To Greg McFarland
CC II 402

Attached are the mineralogical analyses of previously analyzed core chips from the subject well along with the four additional samples submitted August 30, 1990 for testing. These additional cores are denoted with asterisks by the depths. Please note that the sample from 9875' had already been analyzed and reported. The mineral contents are calculated as percentages of the total sample using integrated peak areas from both the clay and sand plus silt fractions.

Richard Stallings

Richard Stallings
Chemical & Environmental Services

RHS/js

Attachment

cc: Gerald Coulter
Chip Claiborne - OK
Ken King - OK
Bronwyn Owens - CC II 422
Randy Reese - OK
Robert Skopec
Howard White - CC II 1763
Kingston Yong
File

PARTICLE SIZE DISTRIBUTION EXPRESSED AS A PERCENTAGE OF SAND, SILT AND CLAY

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

NOTE- SAND PARTICLE SIZES ARE GREATER THAN 44 MICRONS
CLAY PARTICLE SIZES ARE LESS THAN 44 MICRONS

DEPTH	SAND+SILT	CLAY
9875	98.9	1.1
**9875	99.0	1.0
9876.8	99.3	0.7
9877.3	99.5	0.5
9879	98.3	1.7
9879.5	99.3	0.7
9881	99.1	0.9
9882.5	99.3	0.7
9883	98.9	1.1
9883.7	97.8	2.2
9884	85.9	13.1
9886	88.7	11.3
9887	89.7	10.3
9890	80.1	19.9
9892.4	86.5	13.5
9893.2	85.2	14.8
9897	88.4	11.6
9900	86.3	13.7
**9901	86.9	13.1
9904.1	82.8	17.2
9905.9	100.0	0.0
9910	84.0	16.0
9913.1	81.8	18.2
9918.5	79.1	20.9
9919	94.2	5.8
9919.3	99.3	0.7
9919.4	99.1	0.9
9920.7	99.3	0.7
9921.1	99.3	0.7
**9921.3	98.6	1.4
9922.7	99.1	0.9
9923.1	99.2	0.8
9924.3	99.2	0.8
9925.5	99.3	0.7
**9927.9	71.8	28.2
9928	75.0	25.0
9929.5	69.6	30.4
9929.9	73.1	26.9
9930.1	75.9	24.1
9930.7	78.8	21.2

MINERALOGICAL ANAYLSIS EXPRESSED AS PERCENT OF TOTAL SAMPLE

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

DEPTH		ILLITE	KAOLI-NITE	CHLORITE	QUARTZ	FELDSPAR	CALCITE	FERROAN DOLOMITE	PYRITE	SPHALE-RITE	ANHY-DRITE
9875	SA+SI	12.4	0.0	6.2	55.6	7.0	4.6	6.2	3.9	3.1	0.0
	CLAY	0.4	0.0	0.1	0.4	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	12.8	0.0	6.2	56.0	7.0	4.7	6.3	3.9	3.1	0.0
**9875	SA+SI	12.8	0.0	4.0	55.9	6.4	4.0	8.0	4.8	3.2	0.0
	CLAY	0.4	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	13.2	0.0	4.1	56.1	6.4	4.0	8.1	4.8	3.2	0.0
9876.3	SA+SI	7.6	0.0	3.8	68.7	6.1	3.1	5.3	3.1	1.5	0.0
	CLAY	0.2	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	7.9	0.0	3.9	69.0	6.1	3.1	5.4	3.1	1.5	0.0
9877.3	SA+SI	1.8	0.0	0.0	84.6	2.7	1.8	2.7	2.7	3.2	0.0
	CLAY	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	1.8	0.0	0.1	84.8	2.7	1.8	2.7	2.7	3.2	0.0
9879	SA+SI	3.7	0.0	3.0	74.5	3.7	3.0	4.5	4.5	1.5	0.0
	CLAY	0.2	0.0	0.1	0.9	0.1	0.1	0.2	0.1	0.0	0.0
	TOTAL	3.9	0.0	3.0	75.4	3.8	3.1	4.6	4.6	1.5	0.0
9879.6	SA+SI	2.8	0.0	2.1	72.3	2.8	11.3	3.5	2.8	1.4	0.0
	CLAY	0.1	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0
	TOTAL	2.9	0.0	2.2	72.6	2.8	11.6	3.6	2.8	1.4	0.0
9881	SA+SI	4.4	0.0	3.7	70.5	5.1	3.7	5.9	2.9	2.9	0.0
	CLAY	0.3	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	4.7	0.0	3.7	70.8	5.1	3.7	5.9	3.0	3.0	0.0
9882.5	SA+SI	0.8	0.0	0.8	90.3	0.0	0.0	3.3	2.5	1.6	0.0
	CLAY	0.1	0.0	0.0	0.5	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	0.9	0.0	0.8	90.7	0.0	0.0	3.4	2.5	1.7	0.0
9883	SA+SI	4.7	0.0	4.0	65.5	5.3	2.7	12.0	4.0	0.7	0.0
	CLAY	0.3	0.0	0.1	0.4	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	5.0	0.0	4.1	65.9	5.4	2.7	12.2	4.0	0.7	0.0
9883.7	SA+SI	5.4	0.0	4.0	61.6	4.7	2.7	15.1	2.7	0.7	0.0
	CLAY	0.8	0.0	0.2	0.8	0.0	0.1	0.3	0.1	0.0	0.0
	TOTAL	6.1	0.0	4.3	62.4	4.7	2.7	15.4	2.7	0.7	0.0
9884	SA+SI	3.6	0.0	2.7	43.9	3.2	1.8	23.8	0.9	0.0	0.0
	CLAY	4.8	0.0	1.3	5.3	0.2	0.4	1.1	0.0	0.0	0.0
	TOTAL	8.4	0.0	4.0	51.3	3.3	2.2	29.9	0.9	0.0	0.0

