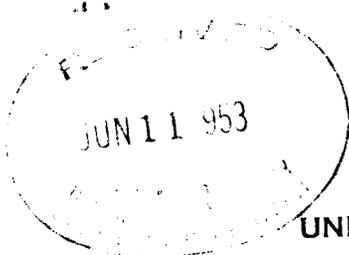


FORMATION RECORD—Continued

Budget Bureau No. 42-R355.2.
Approval expires 12-31-52.

Form 9-380

U. S. LAND OFFICE Salt Lake City
SERIAL NUMBER SL066103
LEASE OR PERMIT TO PROTECT Big Flat
Unit



0							
---	--	--	--	--	--	--	--

1138' FNL
869' FWL
of S. 11

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ORIGINAL FORWARDED TO CASPER
LOG OF OIL OR GAS WELL

LOCATE WELL CORRECTLY

Company Glen M. Ruby, Operator Address 1019 Kearns Bldg., Salt Lake City, Utah
Lessor or Tract Big Flat Unit Field _____ State Utah
Well No. 1-A Sec. 11 T. 26S R. 19E Meridian Salt Lake County Grand
Location 4221 ft. X of _____ Line and 9418 ft. W of _____ Line of Section 7 Elevation 6077' KCB See note
(Denote floor relative to _____)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

4221' FSL and 9418' W from W line of S. 7 Signed Glen M. Ruby
Date _____ T 26S, R20E Title Operator

The summary on this page is for the condition of the well at above date.

Commenced drilling 27 October, 19 51. Finished drilling 17 March, 19 53.

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 6367 to 6373 O & G No. 4, from _____ to _____
No. 2, from 7824 to 7963 No. 5, from _____ to _____
No. 3, from _____ to _____ No. 6, from _____ to _____

IMPORTANT WATER SANDS or ZONES

No. 1, from 2337 to 2355 No. 3, from 8105 to 8213 (portions)
No. 2, from 8013 to 8105 No. 4, from _____ to _____

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated		Purpose
							From—	To—	
13 3/8	48	8		921	straight				case cave.
8 5/8	58	8		4479	straight				cave & water
7	28	6		(4247 to 7010)	Baker float				case salt.
* Extreme line. Set on Burns' Limer Marker.									

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13 3/8	921	180 sacks	Downed		
8 5/8	4479	360 sacks.	Pumped, Halliburton	retainer.	
7	4247 to				retainer.

POOR COPY

FOLD HERE

Heaving plug—Material Length Depth set

Adapters—Material Size

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
No shooting was done. See history of well for acidizing record.						

TOOLS USED

Rotary tools were used from 4500 feet to 8213 feet, and from feet to feet

Cable tools were used from 0 feet to 4500 feet, and from feet to feet

DATES

....., 19..... Put to producing, 19.....

The production for the first 24 hours was barrels of fluid of which % was oil; % emulsion; % water; and % sediment. Gravity, °Bé. 35 and 42.9

If gas well, cu. ft. per 24 hours Gallons gasoline per 1,000 cu. ft. of gas

Rock pressure, lbs. per sq. in.

EMPLOYEES

....., Driller , Driller

....., Driller , Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
Surface	230	230	Kayenta (Jurassic) sandstone and shale.
230	550	320	Wingate (Jurassic) massive sandstone.
550	925	375	Chinle (Triassic) Shale with sandstones and some limestones. Shinarump — missing at this location.
925	1395	470	Moenkoni (Triassic) siltstone with shales and sandstones.
1395	2085	690	Outler-Rico (Permian) sandstones, shales, and siltstones. (undifferentiated)
2085	4100	2015	Hermosa (Pennsylvanian) limestone, sandstone, arkose, siltstone. (upper)
4100	7821	3721	Hermosa (Pennsylvanian) shale, siltstone, anhydrite, gypsum, salt. (Paradox) Salt — 4158 to 7520
7821	7821	4 inches	Molas (Pennsylvanian) shale and limestone conglomerate.

(OVER)

16-43094-2

POOR COPY

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION
7821	8105	284	Leadville (Mississippian) limestone, dolomitic in part.
8105	8213 T.D.	108	Devonian dolomite, some shale and chert.

6033 GL

NOTE: Ground elevation of location is 6033.
 Derrick floor elevation from surface to 1534 —6035
 " " " " 1534 to 4500 —6037
 Kelly bushing elevation from 4500 to 8213 —6047

POOR COPY

SUMMARY OF OPERATIONS

BIG FLAT UNIT No. 1-A
 SEC. 11, T26S - R19E, SLM
 GRAND COUNTY, UTAH

SLC 066103

BIG FLAT UNIT No. 1-A WAS SPUNDED OCTOBER 27, 1951, WALTER L. HUEY - CONTRACTOR
 A. MILEK - FIELD SUPERINTENDENT. DRILLING PROCEEDED SATISFACTORILY TO A DEPTH OF 723 FEET, WHERE CROOKED HOLE AND CAVING CHINLE SHALE GAVE CONSIDERABLE DIFFICULTY. THIS WAS CORRECTED BY CEMENTING AND DRILLING OUT.

A CASING SEAT FOR THE 13 3/8 INCH WAS FOUND AT 921 FEET IN A FIRM SANDSTONE AT THE BOTTOM OF THE CHINLE FORMATION. THIS STRING OF CASING WOULD NOT GO TO BOTTOM (STOPPED AT 723 FEET) ON THE FIRST RUN AND IT WAS NECESSARY TO UNDERREAM. ON THE SECOND ATTEMPT THE CASING WENT TO 840 FEET AND PARTED. THE UPPER SECTION WAS PULLED AND 5 JOINTS OF THE LOWER SECTION WERE FISHED OUT, LEAVING 2 JOINTS IN THE HOLE. UPON GOING BACK IN AFTER THE LAST 2 JOINTS THE HOLE HAD BRIDGED OVER THEM. THE CAVING SHALE BETWEEN 630 AND 670 FEET HAD BROKEN IN AGAIN. THIS WAS RECEMENTED AND DRILLED OUT. FORTUNATELY, THE REMAINING 2 JOINTS WERE RECOVERED. THE HOLE WAS PREPARED TO RE-RUN THE CASING AND THE BOTTOM 8 JOINTS WERE RUN WITH THREADS AND COLLARS OFF AND BUTT WELDED. THE CASING WAS LANDED AT 921 FEET AND CEMENTED WITH 300 SACKS POURED AROUND THE ANNULUS. FILL-UP WAS TO WITHIN 300 FEET OF THE SURFACE - REMAINDER OF VOID WAS FILLED WITH AQUA-JEL. 48 DAYS WERE CONSUMED IN RUNNING CASING, CEMENTING, ETC.

DRILLING PROCEEDED TO 1534 FEET BY MARCH 7, 1952, WHEN OPERATIONAL DIFFICULTIES MADE IT NECESSARY TO DISCONTINUE OPERATIONS WITH MR. HUEY.

A NEW CONTRACT WAS MADE WITH CHILTON AND FERREL, USING A 48-L BUCYRUS ERIE SPUDDER, AND THEY RESUMED DRILLING APRIL 1, 1952. J. O. MCFADDIN HAD NOW ASSUMED DUTIES OF FIELD SUPERINTENDENT. DRILLING, WITH SOME REAMING, PROCEEDED SATISFACTORILY AND BY MAY 26TH A DEPTH OF 3340 FEET HAD BEEN REACHED. THE ZONE BETWEEN 1200 FEET AND 3000 FEET IS VERY ABRASIVE AND CAUSED MORE THAN NORMAL WEAR ON DRILLING LINES. A WATER SAND WAS ENCOUNTERED AT 2337 FEET TO 2355 FEET WHICH MADE 1.5 BARRELS PER HOUR OF SALT WATER CONTAINING 69,000 P/P.M. OF CHLORIDE. THIS WATER GAVE NO TROUBLE AND WAS USED FOR DRILLING.

IN THE ZONE 3300 FEET TO 3400 FEET IT WAS EXPECTED TO FIND A SHOW OF OIL IN AN OOLITIC LIMESTONE. A SHOWING OF OIL WAS FOUND FROM 3342 FEET TO 3351 FEET BUT THE EXPECTED OOLITIC LIMESTONE WAS MISSING. NO FURTHER SHOW.

DRILLING PROCEEDED WITH AN OCCASIONAL SHOW OF OIL (STRAINING) AND REACHED THE TOP OF THE SALT AT 4148 FEET ON JUNE 24, 1952. A SMALL SHOWING OF OIL WAS NOTED IN A GYPSUM AND ANHYDRITE BREAK AT 4241 FEET TO 4338 FEET.

BY JUNE 30TH DEPTH WAS 4372 FEET AND THE HOLE WAS CAVING IN A SOFT BLACK SHALE FROM 4358 FEET TO BOTTOM. THIS SHALE CONTAINED A SMALL AMOUNT OF GAS WHICH SPALLED THE FORMATION INTO THE HOLE. WATER FROM THE 2337 FEET TO 2355 FEET ZONE COMPLICATED THE PROBLEM. THE PERIOD FROM JUNE 30TH TO AUGUST 15TH WAS SPENT CLEANING OUT, FIGHTING CAVE WITH CEMENT AND CAL-SEAL, AND DRILLING AHEAD TO 4471.

4386 FEET OF 8 5/8 INCH, 32 LB., J55 CASING WAS RUN ON AUGUST 16TH, USING A FLOAT COLLAR BETWEEN THE 2ND AND 3RD JOINTS. FROM AUGUST 17TH TO OCTOBER 2, 1952, ATTEMPTS WERE MADE TO CLEAN OUT BELOW THE CASING AND TO DRILL AHEAD. THE HOLE WAS DRILLED TO 4550 FEET AND ADDITIONAL CASING WAS EXTENDED TO 4479 FEET. EFFORTS TO CLEAN UP THE HOLE AND TO CEMENT THE CASING FAILED AND THE DECISION WAS MADE TO CONTINUE OPERATIONS WITH ROTARY TOOLS.

A NEW CONTRACT WAS MADE WITH THE ANSCHUTZ DRILLING CO. TO USE A WILSON GIANT RIG. ON DECEMBER 3, 1952 THIS EQUIPMENT HAD BEEN RIGGED UP AND OPERATIONS PROCEEDED TO CEMENT THE 8 5/8 INCH CASING AND DRILL AHEAD. AFTER THREE ATTEMPTS THE 8 5/8 INCH CASING WAS CEMENTED WITH 360 SACKS OF STRATA-CRETE CEMENT, WITHSTANDING PRESSURE OF 2250 LBS./SQ. IN. AFTER DRILLING OUT, IT WAS DISCOVERED THAT THE CASING HAD PARTED AND THAT THE 2 LOWER JOINTS HAD BEEN BY-PASSED. THE CEMENTED PORTION OF THIS STRING OF CASING THEN BOTTOMED AT 4401 FEET PLUS OR MINUS.

DRILLING RESUMED ON DECEMBER 16TH AND BY DECEMBER 23RD A DEPTH OF 6370 FEET HAD BEEN REACHED. AT 10:30 P.M. DECEMBER 23RD, AT A DEPTH OF 6367 FEET DRILLING SPEED INCREASED AND A 3 FOOT SECTION WAS MADE IN 3 MINUTES. THE KELLY WAS DOWN. AFTER

WORKING ON THE ENGINES FOR A FEW MINUTES THE DRILLER, WHEN PULLING UP THE KELLY TO MAKE ANOTHER CONNECTION, NOTED MUD BLOWING OVER THE DRILLING NIPPLE BY-HEADS. THE MUD WAS MAKING A GOOD BLOW FROM THE FLOW LINE ENTERING THE SHAKER AS WELL AS HAVING A STRONG ODOR OF GAS AND A GOOD SHOWING OF FREE OIL (DARK BROWN TO BLACK, MEDIUM WEIGHT, 35 GRAVITY). THE HOLE WAS CIRCULATED UNTIL 3:00 A.M. DECEMBER 24TH. SAMPLES CONSISTED OF BLACK SHALE, SALT, AND A SMALL AMOUNT OF FINE GRAY SANDSTONE. THE EXACT CARRIER FORMATION COULD NOT BE ESTABLISHED. GAS LIFT ON THE MUD WAS 200 TO 600 LBS. SHOWINGS SUCH AS THIS WERE EXPECTED IN SMALL LENSES THROUGHOUT THE SALT SECTION. PRESSURES WERE GOOD BUT VOLUME SEEMED TO BE SMALL.

DRILLING RESUMED DECEMBER 24TH AND HAD REACHED 7438 FEET WHEN IT WAS NECESSARY FOR THE CONTRACTOR TO SHUT DOWN FOR 3 DAYS FOR REPAIRS. REPAIRS WERE COMPLETED ON JANUARY 1, 1953. DURING THIS SHUT-DOWN PERIOD THE SHAFER COMPLETE SHUTOFF RAMS HAD BEEN CLOSED AND, INADVERTENTLY, THE BLEEDER VALVE HAD ALSO BEEN CLOSED. UPON OPENING THE SHAFER RAMS TO RESUME DRILLING OIL AND GAS BLEW APPROXIMATELY 100 FEET INTO THE AIR. THIS ACCUMULATION HAD TAKEN PLACE DURING THE SHUT-DOWN PERIOD AND AFTER THE PRESSURE HAD MADE THIS BLOW OIL FLOWED THROUGH THE LINE AT THE RATE OF 120 B.O.P.D. FOR SEVERAL HOURS, AFTER WHICH THE FLOW DIMINISHED. NOTE: INTERMITTENT SHOWING OF THIS OIL AND GAS HAD CONTINUED FROM 6370 FEET TO PRESENT DEPTH.

DRILLING AND CORING RESUMED JANUARY 2ND AND A HALLIBURTON DST WAS RUN ON THE ZONE 7425 FEET TO 7524 FEET ON JANUARY 8TH. THIS TEST WAS MADE TO CHECK THE MASON SAND, AS SAMPLES WERE TOO POOR TO DETERMINE ITS EXISTENCE OR PRODUCTIVITY. THE TEST WAS NEGATIVE.

DRILLING AND CORING FROM JANUARY 9TH TO JANUARY 22ND REACHED 7766 FEET. AN EASTMAN MULTI-SHOT SURVEY WAS RUN WHICH REVEALED THAT THE BOTTOM OF THE HOLE AT THIS DEPTH WAS 9.52 FEET SOUTH AND 268.09 FEET WEST OF THE SURFACE LOCATION.

CORING AND DRILLING CARRIED THE HOLE TO 7817 FEET BY JANUARY 25TH WHEN J. O. McFADDIN RETURNED TO CALIFORNIA DUE TO ILL HEALTH. A. J. ARMELL ASSUMED DUTIES AS FIELD SUPERINTENDENT.

CORING ON JANUARY 26TH REACHED THE TOP OF THE LEADVILLE (MISSISSIPPI) LIMESTONE AT 7821 FEET. DRILLING PROCEEDED TO 7824 FEET. THE HOLE WAS CLEANED OUT IN PREPARATION TO RUN THE 7 INCH EXTREME-LINE CASING. THIS STRING OF CASING WOULD NOT GO PAST THE TOP OF THE LOWER SECTION OF THE PARTED 8 5/8 INCH CASING. AFTER MILLING THE OBSTRUCTION AND BY USING A SPECIAL, SPIRE-NOSED BAKER FLOAT SHOE, THE 7 INCH WAS LANDED AT 7810 FEET AND CEMENTED WITH 48 SACKS PUMPED THROUGH THE SHOE WITH A HALLIBURTON RETRIEVABLE CEMENTER (FEBRUARY 2ND). THE TOP OF THE 7 INCH STRING WAS HUNG INSIDE THE 8 5/8 INCH AT 4246 FEET WITH A BURNS LINER HANGER.

THE CEMENT WAS DRILLED OUT AND DRILLING FLUID CHANGED TO FRESH WATER. CORING RESUMED FEBRUARY 7TH AT 7827 FEET AND REACHED 7880 FEET BY FEBRUARY 10TH. A HALLIBURTON DST WAS RUN:

PACKER SET AT 7790 FEET.
OPEN-----3 HOURS.
RECOVERED 5 FEET OF DARK GREEN OIL AND 70 FEET OF WATER.

THE LEADVILLE LIMESTONE FROM 7821 FEET TO 7880 FEET CONTAINS ZONES OF POROSITY THROUGHOUT, STAINING TO SATURATION. MORE THAN HALF THE ZONE HAS BLEEDING CORES TO SATURATED CORES. SEVERAL CORES FAILED TO GIVE FULL RECOVERY - PART OF THIS IS BELIEVED TO BE DUE TO ZONES OF POROSITY. THIS OIL IS GREEN, HIGH GRAVITY (42.9 TO 43.0) AND CONTAINS CONSIDERABLE VOLATILE MATERIAL.

A LANE-WELLS RADIO-ACTIVITY LOG WAS RUN FEBRUARY 11TH.

THE PERIOD FROM FEBRUARY 12 TO FEBRUARY 21ST WAS SPENT SWABBING AND ACIDIZING, AS FOLLOWS:

FEBRUARY 12 - RIGGING UP TO SWAB AND ACIDIZE.

" 13 - SWABBING, ACIDIZING (500 GAL. 15% HCl).

" 14 - SWABBING, PACKER FAILED, WAITING ON NEW PACKER

FEBRUARY 15 - WAITING ON NEW PACKER, ACIDIZING (500 GAL 15% HCl),
RIGGING UP TO SWAB.

- " 16 - SWABBING, RECOVERED 2 TO 3 BARRELS / HOUR OF FLUID -
CO₂, H₂O, HCl (SPENT), AND SOME OIL.
- " 17 - SWABBING, VOLUME DIMINISHING.
- " 18 - SWABBING, VERY LITTLE RECOVERY.
- " 19 - ACIDIZED WELL WITH 3500 GAL. OF 15% HCl, WENT AWAY UNDER
1800 LBS. / SQ. IN. HELD 45 MINUTES. STARTED SWABBING.
NOTED FLUID RISE.
- " 20 - SWABBING - RECOVERING 2.0 TO 2.5 BARRELS/HOUR OF FLUID -
SPENT ACID, BS, AND OIL. CONSIDERABLE GREEN OIL COMING
UP. TEMPERATURE OF FLUID SWABBED - 62 DEGREES F.
- " 21 - SWABBING AS ABOVE, PACKER FAILED. PULLED TUBING.

FEBRUARY 22ND AND 25TH WERE SPENT IN TESTING FOR LEAK IN CASING AND FISHING FOR
JUNK.

FEBRUARY 25TH TO MARCH 1ST WAS SPENT IN CORING FROM 7880 TO 7891, DRILLING FROM
7891 TO 7923, AND WAITING ON PROPER TEST TOOL. A JOHNSTON 4 3/4 INCH DOUBLE PACKER
DST TOOL WAS RUN MARCH 1ST:

PACKER SET AT 7880.
TOOL OPEN - 2 1/2 HOURS.
RECOVERED - 60 FT. OF OIL CUT WATER AND 720 FT. OF HEAVY BRINE.
BHP - 965 LBS./SQ. IN.

THE PERIOD FROM MARCH 2ND THROUGH MAY 26TH WAS SPENT IN CORING, DRILLING ACIDIZING,
AND TESTING. THE DETAILED NATURE OF OPERATIONS DURING THIS PHASE WILL BE MORE CLEARLY
SET FORTH AS A DAILY LOG.

- MARCH 2 - SWABBING FROM 6000 FEET. RECOVERING SOME OIL, WATER INCREASING.
- " 3 - SWABBING -- WATER INCREASING.
- " 4 - PULLED TUBING. DRILLED 7918 TO 7926, LIMESTONE
- " 5 - DRILLED 7926 TO 7960, LIMESTONE. CORING 7960 TO 7967, LIMESTONE.
- " 6 - CORED TO 7972, LIMESTONE, DRILLED 7972 TO 8001, LIMESTONE.
- " 7 - DRILLED 8001 TO 8009, LIMESTONE. CORED 8009 TO 8029, DOLOMITIC
LIMESTONE AND DOLOMITE - LOOKS WET.
- " 8 - CORED 8029 TO 8044, DOLOMITE - VUGGY, HIGH POROSITY AND PERMEABILITY,
CARRIES SALT WATER. WAITING ON JOHNSTON TESTER.
- " 9 - RAN JOHNSTON DST: PACKER SET AT 8026, OPEN 4 HOURS, GOOD BLOW
75 MINUTES, FAIR BLOW 25 MINUTES, NO BLOW AFTER 4 HOURS, FLOW
PRESSURE 2750 LBS./SQ. IN., 6000 FT. FLUID RISE - FIRST PART OIL AND
GAS CUT. ABOUT HALF WAY OUT OF NOLE CIRCULATING PLUG LET GO AND LOST

REMAINDER OF FLUID, EXCEPT FOR 3 JOINTS ON BOTTOM - CONTAINED SALT WATER. RE-RAN TEST: 90 MINUTES GOOD BLOW, GOT 6000 FT. PLUS OF FLUID - ALL SALT WATER, NO OIL OR GAS.

