

X-ray diffraction analysis of cuttings from the

Texaco Inc. East Kurupa Unit No. 2 well (1,310'-9,310'); and  
Mobil Oil Corporation Echooka Unit No. 1 well (1,500'-10,110').



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X-RAY DIFFRACTION ANALYSIS									
WELL NAME	ECHOOKA								
SAMPLE ID	1500-1530	2700-2730	3820-3830	4950-4960	6260-6270	7830-7850	8090-9100	9580-9590	10105-10110
<b>CLAYS/MINERALS &lt; 4 Microns</b>									
WEIGHT PERCENT	15%	7%	9%	7%	10%	10%	11%	7%	11%
I/S % Expandability		15	15	15	15	15	15	15	15
SMECTITE	8.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ILLITE/SMECTITE (I/S)	0.0%	5.6%	8.1%	11.7%	10.1%	8.9%	11.9%	10.0%	12.2%
ILLITE/MICA	48.7%	28.2%	35.0%	38.0%	27.5%	43.7%	28.7%	34.3%	28.6%
KAOLINITE *	4.3%	2.8%	2.9%	2.9%	1.6%	1.5%	0.6%	0.9%	0.7%
CHLORITE	22.6%	35.3%	29.1%	21.7%	12.3%	10.7%	5.4%	12.2%	9.9%
PYROPHYLLITE	2.9%	1.3%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
QUARTZ	7.8%	8.7%	12.3%	13.7%	18.5%	15.5%	20.1%	22.1%	19.5%
K-FELDSPAR	1.6%	1.4%	2.3%	2.3%	2.4%	1.4%	2.2%	2.3%	1.6%
PLAGIOCLASE	2.5%	12.4%	2.7%	2.8%	3.2%	5.0%	9.5%	10.5%	11.8%
CALCITE	0.1%	0.3%	0.0%	0.0%	0.0%	0.8%	4.6%	1.3%	0.8%
DOLOMITE	0.4%	0.0%	0.0%	0.0%	0.0%	1.8%	3.7%	1.9%	2.6%
SIDERITE *	0.5%	1.2%	1.8%	1.5%	0.0%	1.9%	2.2%	1.9%	3.3%
PYRITE	0.5%	0.5%	0.5%	0.8%	0.5%	0.9%	0.6%	1.0%	1.1%
ANALCIME	0.0%	2.2%	3.8%	4.4%	23.8%	7.8%	10.5%	1.6%	8.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<b>MINERALS &gt; 4 Microns</b>									
WEIGHT PERCENT	85%	93%	91%	93%	90%	90%	89%	93%	89%
QUARTZ	65.1%	76.2%	75.9%	78.9%	53.6%	59.9%	52.6%	54.3%	59.4%
K-FELDSPAR	1.4%	1.0%	1.4%	1.0%	4.3%	1.1%	2.1%	3.6%	1.8%
PLAGIOCLASE	10.1%	9.4%	9.0%	8.5%	11.9%	21.9%	27.3%	33.8%	17.0%
CALCITE	1.2%	0.2%	0.4%	0.3%	2.8%	2.2%	4.6%	1.6%	1.8%
DOLOMITE	1.2%	0.0%	0.2%	0.2%	0.0%	3.9%	3.1%	1.2%	4.2%
SIDERITE *	0.3%	0.3%	0.0%	0.2%	0.5%	0.8%	1.1%	0.9%	1.9%
PYRITE	0.3%	0.3%	0.2%	0.2%	0.8%	0.6%	0.6%	0.0%	0.6%
ANALCIME	1.0%	1.7%	2.1%	2.8%	19.0%	4.7%	5.7%	0.4%	6.5%
ILLITE/MICA	6.0%	2.5%	3.4%	3.3%	2.4%	1.6%	1.4%	1.5%	2.3%
KAOLINITE *	1.9%	0.9%	1.5%	0.4%	0.9%	1.0%	0.0%	0.4%	0.7%
CHLORITE	11.6%	7.5%	5.8%	4.1%	3.8%	2.3%	1.5%	2.2%	3.8%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
* Please verify									