MINERALOGICAL ANAYLSIS EXPRESSED AS PERCENT OF TOTAL SAMPLE

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

DEPTH		ILLITE	KAOLI-NITE	CHLORITE	QUARTZ	FELDSPAR	CALCITE	FERROAN DOLOMITE	PYRITE	SPHALE-RITE	ANHY-DRITE
9886	SA+SI	4.1	0.0	1.7	39.8	3.3	4.1	34.0	1.7	0.0	0.0
	CLAY	4.3	0.0	1.3	2.9	0.1	0.9	1.7	0.1	0.0	0.0
	TOTAL	8.4	0.0	2.9	42.7	3.4	5.0	35.7	1.8	0.0	0.0
9887	SA+SI	2.4	0.0	1.6	39.7	3.2	9.5	32.5	0.5	0.0	0.0
	CLAY	3.2	0.0	0.9	1.7	0.1	1.8	2.5	0.1	0.0	0.0
	TOTAL	5.5	0.0	2.5	41.4	3.3	11.3	35.1	0.9	0.0	0.0
9390	SA+SI	3.0	0.0	2.3	39.5	3.0	2.3	28.9	1.1	0.0	0.0
	CLAY	10.0	0.0	2.8	3.0	0.0	1.2	2.5	0.3	0.0	0.0
	TOTAL	13.1	0.0	5.1	42.5	3.0	3.4	31.4	1.5	0.0	0.0
9892.4	SA+SI	1.8	0.0	0.9	45.1	3.6	5.4	29.7	0.0	0.0	0.0
	CLAY	4.7	0.0	1.2	2.5	0.1	1.4	3.6	0.1	0.0	0.0
	TOTAL	6.5	0.0	2.1	47.6	3.7	6.8	33.3	0.1	0.0	0.0
9893.2	SA+SI	2.7	0.0	1.8	46.7	3.7	1.4	28.4	0.5	0.0	0.0
	CLAY	8.5	0.0	1.9	1.5	0.0	0.3	2.5	0.1	0.0	0.0
	TOTAL	11.2	0.0	3.7	48.2	3.7	1.7	30.9	0.6	0.0	0.0
9897	SA+SI	1.2	0.0	0.6	62.1	4.7	8.2	11.7	0.0	0.0	0.0
	CLAY	4.0	0.0	1.0	2.2	0.3	2.4	1.8	0.0	0.0	0.0
	TOTAL	5.1	0.0	1.6	64.2	5.0	10.6	13.5	0.0	0.0	0.0
9900	SA+SI	2.0	0.0	1.5	53.5	7.1	1.0	20.2	1.0	0.0	0.0
	CLAY	6.7	0.0	1.8	2.4	0.1	0.2	2.2	0.2	0.0	0.0
	TOTAL	8.8	0.0	3.3	55.9	7.2	1.2	22.4	1.2	0.0	0.0
**9901	SA+SI	1.6	0.0	1.1	56.1	5.4	1.1	21.6	0.0	0.0	0.0
	CLAY	7.7	0.0	1.7	1.7	0.1	0.2	1.8	0.0	0.0	0.0
	TOTAL	9.3	0.0	2.7	57.8	5.5	1.3	23.4	0.0	0.0	0.0
9904.1	SA+SI	2.0	0.0	1.5	51.9	4.9	2.9	18.6	1.0	0.0	0.0
	CLAY	5.0	0.0	1.6	3.6	0.3	1.3	4.0	0.3	0.0	0.0
	TOTAL	7.9	0.0	3.0	55.8	5.2	4.2	22.6	1.3	0.0	0.0
9906.9	WHOLE	0.7	0.0	0.7	11.8	2.1	37.5	7.6	0.0	0.0	39.6
9910	SA+SI	3.1	0.0	2.1	53.5	3.7	4.2	16.8	0.5	0.0	0.0
	CLAY	6.4	0.0	1.7	3.5	0.3	1.5	2.5	0.0	0.0	0.0
	TOTAL	9.5	0.0	3.8	57.1	4.0	5.7	19.3	0.5	0.0	0.0
9913.1	SA+SI	2.9	0.0	1.9	51.4	4.8	5.7	15.2	0.0	0.0	0.0
	CLAY	7.4	0.0	2.0	3.5	0.3	2.2	2.7	0.0	0.0	0.0
	TOTAL	10.3	0.0	3.9	54.9	5.1	7.9	17.9	0.0	0.0	0.0