- MARCH 10 - CORED 8044 TO 8061, AS LAST CORE ABOVE. REAMED HOLE AND DRILLED TO 8063.
- " 11 - CORED 8063, AS LAST ABOVE. CORED 8083 TO 8088, HARD-DENSE DOLOMITE.
 - " 12 - DRILLED 8088 TO 8105, HARD-DENSE DOLOMITE, CORED 8105 TO 8116, HARD-DENSE DOLOMITE WITH BLACK SILTSTONE AND INDURATED SHALE. TOP OF DEVONIAN.
 - " 13 - DRILLED 8116 TO 8125, DARK GRAY HARD DOLOMITE. CORED 8125 TO 8138, DARK GRAY DOLOMITE WITH BANDS OF BLACK SHALE AND DOLOMITE INTERBEDDED, VUGGY, LOOKS LIKE REEF IN T-W WELL.
 - " 14 - DRILLED 8138 TO 8152. CORED 8152 TO 8155, HARD GRAY DOLOMITE AND GRAY CHERT.
 - " 15 - REAMED TO 8155. DRILLED 8155 TO 8172, HIT BREAK. CORED 8172 TO 8175, DARK GRAY DOLOMITE, DEVONIAN REEF VUGGY IN PART SHOWS POROSITY.
 - " 16 - DRILLED 8175 TO 8182. CORED 8182 TO 8202, REEF AS ABOVE.
 - " 17 - CORED 8202 TO 8213, HARD GRAY DOLOMITE. TOTAL DEPTH OF HOLE.
 - " 18 - RAN LANE-WELLS RADIO-ACTIVITY LOG.
 - " 19 - RAN SCHLUMBERGER DIP-METER SURVEY, RESULTS UNRELIABLE. SET CEMENT RETAINER AT 7912 TO SHUT OFF WATER FROM BELOW.
 - " 20 - PLACED 10 FEET OF CEMENT ON TOP OF RETAINER. STARTED IN BAKER PACKER.
 - " 21 - BAKER TOOL SET IN CASING JUST ABOVE SHOE. RIGGING UP TO SWAB.
 - " 22 - SWABBING. FLUID LEVEL AT 2500 FEET.
 - " 23 - SWABBING THROUGH TUBING AT 3960. FLUID LEVEL DOESN'T LOWER. FLUID COMING IN HOLE. PULLED OUT.
 - " 24 - RAN JOHNSTON DST: PACKER SET AT 7883, TOOL OPEN 1 HOUR AND 35 MINUTES, CLOSED 30 MINUTES, SLIGHT BLOW THROUGHOUT TEST, FLUID RISE 1620 FEET OF SALT WATER. PULLED OUT. WAITING ON RETAINER.
 - " (25 - TOP OF CEMENT ON FIRST PLUG AT 7909. TOP OF UPPER PLUG
 - " (26 - AT 7887, BOTTOM 7890. CEMENTED: SQUEEZED 20 SACKS,
 - " (27 - BROKE DOWN AT 3000 LBS./SQ. IN., WENT AWAY AT 2000 TO 2400 LBS./SQ. IN. SET JOHNSON DOUBLE PACKER AT 7831 AND BUIBERSON HOLD-DOWN PACKER IN 7 INCH CASING AT 7782 - TESTING 7831 TO 7886. PACKERS FAILED, ANNULUS LOWERED. MOVED DOWN HOLE 12 FEET, STILL NOT HOLDING. CHANGED SIZE OF JOHNSTON PACKER AND WENT IN AGAIN.

MARCH (28 - SWABBING, WORKING ON SWABBING UNIT MOSTLY.

" (29
" (30

" 31 - DECIDED TO RELEASE ANSCHUTZ DRILLING CO. RIG. OPERATION COST TOO HIGH TO TEST WITH THIS EQUIPMENT.

APRIL 1ST TO 14TH SPENT MAKING NEW ARRANGEMENTS TO TEST. CONTRACT MADE WITH FERREL BROTHERS FOR USE OF A 48-L BUCYRUS-ERIE SPUDDER. MOVED IN. RIGGED UP. STARTED SWABBING.

APRIL 15 - SWABBING DRILLING FLUID.

" 16 - SWABBING, AS YESTERDAY BUT SOME OIL, FLUID VOLUME DECREASING. ORDERED ACID.

" 17 - SWABBING, FLUID INCREASING, CONSIDERABLE OIL NOW - ABOUT 1 BARREL/HOUR. PUMPED IN 4000 GALS. OF 15% HCl. WENT IN UNDER 1150 TO 1250 LBS. PSI, LAST 1000 GALS. PUT IN UNDER 1400 LBS. PSI AND PART OF IT BROKE AROUND PACKER. PRESSURE LOWERED TO 1150 LBS. PSI PACKER RESEATED ITSELF. VALVE OPENED AND FLOW BACK STARTED IMMEDIATELY. SWABBING BEGUN AS SOON AS FLOW BACK STOPPED. NOTE: THIS ACID JOB MOVED SLOWLY AND PRESSURE DID NOT FALL AWAY WHEN PUMP WAS STOPPED.

" 18 - SWABBING, CLEANING OUT.

" 19 - SWABBING, ABOUT 4 BARRELS/HOUR OF FLUID - 40% TO 90% OIL.

" 20 - RAN 500 GALS. OF JEL-X TO PROTECT PAY SECTION WHILE HOLE IN 8 5/8 INCH CASING IS REPAIRED.

" 21 - RAN CALIPER SURVEY AND SET DOWELL (EXPLODED) PLUG AT 7745 FEET. RAN SPINNER SURVEY AND FOUND LEAK AT LINER HANGER 4246-4247 - TAKING ABOUT 1 BARREL OF FLUID/HOUR AT 1300 LBS./SQ. IN. SET BAKER RETRIEVABLE CEMENTER 50 FEET ABOVE LEAK.

APRIL 22ND THROUGH MAY 6TH - AFTER TWO ATTEMPTS, LEAK IN LINER HANGER WAS CEMENTED WITH 6.5 BARRELS OF STRATA-LITE CEMENT THROUGH A BAKER DRILLABLE RETAINER SET AT 4209. AT FIRST PRESSURE BUILT UP TO 700-1500-2000 LBS./SQ. IN. AND WOULD FALL AWAY, ALTERNATELY. LAST 3 BARRELS WENT AWAY AT A STEADILY INCREASING PRESSURE AND BUILT UP TO 3450 LBS./SQ. IN. HELD. JOB SHUT IN. TESTS FOR LEAKS REVEALED NONE. CEMENT SET AND PLUGS DRILLED OUT.

MAY 7 - RAN SCHLUMBERGER DIP-METER SURVEY FROM 7796 TO 7866, SHOWED DIPS 17 DEGREES TO 20 DEGREES AND DIRECTION OF DIP FROM N-5-W TO N-37-W, RESULTS OF DOUBTFUL RELIABILITY.

" 8 - SET BAKER PRODUCTION PACKER AT 7790.

" 9 - SWABBING. FROM 10:00 AM TO 1:00 PM SWABBED 6 TO 8 BARRELS OF FLUID/HOUR, WHICH WAS FROM 40% TO 95% OIL. FROM 1:00 PM MORE WATER STARTED, LOOKED LIKE SOME DISSOLVED JEL-X. CONTINUED SWABBING 6 TO 8 BARRELS OF FLUID/HOUR WHICH WAS 35% TO 50% OIL. GAS SEEMS TO BE INCREASING.

" 10 - SWABBING, FLUID DIMINISHING. ACIDIZED WITH 4000 GALS. OF 15% HCl. PRESSURE DID NOT BUILD UP UNTIL ACID WAS ALMOST AWAY. BUILT UP TO 1700 LBS./SQ. IN. (2100 LBS./SQ. IN. FOR JUST A MOMENT) WHILE DISPLACING WITH 32 BARRELS OF WATER. RESUMED SWABBING.

" 11 - SWABBING - CLEANING OUT. WATER BEGINNING TO COLOR AND CONTAIN OIL.

" 12 - SWABBING, MAKING ABOUT 7 BARRELS OF FLUID/HOUR WITH 20% TO 50% OIL EMULSION. HOLE SEEMS TO BE CLEANING UP. POROSITY SEEMS TO HAVE BEEN DEFINITELY INCREASED. NO TOP OR BOTTOM WATER. GAS IS INCREASING AND BLOWS LOAD AS HIGH AS 50 FEET INTO THE AIR. GAS IS A

- MAY 23 - SWABING, FLUID - BLACK, AS YESTERDAY. BLACK SULPHUR WATER.
- " 24 - FLUID LEVEL 1200 FEET. BLACK SULPHUR WATER. PULLED TUBING. PREPARED TO ABANDON. DUMPED 9 SACKS OF CEMENT ON TOP OF BAKER PRODUCTION PACKER. FILLED UP TO 7750.
- " 25 - DUMPED 3 SACKS OF CEMENT ON TOP OF BATCH OF YESTERDAY. FILLED UP TO 7741. RIGGING DOWN.
- " 26 - PLUGGED TOP OF WELL. PUT UP MARKER PIPE. FILLED CELLAR.

WELL ABANDONED.

- MAY 12 - SWEET PETROLEUM GAS WITH SLIGHT SULPHUR ODOR.
AT ABOUT 5:00 PM OIL AND OIL EMULSION DIMINISHED AND BLACK WATER
(BITTER BRINE) CAME IN. VOLUME STARTED TO DECREASE.
- " 13 - SWABBING, FLUID DECREASED TO ALMOST NOTHING BY 7:00 AM - RED, RUSTY
LOOKING, OILY WATER.
- RAN 10,000 GALS. OF 15% HCl. PRESSURE ON FIRST 6500 GALS. - ZERO.
PRESSURE THEN BUILT UP RAPIDLY TO 1600 LBS./SQ. IN AND WENT ON UP
TO 1800 LBS./SQ. IN. WHILE DISPLACING WITH 32 BARRELS OF WATER.
CLOSED IN FOR 10 MINUTES UNDER 1800 LBS. PRESSURE. WATER FLOWED
BACK FOR ABOUT 30 MINUTES AND SWABBING STARTED BEFORE FLOW-BACK
HAD STOPPED. CLEANING OUT RAPIDLY, SOME PETROLEUM GAS.
- " 14 - BY 2:30 AM FLUID WAS 50-50 OIL AND WATER - NOT AS EMULSIFIED AS IN
THE PAST. FROM BEGINNING FLUID CONTAINED CONSIDERABLE GAS AND IT
WAS NECESSARY TO PUT ON AN OIL-SAYER AND TIE DOWN FLOW HOSE. SHOWING
WAS GOOD WHEN DRILLER PULLED UP INTO OIL-SAYER AND PULLED SAND LINE
OUT OF SOCKET. FISHING JOB. DRILLER FIRED. NEW SWAB ORDERED FROM
LOS ANGELES.
- " 15 - NEW SWAB ARRIVED AND SWABBING RESUMED BY 7:30 AM. FIRST RUN WAS
B.S. WITH CONSIDERABLE GAS. THEN FLUID BECAME WATER-ACID-GAS. STILL
GOOD BLOW.
- " 16 - SWABBING 8 BARRELS/HOUR OF FLUID - 7% OIL WITH GAS AND CO₂. FLUID
LEVEL 600 FEET. IRREGULAR QUALITY OF FLUID - SOMETIMES HALF OIL,
SOMETIMES MOSTLY WATER AND EMULSIFIED OIL.
- " 17 - BY 7:00 AM ALL FLUID WAS WATER - PART BLACK AND PART WHITE, VERY
LITTLE GAS.
AT 9:00 AM SLUGS OF DARK GREEN EMULSIFIED OIL BEGAN TO APPEAR WITH
AN INCREASE IN GAS.
BY 2:00 PM FLUID WAS 50-50 OIL AND OIL EMULSION AND WATER WITH ENOUGH
GAS TO BLOW 50 FEET INTO THE AIR AS SWAB WAS PULLED. THIS OIL HAD A
LIGHTER COLOR, OIL AND GAS ARE INCREASING.
PROPORTIONS BEGAN TO CHANGE AND WERE NOT STABLE ENOUGH TO GET AN
ACCURATE MEASUREMENT.
- " 18 - OIL DECREASED UNTIL BY 8:00 AM SWABBING BROUGHT UP ONLY BROWN AND
BLACK WATER. NO OIL. NO GAS. LESS THAN A BARREL OF FLUID/SWAB.
BY 4:00 PM FLUID HAD SOME GREEN OIL ON TOP. WATER STILL DARK.
INCREASE IN GAS.
- " 19 - BY 9:00 AM FLUID HAD DIMINISHED TO 1/4 TO 1/2 BARREL PER HOUR. NO
GAS. BLACK WATER - HAS FINE BLACK PARTICLES APPEARING AS A PRECIPITATE,
GIVES OFF ODOR OF H₂S WHEN TREATED WITH CONCENTRATED HCl.
BELIEVED TO BE BLACK SULPHUR WATER SEEPING UP FROM BELOW OR A REACTION
PRODUCT OF ACIDIZING (WHEN ACID STAYED IN FORMATION TOO LONG).

BY 1:00 PM ALL FLUID WAS BROWNISH COLOR, APPEARING TO CONTAIN A
PRECIPITATE.
- " 20 - BY 7:00 AM FLUID LEVEL AT 400 FEET. SWABBING PRODUCED ONLY 10 GALS/
RUN. FLUID LACKS LUBRICATING QUALITIES AND SWAB RUBBERS WEAR OUT
IN 1 OR 2 RUNS. FLUID - BROWN WATER, 1.5 BARRELS/HOUR.
- " 21 - SWABBING, SAME AS YESTERDAY. FLUID LEVEL 600 FEET.
- " 22 - SWABBING. FLUID - BLACK, FOLLOWED BY CLEAR SALT WATER ON END OF
LOAD. FLUID LEVEL 1000 FEET.

SAMPLE LOG

GLEN M. RUBY, OPERATOR
Big Flat Unit
No. 1-A

32C 066103

SECTION 11 - T. 26 S., R. 19 E., S.L.M.
GRAND COUNTY, UTAH



DATE SPURRED: ~~July 7,~~ ^{Oct 27,} 1951
D.F. ELEVATION: 0' TO 1534' = 6041'
D.F. ELEVATION: 1534' TO 4500' = 6043'
K.B. MEAS.: 4500' TO T.D. = 6047'
DATE PLUGGED BACK TO 7886': MARCH 26, 1953
13 3/8" CASING SET AT 921'
8 5/8" CASING SET AT 4479'
7" CASING SET ON BURNS LINER HANGER TO 7821'

ORIGINAL FORWARDED TO CASPER

DATA COMPILED BY JAMES M. RUBY

<u>DEPTH</u>	<u>DESCRIPTION</u>
SAMPLES DESCRIBED BY A. MILEK.	
0 - 75	NO SAMPLES. SANDSTONE AND RED SHALE. KAYENTA FORMATION
75-85	SAMPLE: PURPLE SANDSTONE WITH YELLOW AND GRAY BITS OF SANDSTONE. SOME PURPLE SILTSTONE AND CLAYSTONE. SOME BROWN SHALE. LITTLE POROSITY. GRAINS: FINE, ROUND, CLEAR, IRON STAINED (RED, YELLOW) QUARTZ. CEMENT: WELL CEMENTED WITH CALCITE.
85-95	SAMPLE: RED BENTONITIC SHALE - DIFFICULT TO WASH DOWN.
90-100	SAMPLE: PURPLE-GRAY, YELLOW MOTTLED SANDSTONE. LITTLE POROSITY. GRAINS: PURPLE STAINED, FINE, ROUND QUARTZ; GRAY, SUBANGULAR, CLEAR, COARSE QUARTZ; YELLOW, IRON STAINED, FINE, ROUND QUARTZ. CEMENT: WHITE SANDSTONE HAS MORE CALCITE THAN PURPLE-YELLOW SANDSTONE.
100-110	SAMPLE: PURPLE TO PURPLISH-GRAY SANDSTONE AND SHALE (20%). LOW POROSITY. GRAINS: CLEAR AND PINKISH STAINED, COARSE, SUBANGULAR QUARTZ. SAME AS GRAY IN SAMPLE 90-100. CEMENT: CALCITE AND SOME CLAY. SOMEWHAT QUARTZITIC.
110-115	SAMPLE: PINKISH-GRAY SANDSTONE, LITTLE OR NO SHALE. LITTLE POROSITY. GRAINS: SAME AS 100-110. CEMENT: " " " "
115-120	SAMPLE: MOTTLED PURPLISH-GRAY SANDSTONE. SOME SHALE - 5%. LOW POROSITY. GRAINS: CLEAR AND IRON STAINED, COARSE, SUBANGULAR QUARTZ. CEMENT: SOME CALCITE. QUARTZITIC.
120-130	SAMPLE: PINKISH SANDSTONE, SOME ANHYDRITE. LOW POROSITY. GRAINS: CLEAR, IRON STAINED, COARSE, SUBANGULAR QUARTZ. CEMENT: SOME CALCITE, QUARTZITIC.
130-145	SAMPLE: PINKISH SANDSTONE, SOME WHITE MICA. LOW POROSITY. GRAINS: CLEAR, IRON STAINED, COARSE, SUBANGULAR QUARTZ. CEMENT: SOME CALCITE, QUARTZITIC.
145-160	SAMPLE: SAME AS 130-145, MORE MICA (SERICITE).
160-170	SAMPLE: CLEAR WHITE SANDSTONE (<u>LOOSE SAND</u>), SOME GREEN STAIN. GRAINS: CLEAR, COARSE, SUBANGULAR QUARTZ. CEMENT: ? <u>LOOSE SAND</u> .
170-180	SAMPLE: LIGHT GRAY, TAN SANDSTONE. <u>GOOD POROSITY</u> . SOME ANHYDRITE. GRAINS: CLEAR, STAINED, COARSE, SUBANGULAR QUARTZ. CEMENT: CALCITE.