X-RAY DIFFRACTION ANALYSIS									
WHOLE ROCK MINERALOGY CLAY & SAND/SILT COMBINED									
WELL NAME	ECHOOKA								
SAMPLE ID	1500-1530	2700-2730	3820-3830	4950-4960	6260-6270	7830-7850	8090-9100	9580-9590	10105-10110
QUARTZ	56.6%	71.7%	70.1%	74.0%	50.2%	55.5%	49.2%	51.9%	54.8%
K-FELDSPAR	1.4%	1.1%	1.5%	1.1%	4.1%	1.2%	2.1%	3.6%	1.8%
PLAGIOCLASE	8.9%	9.6%	8.4%	8.0%	11.1%	20.2%	25.4%	32.1%	16.4%
CALCITE	1.0%	0.2%	0.4%	0.3%	2.5%	2.0%	4.6%	1.6%	1.7%
DOLOMITE	1.1%	0.0%	0.2%	0.2%	0.0%	3.7%	3.2%	1.2%	4.0%
SIDERITE *	0.3%	0.3%	0.2%	0.3%	0.4%	0.9%	1.2%	1.0%	2.1%
PYRITE	0.3%	0.3%	0.2%	0.3%	0.8%	0.6%	0.6%	0.1%	0.7%
ANALCIME	0.8%	1.7%	2.3%	2.9%	19.5%	5.0%	6.2%	0.5%	6.7%
TOTAL	70.6%	84.9%	83.3%	87.2%	88.7%	89.0%	92.5%	92.0%	88.1%
SMECTITE	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ILLITE/SMECTITE (I/S)	0.0%	0.4%	0.7%	0.9%	1.0%	0.9%	1.3%	0.7%	1.4%
ILLITE/MICA	12.4%	4.2%	6.3%	5.9%	4.8%	5.8%	4.3%	3.9%	5.4%
KAOLINITE *	2.2%	1.0%	1.6%	0.6%	1.0%	1.1%	0.1%	0.4%	0.7%
CHLORITE	13.2%	9.4%	7.9%	5.4%	4.6%	3.2%	1.9%	2.9%	4.5%
PYROPHYLLITE	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTAL	29.4%	15.1%	16.7%	12.8%	11.3%	11.0%	7.5%	8.0%	11.9%
GRAND TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
RELATIVE CLAY ABUNDANCE									
I/S % Expandability		15	15	15	15	15	15	15	15
SMECTITE	4.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ILLITE/SMECTITE (I/S)	0.0%	2.5%	4.4%	6.8%	8.6%	8.2%	16.8%	9.0%	11.7%
ILLITE/MICA	42.1%	27.7%	37.5%	46.2%	42.1%	53.3%	57.3%	48.9%	44.8%
KAOLINITE *	7.6%	6.8%	9.8%	4.8%	8.5%	9.7%	0.8%	5.6%	5.6%
CHLORITE	44.9%	62.4%	47.5%	42.2%	40.8%	28.9%	25.0%	36.5%	37.9%
PYROPHYLLITE	1.5%	0.6%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
* Please verify									