MINERALOGICAL ANAYLSIS EXPRESSED AS PERCENT OF TOTAL SAMPLE

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

DEPTH		ILLITE	KAOLI-NITE	CHLORITE	QUARTZ	FELDSPAR	CALCITE	FERROAN DOLOMITE	PYRITE	SPHALE-RITE	ANHY-DRITE
##9927.9	SA+SI	4.8	0.0	4.4	36.6	5.1	3.5	15.7	0.9	0.0	0.0
	CLAY	17.6	0.0	4.9	3.0	0.3	0.8	1.4	0.3	0.0	0.0
	TOTAL	22.4	0.0	9.2	39.5	6.4	4.3	17.0	1.1	0.0	0.0
9928	SA+SI	4.4	0.0	6.1	34.9	5.2	3.1	20.1	1.3	0.0	0.0
	CLAY	16.3	0.0	3.7	2.6	0.3	0.8	1.3	0.0	0.0	0.0
	TOTAL	20.7	0.0	9.8	37.5	5.5	3.6	21.4	1.3	0.0	0.0
9929.5	SA+SI	4.4	0.0	4.4	35.5	5.3	3.1	16.0	0.9	0.0	0.0
	CLAY	21.2	0.0	5.1	2.8	0.0	0.6	0.5	0.0	0.0	0.0
	TOTAL	25.6	0.0	9.5	38.3	5.3	3.7	16.5	0.9	0.0	0.0
9929.9	SA+SI	3.9	0.0	4.7	31.9	5.4	3.1	23.3	0.8	0.0	0.0
	CLAY	14.6	0.0	4.5	5.0	0.3	1.1	1.4	0.0	0.0	0.0
	TOTAL	18.5	0.0	9.1	36.9	5.7	4.2	24.7	0.8	0.0	0.0
9930.1	SA+SI	2.9	0.0	3.7	33.5	4.1	2.5	27.9	1.2	0.0	0.0
	CLAY	15.2	0.0	3.5	3.8	0.0	0.5	1.0	0.0	0.0	0.0
	TOTAL	18.1	0.0	7.2	37.4	4.1	3.0	28.9	1.2	0.0	0.0
9930.7	SA+SI	7.3	0.0	6.4	35.4	4.5	2.7	21.0	0.5	0.0	0.0
	CLAY	11.2	0.0	3.7	4.5	0.4	0.7	0.7	0.0	0.0	0.0
	TOTAL	18.4	0.0	10.1	40.9	4.9	3.3	21.7	0.5	0.0	0.0

Subject MINERALOGICAL ANALYSIS - BIG SKY #1 H.D.
WILDCAT - ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATION
MID-CONTINENT REGION

Interoffice
Correspondence

Date September 14, 1990

Location Technology Center

From Richard Stallings, Production Service Laboratory

To Greg McFarland, CC II 437
Howard White, CC II 1786

Attached are the mineralogical analyses of the full diameter core chips taken from the subject well. The samples were ground in a ball mill, dispersed in water and separated into two size fractions, a sand plus silt-sized fraction >2 microns and a clay-sized fraction <2 microns. Both fractions were mounted for X-Ray diffraction analysis. The clay fractions were treated with ethylene glycol to check for swelling clays. The mineral contents are calculated as percentages of the total samples using integrated peak areas from the diffractograms of both size fractions.

Please let me know if there are any questions regarding the attached data.