- 180-190 . SAMPLE: PURPLE SANDSTONE. WASHED DOWN AS THOUGH
TIC SHALE. POROUS.
GRAINS: CLEAR, AND STAINED, COARSE, SUBANGULAR QUARTZ.
NOTE: ALL SAND IS SIMILAR FROM 100'.
CEMENT: MOSTLY CALCITE AND SHALE.
- 190-210 SAMPLE: GRAYISH-PINK SANDSTONE. SOME PURPLE SANDSTONE.
GRAINS: CLEAR, STAINED, COARSE, SUBANGULAR QUARTZ.
CEMENT: MOSTLY CALCITE.
- 210-230 SAMPLE: PURPLISH-PINK SANDSTONE.
GRAINS: STAINED, COARSE, SUBANGULAR QUARTZ. POROUS.
CEMENT: MOSTLY CALCITE.
- TOP OF WINGATE
- 230-235 SAMPLE: TAN SANDSTONE - SOME LUMPS OF PURPLE SANDSTONE.
GRAINS: CLEAR AND STAINED, SUBROUND QUARTZ. SOMEWHAT FINEST
ABOVE.
CEMENT: MOSTLY LOOSE SAND. PURPLE - CALCITE.
- 235-275 SAMPLE: LIGHT TAN, OTHERWISE SAME AS 230-235.
- 275-310 SAMPLE: VERY LIGHT TAN SANDSTONE. LARGE FLAKES. FRIABLE.
GRAINS: FINE, CLEAR, STAINED, SUBROUND QUARTZ.
CEMENT: SECONDARY QUARTZ.
- 310-315 SAMPLE: BROWNISH-PURPLE, LUMPY SANDSTONE. LOW POROSITY.
GRAINS: STAINED-CLEAR, SUBANGULAR, SUBCOARSE QUARTZ.
CEMENT: CALCITE.
- 315-320 SAMPLE: BROWNISH-PURPLE, STREAKS OF WHITE, SANDSTONE. LOW POROSITY.
GRAINS: SUBANGULAR, POORLY SORTED, CLEAR AND STAINED, FINE QUARTZ.
CEMENT: CALCITE AND SECONDARY QUARTZ.
- 320-340 SAMPLE: BROWN SANDSTONE. SOME SULPHUR. LOW POROSITY.
GRAINS: SUBANGULAR, CLEAR AND STAINED, FINE QUARTZ.
CEMENT: CALCITE, SOME SECONDARY QUARTZ.
- 340-370 SAMPLE: LIGHT BROWN SANDSTONE. SOME SULPHUR. LOW POROSITY.
GRAINS: SUBANGULAR, CLEAR LIGHT-STAINED, FINE QUARTZ.
CEMENT: CALCITE, SECONDARY QUARTZ.
- 370-390 SAMPLE: SAME AS ABOVE.
- 390-400 SAMPLE: LIGHT BROWN SANDSTONE.
GRAINS: SUBROUND, CLEAR, STAINED, FINE QUARTZ.
CEMENT: MOSTLY CALCITE, SOME SECONDARY QUARTZ.
- 400-420 SAMPLE: TAN SANDSTONE. LOW POROSITY.
GRAINS: SUBROUND, POORLY SORTED, CLEAR, STAINED, FINE QUARTZ.
CEMENT: MOSTLY CALCITE, SOME SECONDARY QUARTZ.
- 420-440 SAMPLE: TAN TO PURPLE SANDSTONE. LOW POROSITY.
GRAINS: SAME AS 400-420.
CEMENT: PURPLE SANDSTONE HAS MORE CALCITE - SOME SECONDARY QUARTZ.
- 440-450 SAMPLE: SAME AS 400-420.
- 450-460 SAMPLE: MISSING.
- 460-480 SAMPLE: PURPLISH-BROWN, DIRTY LOOKING, SANDSTONE. LOW POROSITY.
GRAINS: SUBROUND, POORLY SORTED, FINE QUARTZ. SOME HORNBLende,
SULPHUR.
CEMENT: MORE CALCITE THAN USUAL.
NOTE: NONE OF THESE SAMPLES BREAK DOWN WHEN TREATED WITH HCL.
- 480-495 SAMPLE: PURPLISH-BROWN SANDSTONE.
GRAINS: SUBROUND, CLEAR, STAINED, POORLY SORTED, FINE QUARTZ.
CEMENT: CALCITE AND BENTONITIC SHALE, AND SECONDARY QUARTZ.

- 495-510 SAMPLE: LIGHT TAN SANDSTONE - MOSTLY LOOSE GRAINS.
NOTE: THUS FAR, IT HAS BEEN THAT WHEN SAMPLE IS MOSTLY LOOSE GRAINS, THE FEW LUMPS HAVE BUT LITTLE CALCITE CEMENT.
GRAINS: FINE, SUBROUND, POORLY SORTED, CLEAR, STAINED QUARTZ.
CEMENT: MOSTLY SECONDARY QUARTZ.
- 510-535 SAMPLE: PURPLISH-BROWN SANDSTONE.
GRAINS: SOME DARKER STAINED AS THOUGH DERIVED FROM PURPLE SANDSTONE. CLEAR, STAINED, SUBROUND, POORLY SORTED, FINE QUARTZ.
CEMENT: MOSTLY CALCITE, SOME SECONDARY QUARTZ.
- 535-550 SAMPLE: TAN SANDSTONE. SOME LS. OR LIME ON SURFACE OF SOME LUMPS.
GRAINS: AS USUAL.
CEMENT: MOSTLY CALCITE THUS FAR.
- TOP OF CHINLE
- 550-560 SAMPLE: CHOCOLATE-BROWN SHALE AND CLAYSTONE, SOME GYPSUM, AND WHITE SANDSTONE.
GRAINS: CLEAR, FINE QUARTZ.
CEMENT: MOSTLY SECONDARY QUARTZ.
- 560-565 SAMPLE: SAME AS LAST ABOVE.
- 565-575 SAMPLE: BROWNISH SANDSTONE, GREEN STAINED CALCAREOUS SHALE - FEW PIECES.
GRAINS: FINE, ROUND, CLEAR AND STAINED QUARTZ.
CEMENT: MUCH CALCITE AND BROWN SHALE, SOME SECONDARY QUARTZ.
- 575-580 SAMPLE: CHOCOLATE-BROWN CLAYSTONE AND BENTONITIC SHALE, WHITE SANDSTONE, AND BROWN SANDSTONE. ONE THIRD OF EACH.
GRAINS: FINE, ROUND, CLEAR AND STAINED QUARTZ.
CEMENT: SOME LUMPS HAVE CONSIDERABLE CALCITE. MOST CEMENT IS QUARTZ.
- 580-588 SAMPLE: NO SAMPLE - STRAIGHTENING HOLE. (SILTY SANDSTONE - SEE BIG FLAT No. 1.)
- 588-595 SAMPLE: BROWN BENTONITIC SHALE. WASHES AWAY. LS AND SS DUMPED IN.
- 595-615 SAMPLE: BENTONITIC SHALE. WASHES AWAY.
- 615-630 SAMPLE: BENTONITIC SHALE. LIGHT PINKISH-BROWN. LESS SOLUBLE THAN 595-615.
- 630-635 SAMPLE: BROWN SANDSTONE. LITTLE POROSITY. 10% BENTONITIC SHALE. WHITE SANDSTONE PROBABLY DUMPED IN AT 620. HOLE WAS MUCKY.
GRAINS: CLEAR, STAINED, ROUND, FINE QUARTZ.
CEMENT: CALCITE, MOSTLY QUARTZ.
- 635-645 SAMPLE: LIGHT BROWN SANDSTONE. SAME AS 630-635.
- 645-650 SAMPLE: GRAYISH-BROWN SANDSTONE, CONTAINS MUCH SERICITE.
GRAINS: ROUND, FINE, CLEAR, STAINED, QUARTZ. LOW POROSITY.
CEMENT: MOSTLY CALCITE, SOME CLAY AND QUARTZ.
- 650-655 SAMPLE: SAME AS 645-650, BUT LESS BROWN.
- 655-660 SAMPLE: GRAY SANDSTONE WITH TINGE OF PINK. LOW POROSITY. 15% BROWN SHALE.
GRAINS: CLEAR, ROUND, FINE QUARTZ. CONSIDERABLE HORNBLLENDE AND SERICITE, POORLY SORTED.
CEMENT: CALCITE AND QUARTZ.
- 660-665 SAMPLE: GRAY SANDSTONE WITH TINGE OF PINK. BROWN SHALE AND SILTSTONE.
GRAINS: CLEAR, ROUND, FINE QUARTZ. CONSIDERABLE HORNBLLENDE AND SERICITE.
CEMENT: CALCITE.
SOME SHALE LOOKS LIKE CAVINGS. THE SILTSTONE (BROWN) MAY NOT BE, BUT BOTH HAVE LARGE CHIPS. THE DEEPER SAMPLES INDICATE SHALE IN PLACE.

- 665-670 SAMPLE: SAME AS 655-660. LESS CAVINGS.
- 670-680 SAMPLE: SAME SANDSTONE AS 655-660. DARK, TO PURPLE-BROWN SHALE AND SILTSTONE. SHALE RUNS INTO SANDSTONE. HAS APPEARANCE OF SANDSTONE WITH CAVINGS BUT BELIEVE SECTION IS SHALE WITH STREAKS OF SANDSTONE. SHALE 75%.
- 680-690 SAMPLE: PURPLE AND GRAY SANDSTONE, CONTAINS SMALL AMOUNT OF PURPLE CLAYSTONE; AND BROWN TO PURPLE SHALE AND SILTSTONE. SS - 2/4.
GRAINS: CLEAR TO STAINED, MEDIUM-COARSE, SUBROUNDED QUARTZ, AND HORNBLLENDE.
CEMENT: CALCITE AND QUARTZ.
MOST OF SHALE (1/4) IS PURPLISH AND MAY BELONG HERE. SOME BROWN, OR - 10% IS RED AND MUST BE CAVINGS.
- 690-695 SAMPLE: BLUISH-GRAY, PINKISH SANDSTONE WITH SMALL CLAYSTONE INCLUSIONS AS GRAINS, MUCH HORNBLLENDE, PURPLISH SHALE AND CLAYSTONE - 20%.
GRAINS: AS ABOVE.
CEMENT: CALCITE, SOME SEEN AS LUMPS OF LIMESTONE.
- 695-700 SAMPLE: BLUISH TO PURPLE SANDSTONE, BECOMING AT TIMES ALMOST IMPURE LIMESTONE; PURPLE SHALE 50%. MUCH HORNBLLENDE AND MICA.
GRAINS: AS ABOVE.
CEMENT: CALCITE.
- NOTE: THIS SECTION 630 TO 700 IS A GRAYWACKE CONTAINING MUCH CLEAR AND CLOUDY QUARTZ, HORNBLLENDE, CLAYSTONE INCLUSIONS, MICA, WITH CALCITE AND SOME GYPSUM AT THE BASE, AND INTERCOLATED WITH SHALE AND SILTSTONE, WHICH SOMETIMES PREDOMINATES, AND GRADING INTO A GRAY SANDSTONE OR A GRAYWACKE WITHOUT SHALE GRAINS AT THE TOP. THE REDDISH BROWN SHALE IS CAVINGS AND EQUALS ABOUT 10%. AFTER THE CALCITE HAS BEEN TAKEN OUT OF SANDSTONE THE SPECIMEN STILL HOLDS TOGETHER - THE CEMENT IS SECONDARY QUARTZ.
- 700-705 SAMPLE: PINKISH-GRAY, MICACEOUS SANDSTONE, 5% PURPLE SHALE, 10% RED SHALE CAVINGS. FEW LUMPS OF LIMESTONE.
GRAINS: AS ABOVE.
CEMENT: AS ABOVE.
- 705-712 SAMPLE: BLUISH GRAY AND GREENISH SANDSTONE, WITH MICA AND SOME HORNBLLENDE; 5% PURPLE SHALE, 15% RED SHALE CAVINGS. FEW LUMPS OF LIMESTONE.
GRAINS: SUBANGULAR, CLEAR AND SMOKY, MEDIUM-COARSE QUARTZ, AND SOME HORNBLLENDE. NO SHALE INCLUSIONS.
CEMENT: CALCITE AND QUARTZ, 50-50.
- 712-720 SAMPLE: PINKISH, GREENISH-GRAY SANDSTONE, WITH MICA AND HORNBLLENDE. NO SHALE INCLUSIONS. SOME CHIPS OF DARK GREEN SHALE - 2%. 10% SHALE CAVINGS.
GRAINS: SUBROUND, MEDIUM-FINE, CLEAR AND SMOKY QUARTZ. MICA FLAKES AND A LITTLE HORNBLLENDE.
CEMENT: 50-50 CALCITE AND QUARTZ. SOME CALCITE LUMPS.
- 720-725 SAMPLE: GREENISH-GRAY SANDSTONE WITH MICA, STAINED GRAINS; 5% GREEN SHALE; 25% RED-PURPLE SHALE CAVINGS.
GRAINS: SUBANGULAR, CLEAR, SMOKY, STAINED, MEDIUM-FINE QUARTZ. SOME HORNBLLENDE AND MICA.
CEMENT: MOSTLY QUARTZ, SOME CALCITE.
- 725-730 SAMPLE: NO SAMPLE. HOLE CAVING BADLY FROM 590-635 INTERVAL. BRIDGED AT 722'.
- 730-735 SAMPLE: GREENISH-GRAY SANDSTONE, WITH MICA, STAINED GRAINS, HORNBLLENDE; 8% GREEN SHALE; 50% RED-PURPLE SHALE CAVINGS.
GRAINS AND CEMENT: AS 720-725.
- 735-740 SAMPLE: GREEN SANDSTONE, WITH MICA, PYRITE, HORNBLLENDE, STAINED GRAINS; 1% GREEN SHALE; 50% RED AND PURPLE SHALE (?CAVINGS).
GRAINS AND CEMENT: AS LAST ABOVE.

SAMPLES DESCRIBED BY A. MILEK AND J. M. RUBY

- 740-750 SAMPLE: DARK GRAY, MINERAL STAINED SANDSTONE WITH SOME CARBONACEOUS MATERIAL - POSSIBLY GRAPHITE; GREEN, CARBONACEOUS SHALE AND SH - 50-50; 10% RED SHALE CAVINGS.
GRAINS: MEDIUM, SUBANGULAR, CLEAR TO DARK-STAINED QUARTZ.
CEMENT: 20% CALCITE, 80% SECONDARY QUARTZ.
- 750-759 SAMPLE: GRAY, MINERAL-STAINED SANDSTONE; LIMESTONE (DROPPED IN HOLE); CEMENT FRAGMENTS; WIRE ROPE FRAGMENTS; LOW POROSITY.
GRAINS: MEDIUM, SUBANGULAR, CLEAR TO DARK-STAINED QUARTZ; SOME PYRITE; SOME CARBONACEOUS MATERIAL.
CEMENT: 5% CALCITE, 95% SECONDARY QUARTZ.
- 765-781 SAMPLE: GREEN SHALE TO GREEN, SILTY SANDSTONE; GRAY AND PINK SANDSTONE SLIGHTLY CARBONACEOUS. LOW POROSITY. LIMESTONE, CEMENT AND WIRE ROPE FRAGMENTS DUMPED IN HOLE.
GRAINS: MEDIUM TO VERY FINE, SUBROUNDED TO ROUNDED, CLEAR TO DARK-STAINED QUARTZ.
CEMENT: MOSTLY SECONDARY QUARTZ IN SANDSTONE, MOSTLY SHALE IN THE SILT.
- 781-793 SAMPLE: 50% BLUE SHALE AND SILTY SHALE, 50% GRAY TO PINK SANDSTONE; RED SHALE CAVINGS. LOW POROSITY. SOMEWHAT CARBONACEOUS AND MINERAL-STAINED.
GRAINS: SS - MEDIUM TO FINE, ROUNDED TO SUBROUNDED, SOME SERICITE.
CEMENT: MOSTLY SECONDARY QUARTZ.
- 793-802 SAMPLE: GRAY TO BLuish-GRAY, QUITE MICACEOUS, CARBONACEOUS, MINERAL-STAINED SANDSTONE; 5% BLUE-GRAY, MICACEOUS, SILTY SHALE. VERY LOW POROSITY. FEW FRAGMENTS OF CEMENT AND RED SHALE CAVINGS.
GRAINS: MEDIUM TO FINE, ROUNDED TO SUBROUNDED.
CEMENT: MOSTLY SECONDARY QUARTZ.
- 802-808 SAMPLE: 60% SANDSTONE - BLUE TO LIGHT GRAY, PINKISH-GRAY, MICACEOUS, CARBONACEOUS, CONTAINS PYRITES, LOW POROSITY. 20% BLUE SHALE. 20% BLUE-GRAY, SANDY LIMESTONE. FEW FRAGMENTS OF CARBONACEOUS MATERIAL AND RED SHALE CAVINGS.
GRAINS: MEDIUM TO FINE, ROUNDED TO SUBROUNDED.
CEMENT: MOSTLY SECONDARY QUARTZ IN SS.
- 808-820 SAMPLE: 25% BLUE SHALE; 15% BLUE TO LIGHT GRAY, SANDY LIMESTONE; 40% RED SHALE; 20% LIGHT GRAY TO PINK SANDSTONE, LOW POROSITY.
GRAINS: MEDIUM TO FINE, ROUNDED TO SUBROUNDED.
CEMENT: SS - 75% CALCITE.
- 820-822 SAMPLE: 40% BLUE TO LIGHT GRAY, SANDY LIMESTONE; 40% LIGHT GRAY SANDSTONE WITH PYRITE AND SOME CARBONACEOUS MATERIAL, LOW POROSITY; 20% RED SHALE TO SILTY SHALE.
GRAINS: FINE, ROUNDED.
CEMENT: SHALE AND CALCITE IN THE SILTY SHALE, 75% CALCITE IN SS.
- 822-835 SAMPLE: 15% RED SHALE AND PURPLE, SILTY SHALE; 5% LIGHT SANDSTONE; 80% BLUE TO GRAY, SANDY LIMESTONE; SMALL AMOUNTS OF PYRITE AND CARBONACEOUS MATERIAL, LOW POROSITY.
GRAINS: FINE, ROUNDED.
CEMENT: SHALE IN THE SILTY SHALE, CALCITE IN THE SS.
- 835-845 SAMPLE: RED SHALE 15%; DARK BLUE-GRAY, GRAY AND PINKISH, SANDY LIMESTONE WITH SOME CARBONACEOUS MATERIAL AND PYRITE 75%; LIGHT SANDSTONE WITH SOME CARBONACEOUS MATERIAL, LOW POROSITY, 10% SMALL AMOUNT OF BLUE SILTY SHALE.
GRAINS: FINE, ROUNDED.
CEMENT: MOSTLY CALCITE IN THE SS.
- 845-853 SAMPLE: GRAY, MICACEOUS SANDSTONE WITH SOME CARBONACEOUS MATERIAL AND PYRITE - 75%; RED SHALE TO SILTY SHALE; AND BLUE-GRAY LIMESTONE. LOW POROSITY.
GRAINS: MEDIUM TO FINE, LIGHT TO DARK, SUBANGULAR QUARTZ WITH A FEW ROUNDED GRAINS OF LIMESTONE.
CEMENT: 25% CALCITE, 75% SECONDARY QUARTZ.

- 853-866 SAMPLE: 90% SANDSTONE - GRAY TO GREENISH-GRAY, GLAUCONITIC, MICACEOUS; RED SHALE TO SILTY SHALE, SOME FRAGMENTS OF LIGNITE, AND BLUE-GRAY LIMESTONE. LOW POROSITY.
GRAINS: MEDIUM TO FINE, ANGULAR QUARTZ.
CEMENT: SECONDARY QUARTZ 90%, CALCITE 10%.
- 866-880 SAMPLE: 75% SANDSTONE - GRAY TO PINK, WITH SOME GLAUCONITIC STAIN AND LUMPS OF SANDY LIMESTONE AND SOME CARBONACEOUS MATERIAL, LOW POROSITY. RED SHALE TO SILTY SHALE, BLUE-GREEN SHALE.
GRAINS: FINE TO COARSE, LIGHT TO DARK, ANGULAR TO SUBANGULAR, MINERAL-STAINED QUARTZ; LIGHT TO DARK LIMESTONE.
CEMENT: 80% CALCITE.
- 880-885 SAMPLE: 80% SANDSTONE - GRAY TO PINK, MICACEOUS, GLAUCONITIC, CARBONACEOUS; RED SHALE TO SILTY SHALE, BLUE SHALE, DARK SANDY LIMESTONE. LOW POROSITY.
GRAINS: FINE TO COARSE, ANGULAR TO SUBANGULAR, GRAY TO DARK, MINERAL-STAINED QUARTZ.
CEMENT: 50-50, CALCITE AND SECONDARY QUARTZ.
- 885-892 SAMPLE: 70% SANDSTONE - GRAY TO PINK, MICACEOUS, GLAUCONITIC, LIGNITIC; 15% RED SHALE TO SILTY SHALE; SOME GREENISH SHALE AND DARK GRAY LIMESTONE. LOW POROSITY.
GRAINS: FINE TO COARSE, ANGULAR TO SUBANGULAR, LIGHT TO DARK, MINERAL-STAINED QUARTZ.
CEMENT: 50-50, CALCITE AND SECONDARY QUARTZ.
- 892-897 SAMPLE: 90% SANDSTONE - WHITE, WITH SMALL AMOUNTS OF MINERAL STAIN, MICA, AND CARBONACEOUS MATERIAL, LOW POROSITY; BLUE, MICACEOUS SHALE; RED SHALE TO SILTY SHALE; DARK GRAY, CALCAREOUS SHALE.
GRAINS: MEDIUM TO COARSE, ANGULAR TO SUBANGULAR, LIGHT, MINERAL-STAINED QUARTZ.
CEMENT: 50-50, CALCITE AND SECONDARY QUARTZ.
- 897-903 SAMPLE: 20% BLUE SHALE TO BLUE CALCAREOUS SHALE; 80% SANDSTONE - WHITE MINERAL-STAINED; TRACES OF RED SHALE TO RED SILTY SHALE. LOW POROSITY.
GRAINS: MEDIUM, ANGULAR TO SUBANGULAR, LIGHT, MINERAL-STAINED QUARTZ.
CEMENT: 50-50, CALCITE AND SECONDARY QUARTZ.
- 903-906 SAMPLE: 60% SANDSTONE - LIGHTBROWNISH-GRAY, MINERAL-STAINED; BLUE, MICACEOUS, SANDY, SHALE; SOME RED SHALE TO SILTY SHALE; TRACES OF LIGHT COLORED LIMESTONE AND SANDSTONE WITH LS PEBBLES. LOW POROSITY.
GRAINS: MEDIUM TO COARSE, ANGULAR TO SUBANGULAR, LIGHT, MINERAL-STAINED QUARTZ.
CEMENT: 50-50, CALCITE AND SECONDARY QUARTZ.
- 906-909 SAMPLE: 60% SANDSTONE - BLUE-GRAY, MINERAL STAINED, MICACEOUS, WITH CARBONACEOUS MATERIAL AND PYRITES; SOME BLUE-GREEN SHALE AND TRACES OF RED SHALE; GREENISH-GRAY, ARENACEOUS LIMESTONE; GREENISH-GRAY, CALCAREOUS, ARGILLACEOUS SANDSTONE. LOW POROSITY.
GRAINS: MEDIUM TO COARSE, ANGULAR TO SUBANGULAR, LIGHT, MINERAL-STAINED QUARTZ.
CEMENT: 75% SECONDARY QUARTZ, 25% CALCITE.
- 909-920 SAMPLE: 30% SHALE - BLUE, MICACEOUS, CALCAREOUS, ARENACEOUS; 30% SHALE-RED, TO RED ARENACEOUS SILTY SHALE WITH BLUE-GREEN SPECKS; REMAINDER - SANDSTONE - GREENISH-GRAY, MICACEOUS, MINERAL-STAINED WITH PYRITES WELL DISTRIBUTED. LOW POROSITY.
GRAINS: MEDIUM TO FINE, SUBANGULAR TO SUBROUNDED, LIGHT QUARTZ.
CEMENT: SS - MOSTLY SECONDARY QUARTZ.
- 920-921 SAMPLE: 15% RED SHALE CAVINGS; 60% SANDSTONE - BLUE-GRAY, MINERAL-STAINED, MICACEOUS, WITH LS PEBBLES AND CONSIDERABLE PYRITES AND CARBONACEOUS MATERIAL; SOME PURPLISH, ARGILLACEOUS SANDSTONE - GRAY, SILTY LIMESTONE - BLUE SHALE - ASPHALTIC RESIDUE. LOW POROSITY.
GRAINS: FINE TO COARSE, ANGULAR TO SUBANGULAR, LIGHT, MINERAL-STAINED QUARTZ.