X-RAY DIFFRACTION ANALYSIS							
WELL NAME	E KURUPA						
SAMPLE ID	1310-1340	2720-2750	4150-4160	5910-5920	7150-7160	8840-8850	9300-9310
<b>CLAYS/MINERALS &lt; 4 Microns</b>							
WEIGHT PERCENT	14%	14%	9%	9%	11%	9%	10%
I/S % Expandability		15		10	10		
SMECTITE	48.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ILLITE/SMECTITE (I/S)	0.0%	14.0%	0.0%	7.7%	6.0%	0.0%	0.0%
ILLITE/MICA	21.0%	33.2%	38.3%	33.9%	18.4%	15.4%	14.3%
KAOLINITE *	1.5%	1.0%	3.3%	2.8%	2.3%	3.6%	1.6%
CHLORITE	15.7%	31.3%	32.7%	26.1%	54.0%	43.4%	63.2%
PYROPHYLLITE	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	0.0%
QUARTZ	5.2%	9.0%	9.9%	10.5%	8.7%	16.0%	7.0%
K-FELDSPAR	1.8%	3.3%	1.7%	3.0%	0.8%	1.9%	1.8%
PLAGIOCLASE	1.7%	4.6%	2.7%	3.2%	2.5%	1.8%	2.4%
CALCITE	0.8%	0.0%	0.0%	0.0%	1.1%	9.8%	5.7%
DOLOMITE	1.3%	0.0%	0.0%	0.0%	4.4%	5.4%	2.2%
FE-DOLOMITE	0.0%	1.8%	10.0%	9.6%	0.0%	0.0%	0.0%
SIDERITE	1.4%	1.1%	0.8%	1.0%	0.9%	1.6%	1.0%
PYRITE	1.0%	0.7%	0.7%	0.7%	0.8%	1.0%	0.7%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<b>MINERALS &gt; 4 Microns</b>							
WEIGHT PERCENT	86%	86%	91%	91%	89%	91%	90%
QUARTZ	64.9%	63.0%	52.4%	51.2%	63.4%	62.5%	64.0%
K-FELDSPAR	1.2%	1.2%	0.6%	0.8%	0.9%	0.5%	0.8%
PLAGIOCLASE	5.0%	13.7%	8.0%	9.7%	8.6%	5.1%	7.5%
CALCITE	2.3%	0.0%	0.2%	0.6%	2.0%	8.3%	4.5%
DOLOMITE	3.2%	0.0%	0.0%	0.0%	5.8%	5.6%	0.7%
FE-DOLOMITE	0.0%	7.1%	22.3%	19.2%	0.0%	0.0%	0.0%
SIDERITE	0.4%	0.6%	0.7%	0.4%	0.2%	0.3%	0.6%
PYRITE	0.7%	0.5%	0.4%	0.8%	0.4%	0.4%	1.1%
ILLITE/MICA	6.1%	3.4%	3.6%	3.1%	3.1%	1.5%	2.2%
KAOLINITE *	1.4%	1.7%	1.8%	2.0%	1.2%	1.9%	2.7%
CHLORITE	14.8%	8.8%	10.1%	12.3%	14.4%	13.9%	15.9%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
* Please verify							

X-RAY DIFFRACTION ANALYSIS							
WHOLE ROCK MINERALOGY CLAY & SAND/SILT COMBINEC							
WELL NAME E KURUPA							
SAMPLE ID	1310-1340	2720-2750	4150-4160	5910-5920	7150-7160	8840-8850	9300-9310
QUARTZ	56.6%	55.6%	48.4%	47.7%	57.4%	58.1%	58.6%
K-FELDSPAR	1.3%	1.5%	0.7%	1.0%	0.9%	0.7%	0.9%
PLAGIOCLASE	4.5%	12.5%	7.5%	9.1%	7.9%	4.8%	7.0%
CALCITE	2.1%	0.0%	0.2%	0.5%	1.9%	8.5%	4.6%
DOLOMITE	2.9%	0.0%	0.0%	0.0%	5.7%	5.6%	0.9%
FE-DOLOMITE	0.0%	6.4%	21.1%	18.4%	0.0%	0.0%	0.0%
SIDERITE	0.6%	0.7%	0.7%	0.4%	0.3%	0.4%	0.6%
PYRITE	0.7%	0.6%	0.4%	0.8%	0.5%	0.5%	1.0%
TOTAL	68.8%	77.2%	79.1%	77.9%	74.5%	78.5%	73.7%
SMECTITE	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ILLITE/SMECTITE (I/S)	0.0%	1.9%	0.0%	0.7%	0.7%	0.0%	0.0%
ILLITE/MICA	8.1%	7.5%	6.8%	5.8%	4.8%	2.8%	3.4%
KAOLINITE *	1.4%	1.6%	1.9%	2.0%	1.3%	2.0%	2.6%
CHLORITE	14.9%	11.8%	12.2%	13.5%	18.7%	16.7%	20.4%
PYROPHYLLITE	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
TOTAL	31.2%	22.8%	20.9%	22.1%	25.5%	21.5%	26.3%
GRAND TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
RELATIVE CLAY ABUNDANCE							
I/S % Expandability		15		10	10		
SMECTITE	21.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ILLITE/SMECTITE (I/S)	0.0%	8.4%	0.0%	3.0%	2.6%	0.0%	0.0%
ILLITE	26.1%	32.7%	32.4%	26.1%	18.7%	13.1%	12.8%
KAOLINITE *	4.6%	6.9%	9.1%	9.2%	5.3%	9.5%	9.8%
CHLORITE	47.7%	52.0%	58.5%	61.2%	73.4%	77.4%	77.4%
PYROPHYLLITE	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
* Please verify							