Richard Stallings

Richard Stallings
Chemical & Environmental Services

RHS/js

Attachment

cc: Gerald Coulter
Robert Skopec
John White
Chip Claiborne/Ken King/Randy Reese - MC
File

2P6/K284 - (1)

PARTICLE SIZE DISTRIBUTION EXPRESSED AS A PERCENTAGE OF SAND, SILT AND CLAY

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

NOTE- SAND PARTICLE SIZES ARE GREATER THAN 44 MICRONS
CLAY PARTICLE SIZES ARE LESS THAN 44 MICRONS

DEPTH	SAND+SILT	CLAY
9875	98.9	1.1
9876.8	99.3	0.7
9877.3	99.5	0.5
9879	98.3	1.7
9879.6	99.3	0.7
9881	99.1	0.9
9882.5	99.3	0.7
9883	98.9	1.1
9883.7	97.8	2.2
9884	86.9	13.1
9886	88.7	11.3
9887	89.7	10.3
9890	80.1	19.9
9892.4	86.5	13.5
9893.2	85.2	14.8
9897	88.4	11.6
9900	86.3	13.7
9904.1	82.8	17.2
9906.9	100.0	0.0
9910	84.0	16.0
9913.1	81.8	18.2
9918.5	79.1	20.9
9919	94.2	5.8
9919.3	99.3	0.7
9919.4	99.1	0.9
9920.7	99.3	0.7
9921.1	99.3	0.7
9922.7	99.1	0.9
9923.1	99.2	0.8
9924.3	99.2	0.8
9925.5	99.3	0.7
9928	75.0	25.0
9929.5	69.6	30.4
9929.9	73.1	26.9
9930.1	75.9	24.1
9930.7	78.8	21.2

MINERALOGICAL ANAYLSIS EXPRESSED AS PERCENT OF TOTAL SAMPLE

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

DEPTH		ILLITE	KAOLI-NITE	CHLORITE	QUARTZ	FELDSPAR	CALCITE	FERROAN DOLOMITE	PYRITE	SPHALE-RITE	ANHY-DRITE
9875	SA+SI	12.4	0.0	5.2	55.5	7.0	4.6	6.2	3.9	3.1	0.0
	CLAY	0.4	0.0	0.1	0.4	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	12.8	0.0	5.2	55.0	7.0	4.7	6.3	3.9	3.1	0.0
9876.8	SA+SI	7.5	0.0	3.8	68.7	6.1	3.1	5.3	3.1	1.5	0.0
	CLAY	0.2	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	7.9	0.0	3.9	69.0	6.1	3.1	5.4	3.1	1.5	0.0
9877.3	SA+SI	1.8	0.0	0.0	84.6	2.7	1.5	2.7	2.7	3.2	0.0
	CLAY	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	1.8	0.0	0.1	84.9	2.7	1.8	2.7	2.7	3.2	0.0
9879	SA+SI	3.7	0.0	3.0	74.5	3.7	3.0	4.5	4.5	1.5	0.0
	CLAY	0.2	0.0	0.1	0.9	0.1	0.1	0.2	0.1	0.0	0.0
	TOTAL	3.9	0.0	3.0	75.4	3.8	3.1	4.6	4.6	1.5	0.0
9879.5	SA+SI	2.8	0.0	2.1	72.3	2.8	11.3	3.5	2.8	1.4	0.0
	CLAY	0.1	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0
	TOTAL	2.9	0.0	2.2	72.6	2.8	11.5	3.5	2.9	1.4	0.0
9881	SA+SI	4.4	0.0	3.7	70.5	5.1	3.7	5.9	2.9	2.9	0.0
	CLAY	0.3	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	4.7	0.0	3.7	70.8	5.1	3.7	5.9	3.0	3.0	0.0
9882.5	SA+SI	0.8	0.0	0.8	90.3	0.0	0.0	3.3	2.5	1.5	0.0
	CLAY	0.1	0.0	0.0	0.5	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	0.9	0.0	0.8	90.7	0.0	0.0	3.4	2.5	1.7	0.0
9883	SA+SI	4.7	0.0	4.0	65.5	5.3	2.7	12.0	4.0	0.7	0.0
	CLAY	0.3	0.0	0.1	0.4	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	5.0	0.0	4.1	65.9	5.4	2.7	12.2	4.0	0.7	0.0
9883.7	SA+SI	5.4	0.0	4.0	61.5	4.7	2.7	16.1	2.7	0.7	0.0
	CLAY	0.8	0.0	0.2	0.8	0.0	0.1	0.3	0.1	0.0	0.0
	TOTAL	6.1	0.0	4.3	62.4	4.7	2.7	16.4	2.7	0.7	0.0
9884	SA+SI	3.5	0.0	2.7	45.9	3.2	1.8	23.8	0.9	0.0	0.0
	CLAY	4.8	0.0	1.3	5.3	0.2	0.4	1.1	0.0	0.0	0.0
	TOTAL	8.4	0.0	4.0	51.3	3.3	2.2	29.9	0.9	0.0	0.0
9886	SA+SI	4.1	0.0	1.7	39.8	3.3	4.1	34.0	1.7	0.0	0.0
	CLAY	4.3	0.0	1.3	2.9	0.1	0.9	1.7	0.1	0.0	0.0
	TOTAL	8.4	0.0	2.9	42.7	3.4	5.0	35.7	1.8	0.0	0.0