- 920-921
(CON'T)
921-924
- CEMENT: 60% CALCITE, 40% SECONDARY QUARTZ.
 SAMPLE: 75% CAVINGS OF RED AND BLUE SHALE AND CEMENT. 25% SANDSTONE - BLUE-GRAY, MINERAL-STAINED, W/CARBONACEOUS MATERIAL AND LS PEBBLES. LOW POROSITY.
 GRAINS: FINE TO COARSE, SUBANGULAR TO SUBROUNDED, LIGHT, MINERAL-STAINED QUARTZ.
 CEMENT: 50-50, CALCITE AND SECONDARY QUARTZ.
- 924-926
- SAMPLE: 50% IMPURE QUARTZITIC SANDSTONE; REMAINDER, CAVINGS OF CEMENT, RED TO PURPLE SHALE, AND SILTY SHALE.
 GRAINS: FINE TO COARSE, SUBANGULAR TO SUBROUNDED.
 CEMENT: SECONDARY QUARTZ.
- TOP OF MOENKOPI - 925'
- 926-930
- SAMPLE: BLUISH-GRAY QUARTZITE W/PYRITES; CHOCOLATE BROWN SILTSTONE W/SERICITE.
- 930-935
- SAMPLE: CHOCOLATE BROWN SILTSTONE W/SERICITE - 80%, BLUISH-GRAY QUARTZITE 20%.
- 935-939
- SAMPLE: CHOCOLATE BROWN SILTSTONE W/SERICITE - 80%. WHITE TO BLUISH-GRAY QUARTZITE; RUSTY COLORED, ARGILLACEOUS, SANDY LIMESTONE.
- 939-959
- SAMPLE: RED SILTY SHALE, CHOCOLATE BROWN SILTSTONE W/SERICITE - 75%. SMALL AMOUNT OF WHITE TO BLUISH-GRAY QUARTZITE; SMALL AMOUNT OF RUSTY-WHITE, SANDY, ARGILLACEOUS LIMESTONE. CONSIDERABLE CAVINGS.
- 959-985
- SAMPLE: CHOCOLATE-BROWN SILTSTONE W/SERICITE - 50%. RED TO BROWN SILTY SHALE - 30%. LIGHT COLORED QUARTZITE; SANDY, ARGILLACEOUS LIMESTONE; AND IMPURE QUARTZITIC SANDSTONE - 20%. SOME CAVINGS, LOW POROSITY.
- 985-1000
- SAMPLE: SAME AS LAST ABOVE, BUT WITH MORE SHALE AND SILTY SHALE. SOME CAVINGS.
- 1000-1009
- SAMPLE: CHOCOLATE BROWN SILTSTONE W/SERICITE - 80%; SOME LIGHT-COLORED QUARTZITE AND LIGHT-GRAY, FINE-GRAINED, CALCAREOUS SANDSTONE. SOME CAVINGS.
- 1009-1018
- SAMPLE: CHOCOLATE BROWN SILTSTONE AND SILTY SHALE - 75%; RED SANDSTONE (FINE-GRAINED AND CALCAREOUS) 15%; GREEN, MICACEOUS, ENDURATED SHALE - 10%.
- 1018-1024
- SAMPLE: CHOCOLATE BROWN SILTSTONE W/MUCH SERICITE - 75%; FINE, RED AND WHITE, CALCAREOUS SANDSTONE - 25%. SOME CAVINGS.
- 1024-1034
- SAMPLE: SAME AS LAST ABOVE, BUT WITH 60% SILTSTONE AND 40% RED AND WHITE SANDSTONE.
- 1034-1044
- SAMPLE: MISSING.
- 1044-1058
- SAMPLE: CHOCOLATE BROWN TO PURPLE, MICACEOUS SILTSTONE AND SILTY SHALE - 75%; FINE-GRAINED, CALCAREOUS SANDSTONE - 25%. SOME NEW CAVINGS.
- 1058-1073
- SAMPLE: SAME AS LAST ABOVE, BUT WITH 40% SANDSTONE.
- 1073-1081
- SAMPLE: CHOCOLATE BROWN, SERICITIC SILTSTONE AND SILTY SHALE. SOME NEW CAVINGS.
- 1081-1102
- SAMPLE: CHOCOLATE BROWN, MICACEOUS SILTSTONE - 50%; BROWN, CALCAREOUS, MICACEOUS SANDSTONE - 50%.
 GRAINS: FINE, ANGULAR TO SUBANGULAR.
 CEMENT: 30% CALCITE, 70% SECONDARY QUARTZ.
- 1102-1112
- SAMPLE: CHOCOLATE BROWN, MICACEOUS SILTSTONE - 60%; BROWN, MICACEOUS SANDSTONE - 35%. BLUE-GRAY, MICACEOUS SANDSTONE - 5%.

- 1102-1112
(CON'T) GRAINS: SS - FINE, SUBANGULAR, LOW POROSITY.
CEMENT: SS - 25% CALCITE, 75% SECONDARY QUARTZ.
- 1112-1123 SAMPLE: CHOCOLATE BROWN, SILTY SHALE - 30%; GRAYISH-BROWN, MICACEOUS, CALCAREOUS SANDSTONE - 25%; CHOCOLATE BROWN, MICACEOUS SILTSTONE - 30%. SOME CAVINGS. LOW POROSITY.
GRAINS: SS - FINE, SUBANGULAR.
CEMENT: SS - 50-50 CALCITE AND SECONDARY QUARTZ.
- 1123-1133 SAMPLE: 30% NEW CAVINGS. CHOCOLATE BROWN, MICACEOUS SILTSTONE AND SILTY SHALE - 50%; FINE, BROWN, CALCAREOUS, MICACEOUS SANDSTONE - 50%. LOW POROSITY.
- 1133-1154 SAMPLE: 30% CAVINGS. SAME AS LAST ABOVE, BUT WITH 70% SANDSTONE AND 30% SILTY SHALE AND SILTSTONE.
- POSSIBLE CASING SEAT - 1140-1160
- 1154-1164 SAMPLE: CHOCOLATE BROWN, MICACEOUS SILTSTONE AND SILTY SHALE - 50%; FINE, BROWN (SOME WHITE), CALCAREOUS, MICACEOUS SANDSTONE - 40%; SOFT, PINK, ARGILLACEOUS, SANDY LIMESTONE - 10%. LOW POROSITY.
- 1164-1168 SAMPLE: CHOCOLATE BROWN, MICACEOUS SILTSTONE AND SILTY SHALE - 60%; FINE, LIGHT TO MEDIUM BROWN, CALCAREOUS, MICACEOUS SANDSTONE - 40%. 5% TO 10% CAVINGS. LOW POROSITY.
- 1168-1177 SAMPLE: SAME AS LAST ABOVE, BUT WITH SANDSTONE - 60% (SOME OF IT IS VARI-EGATED); AND 40% SILTSTONE AND SILTY SHALE. LOW POROSITY.
- 1177-1187 SAMPLE: SAME AS 1164-1168, BUT WITH 75% SANDSTONE AND 25% SILTSTONE AND SILTY SHALE. LOW POROSITY.
- 1187-1198 SAMPLE: SAME AS 1164-1168, BUT WITH 80% SILTSTONE AND 20% SANDSTONE. LOW POROSITY.
- 1198-1210 SAMPLE: SAME AS 1164-1168, BUT WITH 60% SILTSTONE AND SILTY SHALE, AND 40% SANDSTONE. LOW POROSITY.
- 1210-1214 SAMPLE: CHOCOLATE BROWN SILTSTONE AND SILTY SHALE, SOME MICA - 70%; LIGHT BROWN, MICACEOUS, CALCAREOUS SANDSTONE - 30%. LOW POROSITY.
GRAINS: SS - FINE, SUBANGULAR.
CEMENT: SS - 80% CALCITE, 20% SECONDARY QUARTZ.
- 1214-1224 SAMPLE: CHOCOLATE BROWN, SOMEWHAT MICACEOUS, SILTY SHALE AND SILTSTONE - 60%, CONSIDERABLE BROWN CLAY. REDDISH-BROWN TO WHITE, MICACEOUS, CALCAREOUS SANDSTONE WITH SOME LIMESTONE PEBBLES - 25%. BLUE-GRAY, CALCAREOUS SHALE AND SILTY SHALE - 15%. LOW POROSITY.
- 1224-1228 SAMPLE: SAME AS 1214-1224, BUT WITH NO CLAY, LOW POROSITY: CHOCOLATE BROWN SILTY SHALE AND SILTSTONE - 45%; BLUE-GRAY SHALE AND SILTY SHALE - 10%; AND SANDSTONE - 45%.
- 1228-1238 SAMPLE: CHOCOLATE BROWN SHALE TO SILTSTONE W/SOME MICA - 65%; LIGHT REDDISH-BROWN, FINE, CALCAREOUS SANDSTONE - 20%; TAN, SOFT, SILTY LIMESTONE - 5%; BLUE-GRAY, CALCAREOUS, FINE SANDSTONE TO SILTSTONE - 10%. LOW POROSITY. SMALL SHOW OF GAS BUBBLES IN SAMPLE BUCKET. NO ODOR NOTED.
- 1238-1246 SAMPLE: CHOCOLATE BROWN SILTY SHALE TO SILTSTONE W/SOME MICA AND SMALL PORTIONS BLUE-GRAY IN COLOR - 90%; FINE, REDDISH-BROWN SANDSTONE - 10%; SOME REDDISH-BROWN CLAY. LOW POROSITY.
- 1246-1255 SAMPLE: SAME AS 1238-1246, BUT NO CLAY. SOME OF THE SANDSTONE IS LIGHTER IN COLOR.
- 1255-1260 SAMPLE: SAME AS 1246-1255.
- 1260-1268 SAMPLE: SAME AS 1238-1246. 5% CAVINGS.

- 1268-1280 SAMPLE: SAME AS 1238-1246.
- 1280-1288 SAMPLE: SAME AS 1246-1255.
- 1288-1295 SAMPLE: REDDISH-BROWN, MICACEOUS, CALCAREOUS SANDSTONE - 75%; CHOCOLATE-BROWN, MICACEOUS SILTSTONE - 25%.
GRAINS: SS - FINE, ANGULAR TO SUBANGULAR, LOW POROSITY.
CEMENT: SS - CALCITE 25%, SECONDARY QUARTZ 75%.
- 1295-1305 SAMPLE: SAME AS 1288-1295, BUT SANDSTONE 25%; SILTSTONE 75%. CONS. CLAY.
- 1305-1315 SAMPLE: SAME AS 1288-1295, BUT W/50-50 SANDSTONE AND SILTSTONE; SOME SOFT, WHITE, ARGILLACEOUS LIMESTONE.
- 1315-1323 SAMPLE: SAME AS LAST ABOVE.
- 1323-1333 SAMPLE: REDDISH-BROWN VARYING TO CLEAR, POORLY CEMENTED SANDSTONE; SOME CHOCOLATE-BROWN, MICACEOUS SILTSTONE.
GRAINS: MEDIUM TO FINE, ANGULAR TO ROUNDED. LOW POROSITY.
CEMENT: MOSTLY SHALE OR CLAY - SOME CALCITE - SOME SECONDARY QUARTZ.
- 1333-1341 SAMPLE: SAME AS 1288-1295.
- 1341-1348 SAMPLE: SAME AS 1323-1333, BUT SLIGHTLY MORE CEMENTED, AND WITH SOME SOFT, WHITE LIMESTONE.
- 1348-1357 SAMPLE: SAME AS 1288-1295; TRACES OF SOFT, WHITE, ARGILLACEOUS LIMESTONE.
- 1357-1365 SAMPLE: REDDISH-BROWN, MICACEOUS, CALCAREOUS SANDSTONE - 80%; CHOCOLATE-BROWN SILTSTONE AND SHALE - 20%. LOW POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR TO ROUNDED.
CEMENT: CALCITE 60%, SECONDARY QUARTZ 40%.
- 1365-1382 SAMPLE: REDDISH-BROWN, TAN TO VERY LIGHT TAN, SANDSTONE.
GRAINS: MEDIUM TO FINE, SUBANGULAR TO ROUNDED, WIND-BLOWN SAND.
CEMENT: SHALE AND CALCITE, SOME SECONDARY QUARTZ.
DRILLER REPORTED 2' SHALE-BREAK 1372 TO 1374.

TOP OF CUTLER FORMATION, POSSIBLY AT 1374.
- 1382-1388 SAMPLE: REDDISH-BROWN, VARYING TO WHITE, MICACEOUS SILTSTONE GRADING TO SILTY SANDSTONE - 80%; CHOCOLATE-BROWN, MICACEOUS SILTSTONE - 20%.
GRAINS: MEDIUM TO FINE, SUBROUNDED, WITH LUMPS OF WHITE HIGHLY CALCAREOUS SANDSTONE. SOMEWHAT CONGLOMERATIC. PURPLISH COLOR TO SOME LUMPS.
CEMENT: WHITE - 75% CALCITE.
- 1388-1394 SAMPLE: SAME AS 1382-1388, BUT SLIGHTLY COARSER.
- TOP OF CUTLER
- 1394-1400 SAMPLE: REDDISH-BROWN, CALCAREOUS SANDSTONE WITH SOME MICA AND PYRITES - 75%; 10% MEDIUM TO COARSE GRAINS OF WINDBLOWN QUARTZ; 15% CHOCOLATE-BROWN, MICACEOUS, SILTY SANDSTONE AND SILTSTONE W/MEDIUM QUARTZ PEBBLES. LOW POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR.
CEMENT: MEDIUM SS - 50-50 CALCITE AND SECONDARY QUARTZ. FINE SS - 25% CALCITE AND SECONDARY QUARTZ, 75% SHALE.
- 1400-1405 SAMPLE: SAME AS 1394-1400, EXCEPT MORE MICACEOUS AND WITH 5% WHITE, FINE TO MEDIUM, ANGULAR TO SUBANGULAR, CALCAREOUS, BLACK-SPECKED SANDSTONE.
- 1405-1410 SAMPLE: SAME AS 1400-1405, BUT COARSE GRAIN. ALSO, SOME BRIGHTER RED IN COLOR. SOME FELDSPAR. SOME METALLIC FRAGMENTS - CALAVERITE.
- 1410-1414 SAMPLE: 90% - LIGHT-BROWN, BUFF TO CLEAR SANDSTONE. 10% - REDDISH-BROWN TO PURPLE, MICACEOUS, SILTY SANDSTONE. LOW POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR TO ROUNDED, CLEAR TO SLIGHTLY STAINED QUARTZ. CONSIDERABLY WINDBLOWN.

- 1410-1414
(CON'T) CEMENT: 90% WASHED OUT OF SAMPLE - PRESUMABLY CLAY.
- 1414-1420 SAMPLE: 95% WHITE TO BUFF, SOMEWHAT CALCAREOUS SANDSTONE WITH SHOWS OF PYRITE; 5% RED TO PURPLE, SILTY SANDSTONE WITH SOME MICA. LOW POROSITY.
GRAINS: MEDIUM TO COARSE, ANGULAR TO ROUNDED, CLEAR TO SLIGHTLY STAINED, WINDBLOWN QUARTZ.
CEMENT: MOSTLY WASHED OUT OF SAMPLE - PRESUMABLY CLAY. SOME CUTTINGS HAD 20% CALCITE AND 80% SECONDARY QUARTZ.
- 1420-1425 SAMPLE: SAME AS 1414-1420, EXCEPT MORE BUFF COLORED, CEMENT MORE CALCAREOUS.
- 1425-1436 SAMPLE: WHITE (SLIGHTLY PINKISH TO BUFF), CALCAREOUS SANDSTONE; TRACES OF PURPLISH, MICACEOUS, SANDY SILTSTONE. LOW POROSITY.
GRAINS: MEDIUM, ANGULAR TO SUBROUNDED, CLEAR TO SLIGHTLY STAINED QUARTZ.
CEMENT: 50-50 CALCITE AND SECONDARY QUARTZ.
- 1436-1441 SAMPLE: WHITE, CALCAREOUS SANDSTONE. LOW POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR, CLEAR TO VERY SLIGHTLY STAINED QUARTZ.
CEMENT: 80% CALCITE, 20% SECONDARY QUARTZ.
- 1441-1446 SAMPLE: 50% RED, MICACEOUS, CALCAREOUS SANDSTONE; 50% WHITE, CALCAREOUS SANDSTONE; SOME LARGE GRAINS OF WINDBLOWN QUARTZ. LOW POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR, CLEAR TO MINERAL STAINED QUARTZ.
CEMENT: 25% CALCITE, 75% SECONDARY QUARTZ.
- 1446-1451 SAMPLE: SAME AS 1441-1446, EXCEPT, SOMEWHAT LARGER GRAINED, SLIGHTLY MORE RED SANDSTONE, AND SOME HORNBLLENDE. MORE MICACEOUS - BIOTITE. ARKOSIC IN THE RED SANDSTONE.
- 1451-1458 SAMPLE: REDDISH-BROWN, MICACEOUS SANDSTONE WITH SOME CALCITE, HORNBLLENDE, AND FELDSPAR. LOW POROSITY. SOME LIGHT GRAY LIMESTONE.
GRAINS: FINE TO COARSE, ROUNDED TO SUBANGULAR, SOME LOOSE GRAINS.
CEMENT: 20% CALCITE, 80% SECONDARY QUARTZ.
- 1458-1466 SAMPLE: 80% REDDISH-BROWN, MICACEOUS SANDSTONE WITH SOME HORNBLLENDE, SOMEWHAT ARKOSIC AND CALCAREOUS; 20% WHITE, CALCAREOUS SANDSTONE WITH SOME HORNBLLENDE. LOW POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR, SOME MEDIUM TO COARSE LOOSE GRAINS.
CEMENT: 25% CALCITE, 75% SECONDARY QUARTZ.
- 1466-1471 SAMPLE: REDDISH-BROWN, CALCAREOUS, MICACEOUS SANDSTONE WITH SOME HORNBLLENDE, SOMEWHAT ARKOSIC. LOW POROSITY. SOME WHITE TO GREENISH STREAKS.
GRAINS: FINE TO MEDIUM, SUBANGULAR TO SUBROUNDED.
CEMENT: 50% CALCITE, 50% SECONDARY QUARTZ AND SILT.
- 1471-1475 SAMPLE: MIXTURE OF WHITE TO REDDISH-BROWN AND PURPLE, CALCAREOUS, ARKOSIC SANDSTONE. SOME OF IT CONGLOMERATIC. LOW POROSITY.
GRAINS: FINE TO COARSE, ANGULAR TO SUBANGULAR.
CEMENT: 80% CALCITE IN WHITE SS, 25% CALCITE IN RED SS, REST SECONDARY QUARTZ.
- 1475-1481 SAMPLE: 40% PURPLISH, MICACEOUS, ARKOSIC, CALCAREOUS SANDSTONE; 40% WHITE TO RED, CALCAREOUS SANDSTONE; 20% CHOCOLATE-BROWN, MICACEOUS SILTSTONE AND MICACEOUS, BLUE-GREEN SHALE; SOME MARCASITE. LOW POROSITY.
GRAINS: FINE TO MEDIUM, SUBANGULAR TO ANGULAR.
CEMENT: WHITE SS - 90% CALCITE; RED SS - 80% CALCITE; PURPLE SS - 25% CALCITE; REMAINDER SECONDARY QUARTZ.
- 1481-1487 SAMPLE: SAME AS 1475-1481, EXCEPT, FINER GRAINED, MORE MICACEOUS, AND LESS WHITE SANDSTONE.
- 1487-1493 SAMPLE: 50% CHOCOLATE-BROWN TO RED, FINE, MICACEOUS, CALCAREOUS SANDSTONE