MINERALOGICAL ANAYLSIS EXPRESSED AS PERCENT OF TOTAL SAMPLE

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

DEPTH		ILLITE	KAOLI-NITE	CHLORITE	QUARTZ	FELDSPAR	CALCITE	FERROAN DOLOMITE	PYRITE	SPHALE-RITE	ANHY-DRITE
9687	SA+SI	2.4	0.0	1.6	39.7	3.2	9.5	32.5	0.8	0.0	0.0
	CLAY	3.2	0.0	0.9	1.7	0.1	1.8	2.5	0.1	0.0	0.0
	TOTAL	5.5	0.0	2.5	41.4	3.3	11.3	35.1	0.9	0.0	0.0
9690	SA+SI	3.0	0.0	2.3	39.5	3.0	2.3	28.9	1.1	0.0	0.0
	CLAY	10.0	0.0	2.8	3.0	0.0	1.2	2.5	0.3	0.0	0.0
	TOTAL	13.1	0.0	5.1	42.5	3.0	3.4	31.4	1.5	0.0	0.0
9692.4	SA+SI	1.8	0.0	0.9	45.1	3.5	5.4	29.7	0.0	0.0	0.0
	CLAY	4.7	0.0	1.2	2.5	0.1	1.4	3.6	0.1	0.0	0.0
	TOTAL	6.5	0.0	2.1	47.6	3.7	6.8	33.3	0.1	0.0	0.0
9693.2	SA+SI	2.7	0.0	1.8	46.7	3.7	1.4	28.4	0.5	0.0	0.0
	CLAY	8.5	0.0	1.9	1.5	0.0	0.3	2.5	0.1	0.0	0.0
	TOTAL	11.2	0.0	3.7	48.2	3.7	1.7	30.9	0.6	0.0	0.0
9897	SA+SI	1.2	0.0	0.6	52.1	4.7	8.2	11.7	0.0	0.0	0.0
	CLAY	4.0	0.0	1.0	2.2	0.3	2.4	1.8	0.0	0.0	0.0
	TOTAL	5.1	0.0	1.6	54.2	5.0	10.6	13.5	0.0	0.0	0.0
9900	SA+SI	2.0	0.0	1.5	53.5	7.1	1.0	20.2	1.0	0.0	0.0
	CLAY	6.7	0.0	1.8	2.4	0.1	0.2	2.2	0.2	0.0	0.0
	TOTAL	8.8	0.0	3.3	55.9	7.2	1.2	22.4	1.2	0.0	0.0
9904.1	SA+SI	2.0	0.0	1.5	51.9	4.9	2.9	18.5	1.0	0.0	0.0
	CLAY	5.0	0.0	1.6	3.8	0.3	1.3	4.0	0.3	0.0	0.0
	TOTAL	7.9	0.0	3.0	55.8	5.2	4.2	22.6	1.3	0.0	0.0
9906.9	WHOLE	0.7	0.0	0.7	11.8	2.1	37.5	7.5	0.0	0.0	39.6
9910	SA+SI	3.1	0.0	2.1	53.5	3.7	4.2	15.8	0.5	0.0	0.0
	CLAY	6.4	0.0	1.7	3.5	0.3	1.5	2.5	0.0	0.0	0.0
	TOTAL	9.5	0.0	3.8	57.1	4.0	5.7	19.3	0.5	0.0	0.0
9913.1	SA+SI	2.9	0.0	1.9	51.4	4.8	5.7	15.2	0.0	0.0	0.0
	CLAY	7.4	0.0	2.0	3.5	0.3	2.2	2.7	0.0	0.0	0.0
	TOTAL	10.3	0.0	3.9	54.9	5.1	7.9	17.9	0.0	0.0	0.0
9916.5	SA+SI	3.5	0.0	2.6	40.2	3.1	18.4	7.0	2.6	1.7	0.0
	CLAY	6.7	0.0	1.8	5.7	0.5	3.9	1.3	0.5	0.5	0.0
	TOTAL	10.2	0.0	4.4	45.9	3.6	22.2	8.3	3.1	2.3	0.0
9919	SA+SI	7.6	0.0	5.1	58.2	7.6	5.1	4.4	3.8	2.5	0.0
	CLAY	2.3	0.0	0.8	1.6	0.1	0.2	0.7	0.2	0.1	0.0
	TOTAL	9.9	0.0	5.8	59.8	7.7	5.3	5.1	4.0	2.6	0.0

MINERALOGICAL ANAYLSIS EXPRESSED AS PERCENT OF TOTAL SAMPLE

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

DEPTH		ILLITE	KAOLI-NITE	CHLORITE	QUARTZ	FELDSPAR	CALCITE	FERROAN DOLOMITE	PYRITE	SPHALE-RITE	ANHY-DRITE
9919.3	SA+SI	12.3	0.0	8.2	54.8	5.5	4.1	8.9	3.4	2.1	0.0
	CLAY	0.3	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	12.6	0.0	8.3	55.0	5.5	4.1	8.9	3.4	2.1	0.0
9919.4	SA+SI	12.0	0.0	6.8	56.4	6.0	4.3	8.5	5.1	0.0	0.0
	CLAY	0.4	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	12.4	0.0	7.0	56.6	6.0	4.3	8.6	5.1	0.0	0.0
9920.7	SA+SI	10.3	0.0	5.2	42.6	6.4	3.9	6.4	19.3	5.2	0.0
	CLAY	0.3	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL	10.6	0.0	5.2	42.7	6.5	3.9	6.5	19.4	5.2	0.0
9921.1	SA+SI	1.5	0.0	1.5	74.5	2.2	14.6	2.9	2.2	0.0	0.0
	CLAY	0.1	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.0	0.0
	TOTAL	1.5	0.0	1.5	74.9	2.2	14.7	2.9	2.2	0.0	0.0
9922.7	SA+SI	11.9	0.0	6.8	57.6	6.8	4.2	5.9	4.2	1.7	0.0
	CLAY	0.4	0.0	0.1	0.2	0.0	0.1	0.1	0.0	0.0	0.0
	TOTAL	12.2	0.0	6.9	57.8	6.8	4.3	6.0	4.3	1.7	0.0
9923.1	SA+SI	9.7	0.0	6.5	58.1	6.5	4.8	8.1	4.0	1.6	0.0
	CLAY	0.3	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	10.0	0.0	6.6	58.3	6.5	4.9	8.1	4.0	1.6	0.0
9924.3	SA+SI	11.9	0.0	6.6	52.9	6.5	5.3	11.9	4.0	0.0	0.0
	CLAY	0.4	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	TOTAL	12.3	0.0	6.7	53.0	6.5	5.3	12.0	4.0	0.0	0.0
9925.5	SA+SI	0.0	0.0	0.0	82.1	3.0	0.7	9.0	4.5	0.0	0.0
	CLAY	0.1	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0
	TOTAL	0.1	0.0	0.0	82.4	3.0	0.9	9.0	4.5	0.0	0.0
9928	SA+SI	4.4	0.0	6.1	34.9	5.2	3.1	20.1	1.3	0.0	0.0
	CLAY	16.3	0.0	3.7	2.6	0.3	0.8	1.3	0.0	0.0	0.0
	TOTAL	20.7	0.0	9.8	37.5	5.5	3.8	21.4	1.3	0.0	0.0
9929.5	SA+SI	4.4	0.0	4.4	35.5	5.3	3.1	16.0	0.9	0.0	0.0
	CLAY	21.2	0.0	5.1	2.8	0.0	0.6	0.6	0.0	0.0	0.0
	TOTAL	25.6	0.0	9.5	38.3	5.3	3.7	16.6	0.9	0.0	0.0
9929.9	SA+SI	3.9	0.0	4.7	31.9	6.4	3.1	23.3	0.8	0.0	0.0
	CLAY	14.6	0.0	4.5	5.0	0.3	1.1	1.4	0.0	0.0	0.0
	TOTAL	18.5	0.0	9.1	36.9	6.7	4.2	24.7	0.8	0.0	0.0

MINERALOGICAL ANAYLSIS EXPRESSED AS PERCENT OF TOTAL SAMPLE

BIG SKY NO. 1 H.D.
WILDCAT, ROOSEVELT COUNTY, MONTANA
BAKKEN AND THREE FORKS FORMATIONS
MID CONTINENT REGION

DEPTH		ILLITE	KAOLI-NITE	CHLORITE	QUARTZ	FELDSPAR	CALCITE	FERROAN DOLOMITE	PYRITE	SPHALE-RITE	ANHY-DRITE
9930.1	SA+SI	2.9	0.0	3.7	33.6	4.1	2.5	27.9	1.2	0.0	0.0
	CLAY	15.2	0.0	3.5	3.8	0.0	0.5	1.0	0.0	0.0	0.0
	TOTAL	18.1	0.0	7.2	37.4	4.1	3.0	28.9	1.2	0.0	0.0
9930.7	SA+SI	7.3	0.0	6.4	36.4	4.5	2.7	21.0	0.5	0.0	0.0
	CLAY	11.2	0.0	3.7	4.5	0.4	0.7	0.7	0.0	0.0	0.0
	TOTAL	18.4	0.0	10.1	40.9	4.9	3.5	21.7	0.5	0.0	0.0

Jacks, Bruce
Ken

Subject PROGRESS REPORT - BIG SKY NO. 1, BAKKEN FORMATION ANALYTICAL PROGRAM

Interoffice Correspondence

Date August 30, 1990

From R. Skopec Core and Fluid Technology
J. Perez Completion Engineering

To Distribution

A total of 55 feet of core was cut from the Bakken and Three Forks formations. The multishot core orientation data has been proven to be reliable. The following is a summary of the entire analytical program with comments concerning timing and preliminary results.