- 1487-1493
(CON'T) GRADING TO SILTSTONE; 40% PINK TO RED, CALCAREOUS, AGGLOMERATIC-ARKOSIC SANDSTONE; 10% BLUE-GREEN TO GRAY, MICACEOUS SHALE.
GRAINS: FINE TO COARSE, ANGULAR TO SUBANGULAR.
CEMENT: 75% CALCITE, 25% SILT AND SECONDARY QUARTZ.
- 1493-1500 SAMPLE: 50% REDDISH TO CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS SANDSTONE GRADING TO SILTSTONE. LOW POROSITY. 50% REDDISH-BROWN, SLIGHTLY CALCAREOUS, ARKOSIC SANDSTONE; SOME PINK TO SALMON COLORED FELDSPAR GRAINS AND HORNBLLENDE.
GRAINS: FINE TO COARSE, SUBANGULAR TO ANGULAR.
CEMENT: 25% CALCITE, 75% SECONDARY QUARTZ AND SILTY CLAY.
- 1500-1507 SAMPLE: SAME AS 1493-1500, BUT MORE BIOTITE AND MUCH MORE CALCAREOUS.
- 1507-1520 SAMPLE: 90% LIGHT BROWNISH-SALMON TO RED, CALCAREOUS, ARKOSIC SANDSTONE; 10% CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS SILTSTONE AND SHALE.
GRAINS: FINE TO COARSE, SUBANGULAR TO ANGULAR.
CEMENT: 90% CALCITE IN LIGHTER COLORED, TO 50% CALCITE IN DARKER COLORED.
- 1520-1528 SAMPLE: SAME AS 1507-1520, EXCEPT, LESS SILTSTONE, MORE BROWN COLOR, AND MORE FELDSPAR.
- 1528-1534 SAMPLE: SAME AS 1520-1528 W/SOME HORNBLLENDE. SOME OF THIS SAMPLE IS AGGLOMERATIC, CEMENTED WITH CLAY, AND WITH GOOD POROSITY.
- 1534-1547 SAMPLE: REDDISH-BROWN, CALCAREOUS, ARKOSIC SANDSTONE. SOME HORNBLLENDE AND MICA (BIOTITE AND MUSCOVITE).
GRAINS: FINE TO COARSE, ANGULAR TO SUBANGULAR, GRAINS OF QUARTZ, FELDSPAR, HORNBLLENDE, AND MICA. LOW POROSITY.
CEMENT: 50-50 CALCITE AND RED CLAY.
- 1547-1567 SAMPLE: REDDISH-BROWN, CALCAREOUS, ARKOSIC SANDSTONE W/BIOTITE AND MUSCOVITE - 90%, LOW POROSITY; 10% CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS SILTSTONE.
GRAINS: SAME AS ABOVE.
CEMENT: HIGHLY CALCAREOUS, RED CLAY.
- 1567-1574 SAMPLE: SAME AS LAST ABOVE.
- 1574-1587 SAMPLE: REDDISH TO CHOCOLATE-BROWN, MICACEOUS (BIOTITE AND MUSCOVITE), SLIGHTLY CALCAREOUS, ARKOSIC, FINE SANDSTONE GRADING TO SILTSTONE.
- 1587-1595 SAMPLE: 20% CAVINGS. LIGHT BROWN, CHOCOLATE-BROWN, TO PURPLISH, ARKOSIC, HIGHLY MICACEOUS, CALCAREOUS SANDSTONE - 75%; 25% - PURPLISH, MICACEOUS SILTSTONE. LOW POROSITY.
GRAINS: VERY FINE TO COARSE, SUBANGULAR TO SUBROUNDED.
CEMENT: 75% CALCITE, 25% SECONDARY QUARTZ.
- 1595-1602 SAMPLE: 50% CHOCOLATE-BROWN TO PURPLE, MICACEOUS SILTSTONE; 50% REDDISH-BROWN, MICACEOUS, HIGHLY CALCAREOUS, SANDSTONE - FINE GRAIN, AND CEMENTED WITH RED TO WHITE ARGILLACEOUS LIME.
- 1602-1610 SAMPLE: REDDISH-BROWN TO PURPLE, HIGHLY CALCAREOUS, MICACEOUS, ARKOSIC SANDSTONE. LOW POROSITY.
GRAINS: VERY FINE TO COARSE, SUBANGULAR TO ROUNDED.
CEMENT: RED ARGILLACEOUS LIME.
- 1610-1628 SAMPLE: SAME AS LAST ABOVE.
- 1628-1658 SAMPLE: REDDISH-BROWN TO CHOCOLATE-BROWN AND PURPLE, MICACEOUS, CALCAREOUS SILTSTONE - 75%; 25% REDDISH-BROWN TO PURPLE, MICACEOUS, VERY CALCAREOUS, SOMEWHAT ARKOSIC, VERY FINE TO MEDIUM GRAINED SANDSTONE.
- 1658-1662 SAMPLE: REDDISH-BROWN TO PURPLE, CALCAREOUS, SOMEWHAT ARKOSIC, MICACEOUS SANDSTONE - 90%; 10% GREEN, MICACEOUS SANDSTONE.
GRAINS: FINE TO MEDIUM, SUBANGULAR.

- 1658-1662
(CON'T) CEMENT: 90% ARGILLACEOUS LIME IN THE LIGHT, FINE, BROWN SANDSTONE. 20% CALCITE AND 80% SECONDARY QUARTZ IN THE DARKER SANDSTONE. 95% SECONDARY QUARTZ IN THE GREEN SANDSTONE.
- 1662-1670 SAMPLE: REDDISH-BROWN, AND PINK AND PURPLE, MICACEOUS, ARKOSIC SANDSTONE.
GRAINS: FINE TO MEDIUM, ANGULAR.
CEMENT: RED ARGILLACEOUS LIME.
- 1670-1680 SAMPLE: 75% REDDISH-BROWN TO PURPLE, HIGHLY CALCAREOUS, ARKOSIC SANDSTONE; 25% PURPLE, HIGHLY MICACEOUS, CALCAREOUS SANDSTONE.
GRAINS: FINE TO MEDIUM.
CEMENT: RED ARGILLACEOUS LIME IN THE ARKOSE. PURPLISH-BROWN, ARGILLACEOUS LIME AND CLAY IN THE PURPLE SANDSTONE.
- 1680-1701 SAMPLE: 80% REDDISH-BROWN, CALCAREOUS, MICACEOUS, ARKOSIC SANDSTONE; 20% PURPLE TO DARK BROWN, MICACEOUS, CALCAREOUS, SILTSTONE.
GRAINS: FINE TO MEDIUM, SUBANGULAR TO ANGULAR.
CEMENT: RED ARGILLACEOUS LIME.
- 1701-1709 SAMPLE: SAME AS LAST ABOVE, EXCEPT SILTSTONE GRADES INTO FINE SANDSTONE.
- 1709-1716 SAMPLE: LIGHT BROWN TO PINK, ARKOSIC, MICACEOUS, CALCAREOUS SANDSTONE. SOME FINE RED SANDSTONE.
GRAINS: MEDIUM TO COARSE, ANGULAR TO SUBANGULAR.
CEMENT: BROWNISH, ARGILLACEOUS LIME AND CALCITE 90%.
- 1716-1722 SAMPLE: SAME AS LAST ABOVE, BUT SLIGHTLY DARKER IN COLOR.
- 1722-1728 SAMPLE: 75% CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS SILTSTONE TO VERY FINE SANDSTONE; 25% REDDISH BROWN, HIGHLY CALCAREOUS, ARENACEOUS CLAYSTONE.
- 1728-1735 SAMPLE: 10% CHOCOLATE-BROWN, MICACEOUS, THINLY LAMINATED, SHINY SHALE. 50% REDDISH-CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS, ARKOSIC, FINE GRAINED SANDSTONE. 10% BUFF TO WHITE, MICACEOUS, MEDIUM GRAINED, CALCAREOUS SANDSTONE WITH A STREAK OF GREEN, CALCAREOUS SHALE ON CONTACT SURFACE. 30% REDDISH-BROWN, CALCAREOUS, MICACEOUS, MEDIUM TO COARSE GRAINED, ARKOSIC SANDSTONE.
GRAINS: ABOVE, ANGULAR TO SUBANGULAR.
CEMENT: 50% CALCITE, 50% SECONDARY QUARTZ WITH SOME RED CLAY.
- 1735-1746 SAMPLE: REDDISH-BROWN TO CHOCOLATE-BROWN, VERY FINE TO MEDIUM GRAINED, MICACEOUS, (LARGER GRAINED - ARKOSIC), CALCAREOUS SANDSTONE, CEMENTED WITH CALCITE AND ARGILLACEOUS LIME.
- 1746-1754 SAMPLE: GOOD POROSITY. 90% REDDISH-BROWN, MEDIUM-GRAINED, ARKOSIC SANDSTONE, CEMENTED WITH ARGILLACEOUS RED LIME; 10% CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS, LAMINATED SHALE.
- 1754-1765 SAMPLE: RED TO CHOCOLATE-BROWN, FINE GRAINED, CALCAREOUS, SANDSTONE WITH MUCH BIOTITE AND MUSCOVITE. SOME MEDIUM-GRAINED ARKOSIC SANDSTONE.
GRAINS: FINE WITH SOME LARGE PEBBLES.
CEMENT: MOSTLY CALCIUM CARBONATE.
- 1765-1775 SAMPLE: SAME AS LAST ABOVE, BUT WITH 50% MEDIUM-GRAINED, ARKOSIC, CALCAREOUS SANDSTONE AND WITH AN ARGILLACEOUS, RED CaCO_3 CEMENT.
- 1775-1784 SAMPLE: REDDISH-BROWN, FINE-GRAINED, MICACEOUS, CALCAREOUS SANDSTONE, CALCITE CEMENT.
- 1784-1796 SAMPLE: SAME AS 1735-1746, WITH SOME WHITE CALCAREOUS SANDSTONE.
- 1796-1805 SAMPLE: REDDISH-BROWN, HIGHLY CALCAREOUS, ARKOSIC SANDSTONE.
GRAINS: FINE TO COARSE, SUBANGULAR TO SUBROUNDED.
CEMENT: RED, ARGILLACEOUS LIME.
- 1805-1835 SAMPLE: SAME AS LAST ABOVE, WITH MICA.
- 1835-1843 SAMPLE: SAME AS LAST ABOVE, BUT WITH MORE FELDSPAR AND BIOTITE.

- 1843-1855 SAMPLE: SAME AS 1775-1784, BUT CEMENTED WITH 50-50 CALCITE AND SEC. QUARTZ.
- 1855-1865 SAMPLE: 80% REDDISH-BROWN, FINE TO COARSE GRAINED, CALCAREOUS, MICACEOUS, ARKOSIC SANDSTONE WITH RED, ARGILLACEOUS LIME CEMENT; 10% AS ABOVE BUT WITH ENOUGH CALCAREOUS RED CLAY TO BE CALLED AN ARENACEOUS MUDSTONE. 5% GREENISH, MICACEOUS, CALCAREOUS SANDSTONE. 5% CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS SILTSTONE TO FINE SANDSTONE.
- 1865-1870 SAMPLE: BROWN TO PURPLE, MICACEOUS (BIOTITE AND MUSCOVITE), CALCAREOUS, ARKOSIC SANDSTONE.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR.
CEMENT: MOSTLY CALCITE, SOME RED CLAY AND SECONDARY QUARTZ.
- 1870-1917 SAMPLE: SAME AS LAST ABOVE, BUT MORE REDDISH-BROWN IN COLOR - MORE CALCAREOUS - LESS ARKOSIC.
- 1917-1923 SAMPLE: REDDISH-BROWN, HIGHLY CALCAREOUS ARKOSIC SANDSTONE; 10% GREENISH-GRAY, MICACEOUS, CALCAREOUS SILTSTONE WITH COARSE DARK GRAY PEBBLES.
GRAINS: FINE TO COARSE, SUBANGULAR TO ROUNDED.
CEMENT: CALCITE AND AMORPHOUS LIME.
- 1923-1932 SAMPLE: REDDISH-BROWN, MICACEOUS, HIGHLY CALCAREOUS, ARKOSIC SANDSTONE (CONGLOMERATIC).
GRAINS: VERY FINE TO COARSE, ANGULAR TO ROUNDED.
CEMENT: MOSTLY CALCITE.
- 1932-1940 SAMPLE: SAME AS LAST ABOVE.
- 1940-1952 SAMPLE: REDDISH-BROWN, PINK, CHOCOLATE-BROWN AND WHITE, CALCAREOUS, MICACEOUS, ARKOSIC SANDSTONE.
GRAINS: FINE TO MEDIUM, ANGULAR TO ROUNDED, GRAINS OF CLEAR TO FROSTED, WHITE TO ROSE QUARTZ AND SMALL PINK GRAINS OF FELDSPAR.
CEMENT: CALCITE.
- 1952-1965 SAMPLE: SAME AS LAST ABOVE, WITH MORE ARGILLACEOUS LIME.
- 1965-1975 SAMPLE: SAME AS LAST ABOVE.
- 1975-1995 SAMPLE: SAME AS LAST ABOVE, BUT FINER GRAINED AND WITH MORE RED CLAY IN CEMENT.
- 1995-2004 SAMPLE: PINK, RED, BROWN TO WHITE, MICACEOUS, CALCAREOUS SANDSTONE. LOW POROSITY. ALL BUT THE WHITE IS ARKOSIC.
GRAINS: VERY FINE TO MEDIUM, ANGULAR TO SUBANGULAR GRAINS OF WHITE TO REDDISH-BROWN CLEAR QUARTZ, REDDISH-BROWN TO PINK FELDSPAR, AND BLACK-GREEN-WHITE MICA.
CEMENT: MOSTLY CALCITE.
- 2004-2011 SAMPLE: 85% PINK, MICACEOUS (MUSCOVITE AND BIOTITE), CALCAREOUS, ARKOSIC SANDSTONE. HIGH PERCENTAGE OF FELDSPAR. LOW POROSITY; 15% BROWN, MICACEOUS SHALE.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR.
CEMENT: 50-50, CALCITE AND SECONDARY QUARTZ.
- 2011-2024 SAMPLE: 20% SAME PINK SANDSTONE AS ABOVE. 10% BROWN, LAMINATED, CALCAREOUS, MICACEOUS SHALE. 40% CHOCOLATE-BROWN TO REDDISH-BROWN TO WHITE, CALCAREOUS, MICACEOUS SANDSTONE - FINE GRAINED. 30% WHITE AND REDDISH TO PURPLISH-BROWN, WHITE SPLOTCHED, ARENACEOUS LIMESTONE.
- 2024-2035 SAMPLE: REDDISH-BROWN TO PURPLE, CALCAREOUS, MICACEOUS, *ARKOSIC SANDSTONE WITH VEINS AND PARTICLES OF ANHYDRITE; 10% BROWN, MICACEOUS, CALCAREOUS SHALE.
GRAINS: FINE TO MEDIUM, ANGULAR. *SOME OF THE MICA IS DEEP PURPLE.
CEMENT: CALCITE AND ANHYDRITE.
- 2035-2055 SAMPLE: REDDISH-BROWN TO PURPLE, CALCAREOUS, MICACEOUS, ARKOSIC SANDSTONE 90%; BROWN, CALCAREOUS, MICACEOUS SHALE 10%.

- 2035-2055
(CON'T) GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR.
CEMENT: CALCITE.
- 2055-2063 SAMPLE: SAME AS 1995-2004.
- 2063-2070 SAMPLE: SAME AS 2035-2055, BUT LESS PURPLE.
- 2070-2078 SAMPLE: 75% PINK, MICACEOUS, CALCAREOUS, ARKOSIC SANDSTONE; 20% REDDISH-BROWN, CALCAREOUS, MICACEOUS, ARKOSIC, PARTIALLY EARTHY SANDSTONE.
5% WHITE, MICACEOUS, CALCAREOUS SANDSTONE.
GRAINS: VERY FINE TO MEDIUM, ANGULAR.
CEMENT: CALCITE AND SOME PARTIALLY DECOMPOSED FELDSPAR.
- 2078-2088 SAMPLE: 50% SAME PINK SANDSTONE AND WHITE SANDSTONE AS LAST ABOVE, WITH SOME BROWN AND SHADING TO A LAVENDER; 20% SALMON AND PINK TO LAVENDER, GRADING FROM SANDSTONE TO ARENACEOUS LIMESTONE; 30% GRAY TO PINK, DOVE GRAY, AND LAVENDER LIMESTONE - SLIGHTLY SILTY.
- TOP OF HERMOSA FORMATION - 2085'
- 2088-2093 SAMPLE: 75% LIMESTONE AS LAST ABOVE; 25% PINK, REDDISH-BROWN TO LAVENDER SANDSTONE - MICACEOUS IN PART, CALCAREOUS, FINE TO COARSE GRAINED, LOOSE, CLEAR QUARTZ GRAINS.
- 2093-2097 SAMPLE: LIGHT BROWN, PINK TO SALMON, MICACEOUS, CALCAREOUS SANDSTONE - 90%; 10% LIMESTONE AS ABOVE.
GRAINS: FINE TO COARSE, ANGULAR, CLEAR TO FROSTED, COLORLESS TO SALMON, PINK, QUARTZ GRAINS.
CEMENT: CALCITE.
- 2097-2102 SAMPLE: 50% SANDSTONE AS ABOVE; 40% DARK GRAY TO PURPLISH-BLACK, MICACEOUS, CALCAREOUS, ARENACEOUS SHALE; 10% GRAY LIMESTONE AND WHITE TO LIGHT GRAY SANDSTONE WITH BIOTITE.
- 2102-2110 SAMPLE: 30% DARK GRAY, CALCAREOUS SANDSTONE W/BIOTITE, FINE GRAINED; 70% LAVENDER-GRAY, MICACEOUS (MUSCOVITE AND MUCH BIOTITE), CALCAREOUS SANDSTONE - FINE, ANGULAR, CALCITE CEMENT, SOMEWHAT ARKOSIC, MICA RUNS FROM BLACK TO GREEN TO WHITE.
- 2110-2119 SAMPLE: 40% GRAY TO BROWNISH-PURPLE LIMESTONE; 40% SAME SANDSTONE AS ABOVE; 20% GREEN, BROWN, TO WHITE, MICACEOUS, CALCAREOUS SANDSTONE - FINE GRAIN, CALCITE CEMENT.
- 2119-2127 SAMPLE: 75% BRICK-RED, MICACEOUS, CALCAREOUS, SANDSTONE; 20% LAVENDER, LIGHT-GREEN TO WHITE, MICACEOUS, CALCAREOUS SANDSTONE; 5% BLUE-GREEN MICACEOUS SHALE.
GRAINS: VERY FINE TO FINE, ANGULAR.
CEMENT: MOSTLY CALCITE.
- 2127-2135 SAMPLE: SAME AS ABOVE. SANDSTONE SOMEWHAT LARGER GRAINED AND ARGILLACEOUS, SHALE DARKER.
- 2135-2140 SAMPLE: SOME REAMING CHIPS. 60% WHITE, GRAY TO BROWN AND PURPLE SANDSTONE, COARSE, ANGULAR, AGGLOMERATIC, WITH MUCH CALCITE. PART OF THIS IS ALMOST A SANDY LIMESTONE. 10% GRAY TO BROWNISH LIMESTONE. 30% BROWN TO PURPLE, MICACEOUS, CALCAREOUS, VERY FINE SANDSTONE.
- 2140-2149 SAMPLE: 10% BROWN SHALE; 40% REDDISH-BROWN, MICACEOUS, CALCAREOUS, VERY FINE SANDSTONE; 50% REDDISH-BROWN, RED AND GRAY, HIGHLY MICACEOUS, CALCAREOUS, FINE TO MEDIUM GRAINED SANDSTONE.
- 2149-2158 SAMPLE: 30% CAVINGS. SAME AS ABOVE - MUCH FINER GRAIN.
- 2158-2166 SAMPLE: 30% BROWN TO GRAY, MICACEOUS, VERY FINE SANDSTONE; 30% ARENACEOUS, CHALKY LIMESTONE; 40% REDDISH-BROWN, GRAY TO PURPLE SANDSTONE - FINE TO COARSE, ANGULAR TO SUBANGULAR, CEMENTED WITH WHITE POWDERY LIME AND RED ARGILLACEOUS LIME.