Anelastic Strain Relaxation (ASR)

Ten samples were examined with the ASR wellsite technique to determine the principal horizontal stress orientation. Four of the test samples exhibited a N70E trend, 3-4 of tests experienced some difficulty in the sample preparation process and 2 of the samples yielded data that was out of the trend. This type of scatter is not unusual to ASR and this is particularly true in shales. It is worth noting that the rock for the most part was in contraction rather than expansion during the course of the experiments. This phenomena is being investigated and is most likely attributed to mineralogy and/or dewatering. Although the ASR tests were run isothermally, temperature and other environmental effects will be investigated. Differential strain curve analysis and acoustic anisotropy measurements will be used to expand upon the field interpretation.

Fracture Analysis

A total of 59 natural fractures were identified over the 55' core interval. Eighteen of the 59 fractures were completely mineralized. An additional 16 induced fractures were also noted. The expected fracture orientation based solely on the ASR data would be to follow the maximum stress orientation (assuming our minimum stress is orthoganol to our maximum). This trend is only true for the mineralized fractures, while the open fractures strike more in a north-south direction. The induced fractures also follow a north south trend. Because of the very small data population, it will be very difficult to place great importance on the fracture orientation data. Statistically there are never more than three fractures contributing (on a weighted average basis) to any preferred orientation. Given our data set, this suggests a random distribution for fracture orientation.

Basic Core Analysis/Petrography

Plugs have now been successfully cut in a horizontal direction for fresh-state resistivity and rock mechanics testing. Plugs are also being cut for thin sections (fluorescent dye injected), mineralogy by X-ray diffraction and organic geochemistry. Howard White has selected zones of interest for petrographic evaluation. The plugging of shales has been a problem in the past and TerraTek now uses a modified core bit. Vertical plugs will also be attempted for rock anisotropy studies. A multicomponent Gamma Ray trace has been run.

Full diameter porosity, permeability and saturations will be attempted on 10 samples. Directional permeability studies will be pursued if warranted. This data will be used in conjunction with the fracture analysis and rock mechanics. C/T scans and/or NMR imaging may also be used to visually examine directional trends. Mercury injection may also be used for determining the pore size distribution of the rock and is an excellent tool for identifying microfractues.

Core chips were collected in each of the four intervals and are going to be used to obtain XRD data. These samples are also suitable for static fluid compatibility testing if necessary.

Rock Mechanics

All rock mechanics testing is being coordinated by the Core Technology and Completion Engineering Group. A Mohr Failure Envelope should be available by late Friday, August 31, or early September 4. All pressure regime and experimental parameters have been determined, where Sigma-H = 0.8 PSI/FT. (determined from micro-frac), Sigma-VMAX (overburden) = 1.0 PSI/ft and pore pressure = 6000 PSI. Net effective reservoir stress will be determined from these data. A second load frame is being used for obtaining triaxial and uniaxial compression data. Static and dynamic elastic moduli are being measured concurrently. Tensile strength data will be collected using the Brazilian bench top technique. Differential strain curve analysis will be initiated early next week (on samples previously used for ASR). Dynamic data will need to be compared to the digital sonic log and the static data will be used for calibration purposes. A density log from an offset well is being obtained to refine the estimation of the overburden pressure gradient.

This program was presented to our partner, Canadian Hunter and they are in agreement with our analytical scheme. They also have obtained similar ASR results and concur with the maximum stress orientation found in our work.

I have attached a table of sample depths for the laboratory program, as well as a rough time estimate for obtaining the results. Please contact me at the Tech Center if you should have any questions.

Robert A. Skopec

Joe I. Perez

/jw

Attachment

BIG SKY NO. 1

CORE ANALYSIS TIME TABLE

	Data Expected	Preliminary Report	Final
ASR	8/21	8/23	9/10
Mohr Failure Envelope	9/4	9/6	9/10
Fracture Analysis	8/27	9/6	9/10
Basic Rock Mechanics	9/5	9/10	9/12
DSA	9/10	9/17	9/20
Acoustic Anisotropy	9/20	I	I
Thin Sections	9/10	9/12	I
TOC/Geochemistry	9/10	9/10	9/10
X-Ray Diffraction	9/7	9/7	9/7
Resistivity	9/10	9/10	9/10
Full Diameter Core Analysis	9/21	I	I
Directional Permeability	10/1	I	I