- 2166-2181 SAMPLE: REDDISH-BROWN, MICACEOUS, CALCAREOUS, ARKOSIC SANDSTONE.
GRAINS: MEDIUM TO COARSE, ANGULAR.
CEMENT: CALCITE.
- 2181+2186 SAMPLE: 60% REDDISH-BROWN TO RED AND BROWN, MICACEOUS, ARENACEOUS, CALCAREOUS SHALE; 40% RED AND GRAY SANDSTONE AS IN 2140-2149.
- 2186-2197 SAMPLE: PINK TO REDDISH-BROWN, ARKOSIC SANDSTONE W/SOME MICA, CALCAREOUS.
GRAINS: MEDIUM TO COARSE, ANGULAR TO SUBANGULAR.
CEMENT: CALCITE. 10% CAVINGS.
- 2197-2203 SAMPLE: 25% GREEN TO GRAY, CALCAREOUS, MICACEOUS SANDSTONE; 25% PINK TO BROWN, HIGHLY CALCAREOUS, CONGLOMERATIC SANDSTONE - COARSE GRAINED; 40% RED, PINK AND BROWN VERY FINE TO COARSE, CALCAREOUS, MICACEOUS, ARKOSIC SANDSTONE; 10% WHITE TO PINK LIMESTONE.
- 2203-2210 SAMPLE: 30% RED TO BROWN, MICACEOUS, SILTY SHALE; 70% REDDISH-BROWN, MICACEOUS, HIGHLY CALCAREOUS, SANDSTONE.
GRAINS: VERY FINE TO COARSE, ANGULAR TO SUBROUNDED.
CEMENT: CALCITE, PORTIONS WITH SOME RED ARGILLACEOUS LIME.
- 2210-2218 SAMPLE: SAME AS ABOVE WITH LESS SHALE (ONLY 10%).
- 2218-2228 SAMPLE: RUSTY-RED, CALCAREOUS SANDSTONE, SOME MICA, SOFTLY CEMENTED.
GRAINS: FINE TO MEDIUM, SUBANGULAR.
CEMENT: CALCITE.
- 2229-2239 SAMPLE: 30% REDDISH-BROWN TO BROWN, MICACEOUS SILTSTONE TO VERY FINE SANDSTONE; 70% REDDISH-BROWN, MICACEOUS, SLIGHTLY CALCAREOUS SANDSTONE. FAIR POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR.
CEMENT: SOME CALCITE, BUT MOSTLY HELD TOGETHER BY COMPACTION AND SOME FERRUGINOUS MATERIAL.
- 2239-2250 SAMPLE: 30% SANDSTONE AS ABOVE BUT MORE FIRMLY CEMENTED; 70% REDDISH-BROWN, MICACEOUS SHALE GRADING TO VERY FINE SANDSTONE, WITH COLOR CHANGING TO GREEN IN THIN STREAKS AND LENSES.
- 2250-2275 SAMPLE: 40% SHALE TO VERY FINE SANDSTONE AS ABOVE; 60% REDDISH-BROWN TO PINK, MICACEOUS, SOME CALCAREOUS, ARKOSIC, MEDIUM TO COARSE-GRAINED, ANGULAR, SANDSTONE - CEMENTED WITH CALCITE AND FERRUGINOUS MATERIAL.
- 2275-2283 SAMPLE: 5% BROWN, MICACEOUS SHALE; 95% SAME SANDSTONE AS ABOVE WITH MORE CALCITE. LOW POROSITY. MUCH BIOTITE.
- 2283-2313 SAMPLE: BRICK-RED, MICACEOUS, CALCAREOUS SANDSTONE WITH GREEN AND GRAY SPOTS AND LENSES.
GRAINS: FINE, ANGULAR.
CEMENT: CALCITE.
- NOTE: THE SAND LINE WAS STRUNG IN AND THE ABOVE DEPTH WAS CORRECTED FROM 2301 TO READ 2313. FROM 1534' TO 2313' THE NEW SAND LINE HAD STRETCHED AND ADDING ERRORS OF STICK MEASUREMENT, AN ACCUMULATED ERROR OF 12' HAD OCCURRED. THIS FACTOR SHOULD BE CONSIDERED IN ADJUSTING DEPTHS IN THIS ZONE. 2313' IS A CORRECT MEASUREMENT.
- 2313-2323 SAMPLE: 10% BROWN AND REDDISH-BROWN SHALE AND SILTSTONE - MICACEOUS, 5% GREEN-GRAY LIMESTONE; 85% BRICK-RED, MICACEOUS, HIGHLY CALCAREOUS SANDSTONE. FAIR POROSITY.
GRAINS: FINE TO COARSE, ANGULAR TO SUBROUNDED, POORLY SORTED.
CEMENT: CALCITE WITH SOME RED CLAY.
- 2323-2329 SAMPLE: 25% BROWN TO PURPLE-BROWN, MICACEOUS, LAMINATED SHALE TO SILTSTONE; 5% SAME AS ABOVE ONLY GREEN IN COLOR; 60% SAME SANDSTONE AS LAST ABOVE; 10% WHITE TO GRAY, MICACEOUS, CALCAREOUS, VERY FINE SANDSTONE.
- 2329-2335 SAMPLE: BRICK-RED, MICACEOUS, CALCAREOUS SHALE GRADING TO VERY FINE AND FINE SANDSTONE.

- 2335-2348 SAMPLE: LIGHT-BROWN, CALCAREOUS, ARGILLACEOUS SANDSTONE. THIS SANDSTONE OR (SAND) HAS GOOD POROSITY AND ON A TEST OF 12 HOURS PRODUCED 7.2 BAILERS OF SALT WATER OR 78 GAL./HR. THIS WATER-BEARING ZONE EXTENDS FROM 2337 TO ABOUT 2355.
GRAINS: MEDIUM TO VERY COARSE, ANGULAR TO SUBROUNDED, CLEAR TO BROWN, FINE PURPLE QUARTZ. SOME GRAINS AS LARGE AS $\frac{4}{25}$ OF AN INCH. ((CONTAINS 69,000 PPM OF CHLORIDE)).
CEMENT: NOT TOO FIRMLY CEMENTED, WITH CALCITE AND REDDISH-BROWN CLAY.
- 2348-2355 SAMPLE: SAME AS ABOVE, BUT FINER GRAIN, AND MORE RED TO LAVENDER COLOR, MICACEOUS AND MORE FIRMLY CEMENTED.
- 2355-2363 SAMPLE: 20% SAME AS LAST ABOVE. 80% BRICK-RED TO PURPLISH-BROWN, MICACEOUS, CALCAREOUS, VERY FINE TO FINE SANDSTONE. SOME GREEN AND GRAY SPOTS.
CEMENT: CALCITE AND RED CLAY.
- 2363-2369 SAMPLE: BRICK-RED, SLIGHTLY MICACEOUS, CALCAREOUS, ARGILLACEOUS SANDSTONE TO SHALE.
GRAINS: VERY FINE TO CLAY.
CEMENT: CALCITE.
- 2369-2375 SAMPLE: REDDISH-BROWN, CALCAREOUS SANDSTONE AND SOME SHALE. TRACES OF MICA. WHITE TO GRAY AND PURPLE PIECES - 10%.
GRAINS: FINE TO COARSE, ANGULAR.
CEMENT: CALCITE AND SILT.
- 2375-2386 SAMPLE: BRICK-RED, HIGHLY CALCAREOUS, MICACEOUS, ARGILLACEOUS SANDSTONE. FAIR POROSITY.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBANGULAR.
CEMENT: CALCITE AND RED CLAY OR SILT.
- 2386-2410 SAMPLE: SAME AS LAST ABOVE, SLIGHTLY LARGER GRAIN.
- 2410-2418 SAMPLE: BRICK-RED TO PURPLISH-BROWN, MICACEOUS, VERY SLIGHTLY CALCAREOUS, SHALE. SOMEWHAT SILTY AND SANDY. GREEN SPOTS OCCASIONALLY.
- 2418-2430 SAMPLE: SAME AS LAST ABOVE.
- 2430-2434 SAMPLE: 50% REDDISH-BROWN, MICACEOUS, CALCAREOUS SHALE. 50% REDDISH-BROWN (SOME WHITE), MICACEOUS (BOTH BIOTITE AND MUSCOVITE - SOME GREEN), CALCAREOUS SANDSTONE.
GRAIN: FINE TO MEDIUM, ANGULAR.
CEMENT: CALCITE IN WHITE SS, CALCITE AND RED FERRUGINOUS CLAY IN REDDISH-BROWN SS.
- 2434-2440 SAMPLE: SAME AS LAST ABOVE.
- 2440-2447 SAMPLE: REDDISH-BROWN, SOMEWHAT MICACEOUS, SLIGHTLY CALCAREOUS SHALE, SOME GRADING TO VERY FINE SANDSTONE.
- 2447-2455 SAMPLE: SOME CAVINGS. 60% BROWN, PURPLISH-BROWN TO GRAY, MICACEOUS, CALCAREOUS SHALE AND VERY FINE TO FINE SANDSTONE; 40% DOVE GRAY TO PURPLISH-BROWN, ARGILLACEOUS LIMESTONE.
- 2455-2462 SAMPLE: BLUE-GRAY AND GRAY: 50% ARGILLACEOUS LIMESTONE; 50% MICACEOUS, CALCAREOUS SHALE, SILTY SHALE, AND VERY FINE SANDSTONE.
- 2462-2472 SAMPLE: REDDISH-BROWN, MICACEOUS, CALCAREOUS, VERY FINE TO FINE SANDSTONE. 5% BLUE-GRAY, MICACEOUS, CALCAREOUS, SILTY SHALE.
- 2472-2495 SAMPLE: SAME AS ABOVE, SLIGHTLY LARGER GRAIN.
- 2495-2505 SAMPLE: 30% SAME AS ABOVE; 10% RED SHALE; 20% WHITE TO BLUE-GRAY, MICACEOUS, CALCAREOUS, SANDSTONE AND SHALE; 40% CHOCOLATE-BROWN, MICACEOUS, CALCAREOUS, SILTY SHALE.
- 2505-2512 SAMPLE: CHOCOLATE TO PURPLISH-BROWN, SLIGHTLY CALCAREOUS, ARENACEOUS SHALE.

- 2512-2520 SAMPLE: 40% PURPLISH-BROWN TO VERY DARK GRAY, MICACEOUS, CALCAREOUS SHALE AND VERY FINE SANDSTONE; 30% PURPLISH-BROWN TO PINKISH MICACEOUS, CALCAREOUS, FINE SANDSTONE; 30% GRAY-BROWN TO RED AND PINKISH LIMESTONE.
- 2520-2528 SAMPLE: BLUE, BLUE-GRAY TO BROWN SHALE AND SILTSTONE. SOME SLIGHTLY CALCAREOUS. PORTIONS CONTAINING SOME MICA.
- 2528-2535 SAMPLE: 20% SAME AS ABOVE; 80% PURPLISH TO REDDISH-BROWN, MICACEOUS, CALCAREOUS SANDSTONE. SOME WHITE AND PINKISH-GRAY.
GRAINS: VERY FINE TO COARSE, ANGULAR TO SUBROUNDED.
CEMENT: CALCITE AND RED AND BROWN CLAY.
- 2535-2545 SAMPLE: 10% BLUE, BLUE-GRAY, AND DARK-GRAY SHALE, (SOME BLACK); 90% RED TO PURPLISH-BROWN, MICACEOUS (BIOTITE, MUSCOVITE, AND SOME PHLOGOPITE), CALCAREOUS SANDSTONE.
GRAINS: MEDIUM (SOME COARSE), ANGULAR.
CEMENT: CALCITE AND SILT. PORTIONS ARE SO MICACEOUS AS TO APPEAR TO BE BOUND BY THIS SUBSTANCE.
- 2545-2550 SAMPLE: 25% SAME SANDSTONE AS ABOVE; 75% REDDISH-BROWN TO BRICK-RED SHALE.
- 2550-2558 SAMPLE: 10% SAME SHALE AS ABOVE; 90% REDDISH-BROWN (WITH PINKISH TO PURPLISH CAST), MICACEOUS, CALCAREOUS SANDSTONE.
GRAINS: FINE TO COARSE, ANGULAR.
CEMENT: CALCITE.
- 2558-2570 SAMPLE: 30% GRAY, PINKISH-BROWN TO LAVENDAR, MICACEOUS, CALCAREOUS SANDSTONE; 40% GRAY, TO BLUE-GRAY, MICACEOUS, CALCAREOUS SHALE; 30% GRAY TO DOVE GRAY LIMESTONE.
- 2570-2584 SAMPLE: BLUE-GRAY, MICACEOUS, CALCAREOUS SHALE - 90%; BLUE-GRAY LIMESTONE - 10%.
- 2584-2591 SAMPLE: DARK, BLUE-GRAY, FOSSILIFEROUS LIMESTONE. CONTAINS A FEW FOSSIL STEMS - CRINOIDES.
- 2591-2595 SAMPLE: WHITE, GRAY TO BLUE AND DOVE GRAY, FOSSILIFEROUS LIMESTONE. SOME BLUE-GRAY SHALE. SOME LIMESTONE HAS RASPBERRY COLOR. SOME FOSSILS AS ABOVE WITH SOME SPECIMENS BEING RED CaCO_3 .
- 2595-2603 SAMPLE: GRAY LIMESTONE.
- 2603-2608 SAMPLE: BLUE-GRAY TO DOVE-GRAY, VERY SLIGHTLY FOSSILIFEROUS LIMESTONE (ENCRINAL) 10% BLUE SILTY SHALE.
- 2608-2620 SAMPLE: 20% BLUE-GRAY, SILTY SHALE AND LIMESTONE; 20% BLUE-GRAY TO LIGHT TAN SANDSTONE - FINE GRAINED, CALCAREOUS, MICACEOUS; 60% BROWN, CALCAREOUS, MICACEOUS SANDSTONE - FINE GRAINED CALCITE CEMENT.
- 2620-2630 SAMPLE: 10% BLUE-GRAY SHALE AND DOVE-GRAY LIMESTONE; 50% CHOCOLATE-BROWN, MICACEOUS (SOME PHLOGOPITE), SLIGHTLY CALCAREOUS SILTSTONE; 40% VERY LIGHT TAN TO WHITE, BROWN AND LAVENDER, MICACEOUS (BIOTITE, MUSCOVITE AND PHLOGOPITE), CALCAREOUS SANDSTONE.
GRAINS: FINE TO COARSE, ANGULAR.
CEMENT: CALCITE, AND CALCITE-SECONDARY QUARTZ.
- 2630-2635 SAMPLE: 50% GRAYISH TAN TO BROWN, ARKOSIC SANDSTONE - COARSE, SUBANGULAR GRAINED, CALCITE CEMENT; 50% GRAY TO PURPLISH LIMESTONE AND SILTSTONE.
- 2635-2641 SAMPLE: 30% LIGHT GRAY TO TAN, MICACEOUS, CALCAREOUS SANDSTONE; 70% BLUE-GRAY, CHOCOLATE-BROWN TO BLACK, MICACEOUS SHALE GRADING TO SILTY SHALE AND SILTSTONE.
- 2641-2648 SAMPLE: LIGHT TO DOVE GRAY LIMESTONE - 90%; BLUE AND BROWN SILTY SHALE 10%.
- 2648-2650 SAMPLE: 40% DOVE GRAY LIMESTONE; 60% PINKISH AND TANNISH GRAY TO WHITE, MICACEOUS, CALCAREOUS, FINE TO MEDIUM GRAINED SANDSTONE.

- 2650-2654 SAMPLE: 30% SAME SANDSTONE AS ABOVE; 50% BROWN (CHOCOLATE TO PINK) MICACEOUS SANDSTONE GRADING TO SILTY SHALE; 20% BLUE-GRAY MICACEOUS, SILTY SHALE.
- 2654-2665 SAMPLE: 25% BLUE-GRAY SHALE; 75% DOVE-GRAY LIMESTONE.
- 2665-2671 SAMPLE: 30% SAME LIMESTONE AS ABOVE; 70% TAN TO BROWN AND PINKISH MICACEOUS, CALCAREOUS SANDSTONE - FINE TO MEDIUM, SUBANGULAR CEMENT.
- 2671-2679 SAMPLE: 70% GRAY LIMESTONE TO ARENACEOUS LIMESTONE; 30% GRAY TO BROWN MICACEOUS CALCAREOUS SILTSTONE.
- 2679-2683 SAMPLE: 30% LIMESTONE TO SILTSTONE AS ABOVE; 40% BROWN, BLUE, TO BLACK SHALE; 30% GRAY TO WHITE, MICACEOUS, CALCAREOUS SANDSTONE - MEDIUM TO COARSE, CALCITE.
- 2683-2687 SAMPLE: 90% TAN TO SALMON, CALCAREOUS SANDSTONE. 95% OF CEMENT WASHED AWAY FROM SAMPLE BUT INDICATIONS ARE IT IS GRAY-BROWN ARGILLACEOUS LIME. PORTIONS OF CEMENT ARE MORE MUD THAN CaCO_3 . MEDIUM, SUBANGULAR GRAIN. 10% BLUE AND BROWN MICACEOUS SILTSTONE.
- 2687-2691 SAMPLE: SAME AS ABOVE.
- 2691-2695 SAMPLE: SAME AS ABOVE, BUT WITH MOSTLY CALCITE CEMENT.
- 2695-2700 SAMPLE: 10% BLUE AND RED SILTY SHALE; 90% BROWN TO PURPLISH-BROWN (SOME WHITE) MICACEOUS, CALCAREOUS SILTSTONE GRADING TO VERY FINE SANDSTONE.
- 2700-2708 SAMPLE: 10% BLUE AND BROWN, MICACEOUS SILTSTONE AND GRAY LIMESTONE; 90% TAN TO BROWN AND SALMON, CALCAREOUS SANDSTONE.
GRAINS: MEDIUM, ANGULAR TO SUBROUNDED.
CEMENT: BROWN ARGILLACEOUS LIME.
- 2708-2715 SAMPLE: 75% SAME SANDSTONE AS ABOVE; 15% WHITE, CALCAREOUS, MICACEOUS SANDSTONE - FINE GRAINED W/COARSE ROUND QUARTZ PEBBLES, CALCITE CEMENT; 10% BLUE-GRAY TO PURPLE-BROWN MICACEOUS SILTSTONE.
- 2715-2720 SAMPLE: 30% SAME SANDSTONE AS 2700-2708; 70% REDDISH-BROWN, MICACEOUS, CALCAREOUS SANDSTONE.
GRAINS: FINE, ANGULAR TO SUBANGULAR.
CEMENT: CALCITE AND FERRUGINOUS MATERIAL.
- 2720-2730 SAMPLE: REDDISH-BROWN, MICACEOUS, CALCAREOUS SILTSTONE, 10% BLUE-GREEN COLOR.
- 2730-2740 SAMPLE: 25% SAME AS ABOVE; 75% GRAY LIMESTONE.
- 2740-2743 SAMPLE: 30% GRAY LIMESTONE; SOME SILTSTONE, RED AND BROWN; 70% LAVENDER TO PINK AND WHITE MICACEOUS, CALCAREOUS SANDSTONE.
GRAINS: MEDIUM, ANGULAR.
CEMENT: 50-50 CALCITE AND SECONDARY QUARTZ, SOME FERRUGINOUS MATERIAL IN THE LAVENDER SANDSTONE.
- 2743-2750 SAMPLE: 30% LAVENDER, MICACEOUS, CALCAREOUS SANDSTONE - MEDIUM TO COARSE GRAINED, CALCITE CEMENT, SOME PHLOGOPITE IN MICA. MINOR SH AND LS; 70% SALMON COLORED, SLIGHTLY MICACEOUS SANDSTONE - ARKOSIC, LARGE SALMON-COLORED FELDSPAR GRAINS.
GRAINS: COARSE, ANGULAR TO ROUNDED.
CEMENT: MOST WASHED AWAY, REMAINING CALCITE.
- 2750-2757 SAMPLE: SAME AS ABOVE WITH 70% LAVENDER SANDSTONE, 30% SALMON COLORED SS.
- 2757-2765 SAMPLE: 75% DARK BROWN-GRAY, MICACEOUS, CALCAREOUS SILTSTONE; 25% BROWN, SILTY, ARENACEOUS LIMESTONE.
- 2765-2770 SAMPLE: GRAY, W/SOME WHITE, MICACEOUS, SILTY LIMESTONE.