I = Indeterminate

BIG SKY NO. 1 WELL
BAKKEN FORMATION
ANALYTICAL PROGRAM

	1" PLUG FOR T-S XRD, TOC	ASR	FULL DIAMETER	RESISTIVITY/ROCK MECHANICS
UPPER (8.7')				
9875	9875		9876	9877.3
	9877 9877.3 (silt)		9878	9879.6
	9879		9880.3	
	9881			9883 (near contact)
	9883 9882.5 (silt)			
MIDDLE (34.1')				
9883.7	9884 (silt)		9887	9886 (silt)
	9887 (silt)			
	9890 (silt)			
	9893 (sand)		9893	9892 (sand cross beds)
	9897 (sand)	Core 1	9899	
	9900	1.9900.5		
	9904	2.9901.1		9901.7 (ASR sample, DSA)
	9906.9 (frac fill)	*3.9901.7	9907	9902.4 (ASR sample, DSA)
		*4.9902.4		
		**5.9902.8		9902.8 (ASR sample, DSA)
	9913		9913	9910
LOWER (5.8')	9918			
9918.8	9919			9919.3
	9921		9922.5	9921
	9923	Core 2		
	9924.3	6.9924.1		9922.5
THREE FORKS (6.4')				
9924.6	9925	*7.9924.7		9924.7 (ASR sample, DSA)
	9928	*8.9927.7		9927.7 (ASR sample, DSA)
	9930	9.9928.4	9928	
		**10.9929		9929.5
				9929 (ASR sample, DSA)
BOTTOM	9931 (Dolo sand)			9930
9931				

*ASR Trend Data ** Nontrend

Core 1.	9875-9905	30'
Core 2.	9906-9931	25'

Form 3160-4
(November 1983)
(formerly 9-330)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUBMIT IN DUPLICATE (See other instructions on reverse side)

Form approved.
Budget Bureau No. 1004-0137
Expires August 31, 1985

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☐ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: Oryx Energy Company

3. ADDRESS OF OPERATOR: P.O. Box 26300, Oklahoma City, OK 73126-0300

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface: 1690 FSL & 1490 FEL
At top prod. interval reported below
At total depth: 1410 FNL & 2190 FEL Section 11-30N-58E Bottom Hole Loc.

5. LEASE DESIGNATION AND SERIAL NO.: 142002567453
6. IF INDIAN, ALLOTTEE OR TRIBE NAME:
7. UNIT AGREEMENT NAME:
8. FARM OR LEASE NAME: Big Sky
9. WELL NO.: #1
10. FIELD AND POOL, OR WILDCAT: Wildcat
11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Section 2-30N-58E
12. COUNTY OR PARISH: Roosevelt
13. STATE: Montana
14. PERMIT NO.:
DATE ISSUED:

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
7/16/90	10/1/90	Well T/A'd	GR=2171'	2171.0

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
TMD=12195' TVD=10088'	TVD=10088'	---	→	X	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: N/A

25. WAS DIRECTIONAL SURVEY MADE: Yes

26. TYPE ELECTRIC AND OTHER LOGS RUN: BHC Sonic/GR; DLL/MSFL/GR; LDT/CNL/GR; Array Sonic; SDT; NGT.

27. WAS WELL CORED: Yes

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13 3/8"	54.5	1620	17 1/2"	1260 sx	
9 5/8" & 9 3/4"	43.5,47.0, 59.2,47.0	9388'	9.75" &9.625"	2300 sx	
5 1/2"	20.0 & 23	12195'	8 1/2"	N/A	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
5 1/2"	9225	12195'	None	

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)

31. PERFORATION RECORD (Interval, size and number)
Pre-perfed liner
9989-12194

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
12195	90 bbls. 10% acetic acid
	8 gals. MSA

33.* PRODUCTION

DATE FIRST PRODUCTION:
PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump):
WELL STATUS (Producing or shut-in): T/A wo evaluation

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.):
TEST WITNESSED BY:

35. LIST OF ATTACHMENTS
Horizontal Survey, Drill Stem tests, logs [illegible]

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Susan Carlesh TITLE Administrative Assistant DATE 1/15/91

*(See Instructions and Spaces for Additional Data on Reverse Side)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

37. SUMMARY OF POROUS ZONES: (Show all important zones of porosity and contents thereof; cored intervals; and all drill-stem, tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures, and recoveries):

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
	9865.1	9905.0	DST #1
	9916.1	9931.0	DST #2
	9875	9905	Coring 30'
	9906	9931	Coring 25'
Greenhorn	4336		
Mowry	4652		
Piper	6304		
Kibbey LS	7724		
Charles	7861		
Base Last Salt	8161		
Ratcliffe	8523		
Mission Canyon	8710		
Lodge Pole	9304		
Upper Bakken Sh.	9870		
Middle Bakken	9882		
Lower Bakken Sh.	9915		

38. GEOLOGIC MARKERS

NAME	TOP	
	MEAS. DEPTH	TRUE VERT. DEPTH