- 2770-2771 SAMPLE: GRAY LIMESTONE - HARD. SOME BROWN SILTY SHALE.
- 2771-2777 SAMPLE: 20% GRAY TO WHITE LIMESTONE. SEVERAL CRINOID FOSSILS. 80% DARK, BLUE-GRAY, MICACEOUS, CALCAREOUS SILTSTONE.
- 2777-2782 SAMPLE: 30% SAME SILTSTONE AS ABOVE; 40% GRAY TO WHITE LIMESTONE: 30% WHITE, PINK TO SALMON, CALCAREOUS ARKOSE.
GRAINS: MEDIUM TO VERY COARSE, ANGULAR TO SUBANGULAR, CONTAINING GRANULES OF SALMON COLORED FELDSPAR.
CEMENT: CALCITE.
- 2782-2792 SAMPLE: PINK TO SALMON ARKOSE. CONTAINS AT LEAST 60% SALMON COLORED FELDSPAR, ORTHOCLASE IN GRANULES UP TO 3/16" IN DIAMETER. MICA IN FINER GRAINED PORTIONS.
GRAINS: MEDIUM TO VERY COARSE, ANGULAR TO SUBANGULAR.
CEMENT: CALCITE, SECONDARY QUARTZ, AND SOME CLAY.
- 2792-2798 SAMPLE: SAME AS ABOVE, EXCEPT MORE CALCAREOUS.
- 2798-2802 SAMPLE: 10% SAME AS LAST ABOVE; 90% LIGHT GRAY, MICACEOUS, CALCAREOUS, VERY FINE TO FINE SANDSTONE GRADING TO ARENACEOUS LIMESTONE.
- 2802-2805 SAMPLE: GRAY TO WHITE, MICACEOUS, CALCAREOUS, VERY FINE TO FINE SANDSTONE.
- 2805-2809 SAMPLE: 50% GRAY AND WHITE LIMESTONE. 50% BROWN-GRAY CHALCEDONY OR CHERT.
- 2809-2815 SAMPLE: 70% SAME LIMESTONE AS ABOVE; 30% BROWN-GRAY AND SALMON, TO CLEAR-COLORLESS CHERT AND CHALCEDONY.
- 2815-2822 SAMPLE: 10% DARK GRAY LIMESTONE; 30% GRAY TO ALMOST BLACK SHALE - MICACEOUS AND CALCAREOUS; 60% GRAY SANDSTONE, MICACEOUS, CALCAREOUS, MEDIUM-ANGULAR GRAIN, CEMENT - CALCITE AND SOME SECONDARY QUARTZ.
- 2822-2827 SAMPLE: GRAY, MICACEOUS, CALCAREOUS SHALE.
- 2827-2835 SAMPLE: 50% SAME AS ABOVE; 25% GRAY LIMESTONE; 25% SANDSTONE AS 2815-2822.
- 2835-2843 SAMPLE: 20% SANDSTONE AND 30% SHALE AS ABOVE; 50% WHITE TO GRAY-BROWN LIMESTONE.
- 2843-2849 SAMPLE: GRAY AND GRAY-BROWN, MICACEOUS, ARENACEOUS LIMESTONE.
- 2849-2856 SAMPLE: 50% GRAY LIMESTONE; 50% WHITE, ARENACEOUS LIMESTONE.
- 2856-2860 SAMPLE: WHITE AND GRAY LIMESTONE AND SANDY LIMESTONE GRADING TO CALCAREOUS SANDSTONE. SOME MICA.
- 2860-2866 SAMPLE: GRAY AND WHITE, ARENACEOUS LIMESTONE.
- 2866-2876 SAMPLE: GRAY LIMESTONE, SILTY TO CALCAREOUS SHALE, SLIGHTLY FOSSILIFEROUS - CRINIDS.
- 2876-2880 SAMPLE: DARK GRAY (SOME ALMOST BLACK) LIMESTONE, SOMEWHAT ARGILLACEOUS.
- 2880-2887 SAMPLE: GRAY TO DARK GRAY, CALCAREOUS SHALE 75%; GRAY TO DARK GRAY LIMESTONE.
- 2887-2892 SAMPLE: 30% SAME AS LAST ABOVE; 30% BROWN CHERT; 40% WHITE TO GRAY-BROWN LIMESTONE. (A FEW FRAGMENTS OF FOSSIL CRINOID STEMS.)
- 2892-2896 SAMPLE: GRAY LIMESTONE WITH GRAY AND BROWN CHERT.
- 2896-2900 SAMPLE: THIS SAMPLE IS 90% CAVINGS AND REAMINGS FROM FISHING JOB. ZONE IS GRAY LIMESTONE SIMILAR TO LAST ABOVE.
- 2900-2912 SAMPLE: THIS SAMPLE CONTAINS MUCH CAVINGS FROM CLEAN-OUT, AS ABOVE, AND IS RUST STAINED FROM ACTION OF SALT WATER ON SAMPLE PAN. ZONE IS SAME AS LAST ABOVE.

- 2912-2915 SAMPLE: THIS SAMPLE IS RUST STAINED AND CONTAINS CHIPPINGS OF STEEL FROM BIT. ZONE IS GRAY LIMESTONE, SOMEWHAT SILTY, AND WITH SOME CHERT.
- 2915-2920 SAMPLE: GRAY, SANDY, SILTY LIMESTONE WITH SOME CHERT AND SOME MICA.
- 2920-2924 SAMPLE: 10% AS LAST ABOVE; 90% WHITE, MICACEOUS, CALCAREOUS SANDSTONE GRADING TO SANDY LIMESTONE. SOME FRAGMENTS OF GRAY TO CLEAR PLAGIOCLASE FELDSPAR.
- 2924-2927 SAMPLE: 60% LIGHT GRAY TO WHITE, MICACEOUS (BIOTITE), CALCAREOUS, FINE (CLEAR) GRAINED SANDSTONE; 40% DARK GRAY SLIGHTLY CALCAREOUS SHALE.
- 2927-2932 SAMPLE: 50% LIGHT GRAY, CALCAREOUS, MICACEOUS (MUSCOVITE, BIOTITE, AND MUCH PHLOGOPITE), FINE GRAINED SANDSTONE; 50% DARK GRAY, SLIGHTLY CALCAREOUS, MICACEOUS SHALE.
- 2932-2939 SAMPLE: SAME AS LAST ABOVE.
- 2939-2941 SAMPLE: 30% SAME SANDSTONE AS ABOVE; 40% DARK GRAY TO BLACK SHALE; 30% GRAY-BROWN LIMESTONE.
- 2941-2955 SAMPLE: 20% GRAY-BROWN LIMESTONE; 50% LIGHT GRAY, MICACEOUS, CALCAREOUS, FINE-GRAINED SANDSTONE; 15% DARK GRAY SHALE AND SILTY SHALE; 15% PURPLE-BROWN, SILTY SHALE. SOME RED CAVINGS AND TRACES OF ARKOSE.
- 2955-2960 SAMPLE: 80% LIGHT GRAY TO WHITE, HIGHLY CALCAREOUS, FINELY MICACEOUS, FINE (CLEAR) GRAINED SANDSTONE, WITH MEDIUM TO LARGE PEBBLES OF CLEAR TO ROSE QUARTZ AND SALMON COLORED FELDSPAR. 10% RED SILTY SHALE; 5% SILTY SHALE; 5% PURPLE AND BROWN, SILTY SHALE.
- 2960-2967 SAMPLE: GRAY, SLIGHTLY MICACEOUS, SILTY, SANDY LIMESTONE - 90%; 10% GRAY TO PURPLE, SILTY SHALE.
- 2967-2972 SAMPLE: GRAY-BROWN LIMESTONE - SLIGHTLY MICACEOUS, SILTY AND SANDY. SOME WHITE-CHALKY.
- 2972-2985 SAMPLE: WHITE TO LIGHT GRAY, VERY SLIGHTLY MICACEOUS, HIGHLY CALCAREOUS SANDSTONE.
GRAINS: VERY FINE TO FINE, ANGULAR TO SUBANGULAR, CLEAR, MOSTLY COLORLESS, QUARTZ.
CEMENT: CALCITE.
- 2985-2992 SAMPLE: GRAY (SOME WHITISH), MICACEOUS, CALCAREOUS SANDSTONE.
GRAINS: VERY FINE TO FINE.
CEMENT: MOSTLY CALCITE, SOME SECONDARY QUARTZ.
- 2992-3000 SAMPLE: GRAY, MICACEOUS, CALCAREOUS, FINE-GRAINED SANDSTONE GRADING TO SANDY LIMESTONE.
- 3000-3013 SAMPLE: GRAY, ARENACEOUS LIMESTONE GRADING TO CALCAREOUS SANDSTONE. SOME MICA.
- 3013-3025 SAMPLE: BLUE-GRAY, SANDY AND SILTY LIMESTONE, GRADING TO CALCAREOUS, SANDY SHALE WITH SOME MICA.
- 3025-3033 SAMPLE: 50% BLUE-GRAY, CALCAREOUS, SILTY SHALE; 25% DARK GRAY, CALCAREOUS, MICACEOUS SHALE; 25% GRAY-BROWN, SILTY LIMESTONE.
- 3033-3041 SAMPLE: 75% GRAY-BROWN (SOME WHITE-CHALKY) LIMESTONE W/SOME MICA AND PYRITES. 25% DARK GRAY TO BLACK, CALCAREOUS SHALE - SLIGHTLY FOSSILIFEROUS, CRINOIDAL.
- 3041-3050 SAMPLE: GRAY (SOME WHITE AND SOME BROWNISH), ARGILLACEOUS LIMESTONE, SOME ANHYDRITE.
- 3050-3056 SAMPLE: BLUE-GRAY, (SOME GRAY, BROWN AND WHITE), SANDY TO ARGILLACEOUS LIMESTONE - 90%; 10% DARK GRAY TO BLACK, CALCAREOUS SHALE.
- 3056-3062 SAMPLE: DARK GRAY, SOME POROSITY; 50% ARGILLACEOUS LIMESTONE; 50% CALCAREOUS SHALE.

- 3062-3075 SAMPLE: DARK GRAY, ARGILLACEOUS, SANDY LIMESTONE.
- 3075-3083 SAMPLE: DARK GRAY, ARGILLACEOUS LIMESTONE GRADING TO CALCAREOUS SANDSTONE.
- 3083-3100 SAMPLE: 80% DARK GRAY TO BLACK, CALCAREOUS, SILTY SHALE; 10% GRAY-BROWN TO WHITE LIMESTONE; 10% WHITE, CALCAREOUS SANDSTONE.
- 3100-3113 SAMPLE: MINOR CAVINGS FROM ABOVE. WHITE TO LIGHT GRAY, CALCAREOUS, MICACEOUS SANDSTONE. FRIABLE. LOW POROSITY.
GRAINS: FINE TO MEDIUM, SUBANGULAR, CLEAR-COLORLESS QUARTZ.
CEMENT: CALCITE.
- 3113-3123 SAMPLE: 50% SAME SANDSTONE AS ABOVE GRADING TO SANDY LIMESTONE, FRIABLE.
50% GRAY, ARGILLACEOUS, SOMEWHAT SANDY LIMESTONE.
- 3123-3138 SAMPLE: WHITE TO LIGHT GRAY, CALCAREOUS, SLIGHTLY MICACEOUS, SANDSTONE. SOMEWHAT ARKOSIC. FRIABLE.
GRAINS: FINE TO COARSE, ANGULAR TO SUBROUNDED, CLEAR-COLORLESS TO PINK AND SALMON QUARTZ, WITH SOME SALMON AND PINK FELDSPAR.
CEMENT: CALCITE.
- 3138-3155 SAMPLE: 50% SAME SANDSTONE AS ABOVE; 50% PINKISH-BROWN, CALCAREOUS, MICACEOUS, SLIGHTLY ARKOSIC SANDSTONE. MINOR GRAY LIMESTONE AND SHALE.
GRAINS: MEDIUM, ANGULAR TO SUBANGULAR.
CEMENT: CALCITE.
- 3155-3174 SAMPLE: 15% PURPLISH TO PINKISH BROWN, MICACEOUS, SLIGHTLY CALCAREOUS, FINE SANDSTONE; 85% WHITE TO SALMON, MICACEOUS ARKOSE.
GRAINS: MEDIUM TO VERY COARSE, ANGULAR TO SUBANGULAR, 50% FELDSPAR.
CEMENT: 25% CALCITE, 75% SECONDARY QUARTZ.
- 3174-3180 SAMPLE: ARKOSE, AS ABOVE, SLIGHTLY MORE FELDSPAR.
- 3180-3190 SAMPLE: LIMESTONE - WHITE TO LIGHT GRAY. SLIGHTLY FOSSILIFEROUS - TRACES OF MOLDS OF BI-VALVES. SOME FELDSPAR FROM ABOVE.
- 3190-3193 SAMPLE: WHITE TO LIGHT GRAY LIMESTONE. MINOR RED AND DARK GRAY SHALE CAVINGS.
- 3193-3195 SAMPLE: GRAY TO WHITE LIMESTONE - MICRO-CRYSTALLINE. SOME DARK GRAY SHALE. SMALL AMOUNTS OF PINK TO AMBER CHALCEDONY - SOME VEIN FILLING, SOME IN SPOTS.
- 3195-3203 SAMPLE: 10% GRAY TO GRAY-BROWN LIMESTONE; 90% GRAY TO BLACK, SOMEWHAT MICACEOUS, SLIGHTLY CALCAREOUS SILTSTONE GRADING TO SHALE. SOME FOSSIL LEAF PRINTS. CONTAINS PYRITES AND MARCASITE.
- 3203-3212 SAMPLE: 15% SAME SILTSTONE AS ABOVE; 80% WHITE, CALCAREOUS, MICACEOUS SANDSTONE, CONTAINS MUSCOVITE AND PYRITES.
GRAINS: FINE TO VERY FINE, WITH MEDIUM GRAINED PEBBLES, SUBANGULAR, CLEAR-COLORLESS QUARTZ.
CEMENT: CALCITE; 5% LIGHT GRAY LIMESTONE.
- 3212-3222 SAMPLE: 20% CAVINGS OF RED SHALE, BLACK SHALE, LIMESTONE, ETC. ZONE IS SAME WHITE SANDSTONE AS LAST ABOVE.
- 3222-3230 SAMPLE: DARK GRAY, CALCAREOUS SILTSTONE AND LIMESTONE. CONTAINS PHLOGOPITE.
- 3230-3233 SAMPLE: 30% SAME SILTSTONE AS ABOVE; 70% DOVE-GRAY, SANDY LIMESTONE WITH PINKISH TO SALMON CHALCEDONY.
- 3233-3242 SAMPLE: LIGHT GRAY TO DARK GRAY, CALCAREOUS SILTSTONE.
- 3242-3252 SAMPLE: 10% DARK GRAY SILTSTONE; 90% GRAY TO VERY LIGHT GRAY, MICACEOUS, SILTY LIMESTONE.
- 3252-3259 SAMPLE: 20% GRAY TO LIGHT GRAY, MICACEOUS, SILTY LIMESTONE. SOME CONTAINING CHALCEDONY (SALMON TO RED). 40% DARK GRAY, CALCAREOUS SILTSTONE; 40% LIGHT GRAY (GREENISH), MICACEOUS, CALCAREOUS SANDSTONE. MEDIUM GRAIN, ANGULAR, CALCITE CEMENT.

- 3259-3267 SAMPLE: 40% DARK GRAY, CALCAREOUS SILTSTONE; 60% LIGHT GRAY LIMESTONE; CONTAINS RED TO ORANGE AND BROWN CHALCEDONY.
- 3267-3274 SAMPLE: WHITE TO LIGHT GRAY LIMESTONE. MICRO-CRYSTALLINE. CONTAINS BUFF TO FLESH COLORED CHALCEDONY.
- 3274-3278 SAMPLE: LIMESTONE - GRAY TO LIGHT AND DARK GRAY, SLIGHTLY MICACEOUS, SILTY. FLESH COLORED CHALCEDONY IN SPOTS.
- 3278-3283 SAMPLE: 50% LIMESTONE, GRAY TO LIGHT GRAY, CRYSTALLINE, SLIGHTLY MICACEOUS. SPOTS OF FLESH TO REDDISH AND BROWNISH CHALCEDONY, SILTY. 50% DARK GRAY, MICACEOUS, CALCAREOUS SILTSTONE.
- 3283-3285 SAMPLE: LIMESTONE - GRAY, CRYSTALLINE, SLIGHTLY MICACEOUS, SPOTS OF CHALCEDONY AS ABOVE. SOME DARK GRAY SILTSTONE.
- 3285-3295 SAMPLE: 90% LIMESTONE - GRAY (DARK AND LIGHT), SILTY, SOMEWHAT SANDY; 10% DARK GRAY SILTSTONE.
- 3295-3303 SAMPLE: 40% SILTSTONE - DARK GRAY, CALCAREOUS, SLIGHTLY MICACEOUS. 10% LIMESTONE - GRAY, CRYSTALLINE; 50% SANDSTONE - GRAY, CALCAREOUS, MICACEOUS.
GRAIN: FINE TO MEDIUM, ANGULAR TO SUBANGULAR.
CEMENT: MOSTLY CALCITE.
- 3303-3309 SAMPLE: 25% SANDSTONE AS ABOVE, GREENISH CAST; 35% SILTSTONE - DARK GRAY; 40% LIMESTONE - LIGHT GRAY TO GRAY AND GRAY-BROWN, CRYSTALLINE, SOME BROWN CHERT, SOMEWHAT SILTY AND SANDY.
- 3309-3315 SAMPLE: 20% SILTSTONE - DARK GRAY TO BLACK, CALCAREOUS AND MICACEOUS; 80% LIMESTONE - GRAY AND DARK GRAY TO GRAY-BROWN, SOMEWHAT MOTTLED WITH WHITE, CRYSTALLINE, SILTY, BANDED IN PART, SOME LIGHT TO WHITE CHALCEDONY.
- 3315-3320 SAMPLE: 75% SILTSTONE - DARK GRAY TO BLACK, SLIGHTLY MICACEOUS, AND CALCAREOUS; 25% SANDSTONE - GRAY, SLIGHTLY CALCAREOUS, MICACEOUS, FINE TO VERY FINE GRAIN, ANGULAR, CALCITE CEMENT.
- 3320-3328 SAMPLE: 65% SILTSTONE - GRAY, DARK, GRAY TO BLACK; 35% SANDSTONE - WHITE, SLIGHTLY MICACEOUS, CALCAREOUS, FINE GRAIN, ANGULAR TO SUBANGULAR, CALCITE CEMENT.
- 3328-3333 SAMPLE: 20% SANDSTONE - WHITE, CALCAREOUS, SLIGHTLY MICACEOUS, FINE, ANGULAR TO SUBANGULAR, CLEAR COLORLESS QUARTZ, CALCITE CEMENT. SOME ANGULAR QUARTZ GRAINS. 40% LIMESTONE - GRAY, FINE CRYSTALLINE; 40% SILTSTONE - DARK GRAY TO BLACK.
- 3333-3342 SAMPLE: SANDSTONE - DARK GRAY TO GRAY-BROWN, PURPLE-BROWN, SOME WHITE, CALCAREOUS, EXTREMELY MICACEOUS (MUSCOVITE, BIOTITE, AND PHLOGOPITE). MINOR SILTSTONE AND LIMESTONE CAVINGS AND CUTTINGS.
GRAINS: FINE TO MEDIUM, ANGULAR.
CEMENT: CALCITE.
- 3342-3351 SAMPLE: SANDSTONE - WHITE, CALCAREOUS, SLIGHTLY MICACEOUS, WITH SALMON TO RED QUARTZ GRAINS. SOME DARK GRAY SILTSTONE.
GRAINS: FINE TO MEDIUM, SUBANGULAR.
CEMENT: CALCITE.
- 3351-3360 SAMPLE: SANDSTONE - WHITE, CALCAREOUS, MICACEOUS, VARIOUS COLORED QUARTZ GRAINS. MINOR GRAY LIMESTONE AND DARK GRAY SILTSTONE.
GRAINS: FINE TO MEDIUM, ANGULAR TO SUBROUNDED, COLORLESS-CLEAR QUARTZ, WITH SALMON ETC. COLORED GRAINS.
CEMENT: CALCITE, BUT DOES NOT SEEM TO BE VERY TIGHTLY CONSOLIDATED.
- 3360-3364 SAMPLE: SANDSTONE - SAME AS ABOVE, WITH AN OCCASIONAL PIECE OF WHITE ANHYDRITE.
- 3364-3371 SAMPLE: 60% LIMESTONE - GRAY-BROWN TO GRAY AND LIGHT GRAY, FINELY GRAINED. 40% SILTSTONE - DARK GRAY, CALCAREOUS.

- 3371-3372 SAMPLE: LIMESTONE AS ABOVE. SANDSTONE AND SILTSTONE CAVINGS.
- 3372-3375 SAMPLE: LIMESTONE (LOOKS DOLOMITIC) - DARK GRAY, SOME LIGHT GRAY, MICACEOUS, SILTY AND SANDY. SOME DARK GRAY-GREEN TO BLACK SILTY SHALE.
- 3375-3380 SAMPLE: 80% LIMESTONE AS ABOVE; 20% SHALE AND SILTSTONE, DARK GRAY-GREEN TO BLACK, SILTY.
- 3380-3382 SAMPLE: LIMESTONE - GRAY TO DARK GRAY, XLN, FOSSILIFEROUS - CRINOID SEGMENTS, SILTY, MICACEOUS, SOME CALCITE VEIN FILLING, SOME SAND GRAINS. MINOR DARK GRAY SILTSTONE (CAVINGS?).
- 3382-3389 SAMPLE: 10% LIMESTONE AS ABOVE; 10% SHALE AND SILTSTONE AS 3375-3380 (CAVINGS?); 30% LIMESTONE - WHITE TO LIGHT GRAY, SANDY, MICACEOUS; 50% LIMESTONE - DOVE-GRAY, XLN, SOME BROWN CHERT.
- 3389-3393 SAMPLE: 35% WHITE, MICACEOUS, HIGHLY CALCAREOUS SANDSTONE GRADING TO SANDY LIMESTONE; 65% LIMESTONE - LIGHT GRAY, SILTY, VERY FINELY XLN, SOME LIGHT BROWN CHERT.
- 3393-3398 SAMPLE: 25% LIMESTONE - LIGHT GRAY, AS ABOVE; 75% SANDSTONE - GRAY, CALCAREOUS, MICACEOUS, WITH LIMESTONE PEBBLES GRADING TO SANDY LIMESTONE.
GRAINS: MEDIUM TO COARSE, ANGULAR.
CEMENT: CALCITE.
- 3398-3403 SAMPLE: SANDSTONE - GRAY, CALCAREOUS, MICACEOUS, GRADING TO SANDY LIMESTONE. MINOR DARK GRAY SILTSTONE.
GRAINS: FINE, SILTY, ANGULAR. SOME MEDIUM GRAINS.
CEMENT: CALCITE.
- 3403-3410 SAMPLE: 30% SANDSTONE AS ABOVE; 70% SILTSTONE - DARK GRAY, FOSSILIFEROUS, CRINOIDAL, CALCAREOUS, MICACEOUS, FAIRLY HARD.
- 3410-3417 SAMPLE: SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, SLIGHTLY MICACEOUS.
- 3417-3426 SAMPLE: 50% SILTSTONE - AS ABOVE, BUT WITH SOME PYRITES. 50% LIMESTONE - WHITE TO VERY LIGHT GRAY, OOLITIC (OOLITES 1/64" TO 1/32" IN DIA.) SOME OOLITES KNOCKED OUT OR WEATHERED OUT, SLIGHTLY FOSSILIFEROUS, SOME PYRITES, FAIR POROSITY, XLN, SOME BLACK CARBONACEOUS MATERIAL IN PORES - INSOLUBLE IN CCl₄.
- 3426-3437 SAMPLE: 60% LIMESTONE - OOLITIC, AS ABOVE, DARKER COLOR. 40% LIMESTONE, GRAY TO GRAY-BROWN, HARD, GRADING FROM OOLITIC (ABOVE), SOMEWHAT SANDY AND SILTY. MINOR DARK GRAY SILTSTONE.
- 3437-3446 SAMPLE: 5% LIMESTONE AS ABOVE WITH MINOR DARK GRAY SILTSTONE; 95% SANDSTONE - WHITE, CALCAREOUS, MICACEOUS.
GRAINS: FINE WITH A FEW MEDIUM GRAINS, CLEAR COLORLESS QUARTZ, WITH A FEW MINERAL STAINED GRAINS, ANGULAR.
CEMENT: CALCITE. CEMENTED WITH A SOFT LIME.
- 3446-3455 SAMPLE: SILTSTONE AND LIMESTONE. DARK GRAY, CALCAREOUS SILTSTONE GRADING TO SILTY LIMESTONE. SOME WHITE-CLEAR TO SALMON AND PINK CHALCEDONY FRAGMENTS. MINOR GRAY-BROWN LIMESTONE.
- 3455-3462 SAMPLE: 35% AS LAST ABOVE; 65% LIMESTONE - WHITE TO OFF-WHITE, SILTY, SLIGHTLY MICACEOUS, WITH FRAGMENTS OF BROWN CHERT AND WHITE TO SALMON COLORED CHALCEDONY.
- 3462-3467 SAMPLE: 25% LIMESTONE - WHITE, AS LAST ABOVE; 75% LIMESTONE - GRAY TO GRAY-BROWN, SLIGHTLY SANDY AND MICACEOUS. MINOR DARK GRAY SILTSTONE (CAVINGS.)
- 3467-3473 SAMPLE: LIMESTONE - LIGHT BROWNISH-GRAY TO WHITE, MICRO-XLN.
- 3473-3480 SAMPLE: LIMESTONE - WHITE TO VERY LIGHT GRAY, MICRO-XLN IN PART, HARD, SLIGHTLY MICACEOUS, SILTY AND SANDY.
- 3480-3483 SAMPLE: LIMESTONE - AS ABOVE, A SHADE DARKER IN COLOR.

- 3483-3491 SAMPLE: 60% LIMESTONE - AS LAST ABOVE; 40% SANDSTONE - WHITE, FINE TO VERY FINE GRAIN, CALCITE CEMENT, MICACEOUS, WITH BRIGHT GREEN SPOTS OF CHLORITE, SOME FRAGMENTS OF WHITE CHALCEDONY AND POSSIBLY A FEW PIECES OF ANHYDRITE. MINOR DARK SILTSTONE AND SHALE CARINGS.
- 3491-3501 SAMPLE: SANDSTONE; WHITE TO LIGHT GRAY, MICACEOUS, CALCAREOUS, SOME CHLORITE.
GRAINS: FINE WITH MEDIUM GRAINS INTERSPERSED, SUBANGULAR.
CEMENT: CALCITE.
- 3501-3511 SAMPLE: 60% SANDSTONE - AS ABOVE, BUT SLIGHTLY DARKER; 40% LIMESTONE - GRAY, SANDY, GRADING FROM SANDSTONE ABOVE; SOME SALMON COLORED CHALCEDONY.
- 3511-3521 SAMPLE: SANDSTONE - AS LAST SS ABOVE.
- 3521-3527 SAMPLE: SANDSTONE - AS LAST ABOVE, BUT WHITER IN COLOR.
- 3527-3535 SAMPLE: 90% SANDSTONE - WHITE, CALCAREOUS, SL. MICACEOUS, SOME CHLORITE, SEVERAL FRAGMENTS OF FLESH TO SALMON COLORED CHALCEDONY.
GRAINS: FINE WITH MEDIUM GRAINS, ANGULAR TO SUBANGULAR.
CEMENT: CALCITE. 10% LIMESTONE - GRAY, SANDY, CHALCEDONY ABOVE MAY BE IN LIMESTONE.
- 3535-3540 SAMPLE: LIMESTONE - GRAY, PORTIONS SANDY, SOME CHLORITE, MICACEOUS, SILTY, FOSSILIFEROUS WITH ORANGE CRINOID STEMS, FLESH-ORANGE TO RED CHALCEDONY, SOME BROWN CHERT.
- 3540-3546 SAMPLE: LIMESTONE AS LAST ABOVE, BUT DARKER, MORE MICACEOUS, AND MUCH MORE SANDY, GRADING INTO A SANDSTONE - POSSIBLY INTERBEDDED.
- 3546-3554 SAMPLE: LIMESTONE - GRAY TO DARK GRAY, SILTY, SANDY, MICACEOUS, WITH ORANGE COLORED FRAGMENTS OF CHALCEDONY.
- 3554-3558 SAMPLE: 30% SANDSTONE - GRAY, WITH SOME LIMESTONE AND CHALCEDONY AS ABOVE, CALCAREOUS, FINE GRAINED; 70% SILTSTONE - DARK BLUE-GRAY, CALCAREOUS, WITH DARK BLUE TO BLACK SATINY SHEEN ON SOME SURFACES. CONTAINS DARK BROWN TO BLACK CARBONACEOUS MATERIAL WHICH IS SOFT-CRUMBLY BUT INSOLUBLE IN CCl_4 .
- 3558-3560 SAMPLE: 35% SANDSTONE AS LAST ABOVE; 35% SILTSTONE AS LAST ABOVE; 30% SANDSTONE - WHITE TO LIGHT GRAY AS 3511 TO 3535.
NOTE: THIS ZONE, 3554-3560, APPEARS TO BE INTERBEDDED.
- 3560-3566 SAMPLE: SANDSTONE - LIGHT GRAY TO DARK GRAY, CALCAREOUS, SOME CHLORITE AND CHALCEDONY, CONTAINS A BROWN, CARBONACEOUS-LOOKING SILT WHICH IS INSOLUBLE IN CCl_4 .
- 3566-3570 SAMPLE: 75% SANDSTONE AS ABOVE, BUT DARKER AND MICACEOUS - PHLOGOPITE; 25% DARK GRAY TO BLACK, SILTY SHALE (LAMINATED) AND SILTSTONE.
- 3570-3574 SAMPLE: 25% SILTSTONE - DARK GRAY, CALCAREOUS, SOME CHLORITE, SANDY IN PART; 75% SANDSTONE - WHITE, CALCAREOUS, MICACEOUS, SOME CHLORITE, FINE, ANGULAR TO SUBANGULAR, CALCITE CEMENT.
- 3574-3585 SAMPLE: SANDSTONE - VERY LIGHT GRAY TO WHITE, CALCAREOUS, MICACEOUS, SOME CHLORITE. MINOR DARK GRAY LIMESTONE AND SILTSTONE (REMAININGS).
GRAINS: FINE TO MEDIUM, ANGULAR, CLEAR-COLORLESS QUARTZ.
CEMENT: MOSTLY CALCITE, MINOR SECONDARY QUARTZ.
- 3585-3594 SAMPLE: SANDSTONE AS LAST ABOVE EXCEPT SLIGHTLY MORE CALCAREOUS AND FINER GRAINED.
- 3594-3602 SAMPLE: SANDSTONE - WHITE TO SLIGHTLY OFF-WHITE, AS LAST ABOVE, EXCEPT, FINER GRAINED.
- 3602-3610 SAMPLE: 10% SANDSTONE AS LAST ABOVE; 90% SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, SLIGHTLY MICACEOUS, HARD.
- 3610-3615 SAMPLE: 20% SILTSTONE AS LAST ABOVE, SOME SILTY LIMESTONE; 80% SANDSTONE - LIGHT GRAY TO WHITE, CALCAREOUS, MICACEOUS, FINE, ANGULAR TO SUB-

- 3610-3615
(CON'T) ANGULAR, CLEAR-COLORLESS QUARTZ, CALCITE CEMENT.
- 3615-3623 SAMPLE: LIMESTONE - LIGHT GRAY-BROWN TO WHITE, PARTIALLY SILTY AND SANDY. LIGHT PORTIONS SOMEWHAT OOLITIC, SOME BROWN CHERT. MINOR DARK GRAY SILTSTONE SANDSTONE.
- 3623-3628 SAMPLE: 75% LIMESTONE - GRAY TO GRAY-BROWN, SILTY, SANDY IN PART, FRAGMENTS OF BROWN CHERT; 25% SANDSTONE - WHITE TO GRAY, CALCAREOUS, MICACEOUS. MINOR DARK GRAY SILTSTONE.
- 3628-3633 SAMPLE: LIMESTONE - WHITE TO GRAY AND GRAY-BROWN, SILTY, SANDY IN PART, CONSIDERABLE BROWN CHERT. MINOR SANDSTONE AND SILTSTONE, LESS THAN 5%.
- 3633-3643 SAMPLE: LIMESTONE - LIGHT GRAY TO GRAY AND DOVE-GRAY, SANDY IN PART, SILTY IN PART, SOME PORTIONS HAVE DARK BROWN TO BLACK DEAD OIL OR CARBONACEOUS MATERIAL, SOME BROWN CHERT, FINELY XLN. HEATED SAMPLE HAS SLIGHT HYDROCARBON ODOR.
- 3643-3650 SAMPLE: LIMESTONE - AS LAST ABOVE. NO CHERT.
- 3650-3655 SAMPLE: LIMESTONE - WHITE TO LIGHT DOVE-GRAY, SOME DARK GRAY, SLIGHTLY SILTY AND SANDY.
- 3655-3662 SAMPLE: LIMESTONE - WHITE TO LIGHT GRAY-BROWN, FINELY XLN, SOMEWHAT SANDY AND SILTY.
- 3662-3670 SAMPLE: LIMESTONE - LIGHT TO DARK GRAY AND GRAY-BROWN, FINELY XLN, SOME BROWN CHERT, SOMEWHAT SILTY AND SANDY, PORTIONS HAVE DARK BROWN CARBONACEOUS FILM ON SOME SURFACES. MINOR DARK GRAY SILTSTONE.
- 3670-3675 SAMPLE: 75% LIMESTONE - LIGHT GRAY TO DOVE-GRAY, FINELY XLN. 25% SILTSTONE - DARK GRAY TO BLACK, CALCAREOUS.
- 3675-3681 SAMPLE: 75% LIMESTONE - WHITE TO GRAY AND GRAY-BROWN, SANDY IN PART, SILTY IN PART, CONSIDERABLE BROWN TO GRAY-BROWN CHERT. 25% SILTSTONE AND SILTY SHALE - DARK GRAY TO BLACK.
- 3681-3685 SAMPLE: LIMESTONE - LIGHT TO DARK GRAY AND GRAY-BROWN, SILTY, SOME GRADING TO SILTSTONE. SOME BROWN CHERT.
- 3685-3690 SAMPLE: 20% LIMESTONE AS LAST ABOVE; 10% LIMESTONE - WHITE, SANDY; 70% SILTSTONE TO LIMESTONE - DARK GRAY, CONSIDERABLE BROWN AND GRAY CHERT.
- 3690-3697 SAMPLE: 70% SILTSTONE - DARK GRAY, CALCAREOUS, WITH CONSIDERABLE GRAY CHERT; 15% LIMESTONE - DARK GRAY, SILTY; 15% LIMESTONE - WHITE TO LIGHT GRAY, MICACEOUS, SILTY.
- 3697-3703 SAMPLE: 75% SILTSTONE - DARK GRAY, CALCAREOUS, BROWN AND GRAY (SOME WHITE) CHERT. 25% LIMESTONE - WHITE TO LIGHT GRAY AND GRAY, SILTY.
- 3703-3705 SAMPLE: 15% DARK SILTSTONE AND CHERT AS ABOVE; 85% LIMESTONE - WHITE TO GRAY-BROWN (SOME BROWN), SLIGHTLY SILTY, FINELY XLN.
- 3705-3715 SAMPLE: LIMESTONE - WHITE TO LIGHT GRAY, FINELY XLN, SILTY, QUITE SANDY IN PART, SOME LIME CEMENTED SAND. SOME OIL STAIN.
- 3715-3721 SAMPLE: 25% LIMESTONE AS LAST ABOVE; 75% SANDSTONE - LIGHT GRAY, CALCAREOUS, MICACEOUS, SOME CHLORITE, FINE GRAINED.
- 3721-3725 SAMPLE: SANDSTONE AS LAST ABOVE (WITH SOME GYPSUM FROM RAW BENTONITE USED IN HOLE). MINOR LIMESTONE AND SILTSTONE -- REMAININGS OR CAVINGS.
- 3725-3731 SAMPLE: SANDSTONE AS LAST ABOVE.
- 3731-3736 SAMPLE: SANDSTONE - LIGHT GRAY, CALCAREOUS, MICACEOUS, FINE GRAINED WITH MEDIUM TO COARSE, CLEAR-COLORLESS QUARTZ GRAINS. SOME DARK DEAD OIL STAIN. MINOR LIMESTONE AND SILTSTONE.

- 3736-3744 SAMPLE: SANDSTONE AS LAST ABOVE, BUT MORE TIGHTLY CEMENTED, SOME QUARTZ CEMENT.
- 3744-3748 SAMPLE: SANDSTONE AS LAST ABOVE, SOME LIME CEMENTED SAND.
- 3748-3751 SAMPLE: 50% SANDSTONE AS LAST ABOVE; 50% LIMESTONE - LIGHT GRAY TO BROWN, SILTY, SANDY IN PART.
- 3751-3756 SAMPLE: LIMESTONE - LIGHT GRAY TO GRAY, SILTY, VERY SANDY, HARD.
- 3756-3760
(3746-3750) SAMPLE: 25% LIMESTONE - AS LAST ABOVE; 75% SILTSTONE - GRAY, CALCAREOUS, HARD.
- 3760-3765
(3750-3755) SAMPLE: SILTSTONE - GRAY (SOME LIGHT AND SOME DARK), CALCAREOUS, SANDY IN PART, MINOR FRAGMENTS OF WHITE CHALCEDONY. HARD.
- 3765-3768
(3755-3758) SAMPLE: SILTSTONE - GRAY, CALCAREOUS, SANDY IN PART, SOME BROWN CHERT.
- 3768-3770
(3758-3760) SAMPLE: SILTSTONE - GRAY-BROWN, TO DARK GRAY, CALCAREOUS, SANDY IN PART, SOME WHITE CHALCEDONY AND SOME FRAGMENTS OF ANHYDRITE.
NOTE: STRUNG IN SAND LINE 9 JUNE 1952. 3779 EQUALS 3769. AN ERROR OF 10' TOO DEEP WAS FOUND. THIS WOULD PUT TOP OF SILTSTONE AT 3747 INSTEAD OF 3757.
- 3760-3765 SAMPLE: SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, VERY HARD.
- 3765-3769 SAMPLE: SILTSTONE - AS LAST ABOVE, WITH SOME BROWN CHERT.
- 3769-3773 SAMPLE: SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, HARD, SOME WHITE CHALCEDONY AND A FEW FRAGMENTS OF ANHYDRITE.
- 3773-3779 SAMPLE: SILTSTONE - GRAY-BROWN TO DARK GRAY, CALCAREOUS, SHALY IN PART, FOSSILIFEROUS - SHELL VEIN PRINTS AND CRINOID STEMS, SOME XLN CALCITE, SOME INDICATIONS OF OIL STAIN.
- 3779-3784 SAMPLE: 60% SILTSTONE AS LAST ABOVE, SOMEWHAT SANDY; 40% SANDSTONE - LIGHT GRAY TO WHITE, CALCAREOUS, SLIGHTLY MICACEOUS, SOME CHLORITE, SOME CARBONACEOUS MATERIAL, FINE GRAINED, SOMEWHAT SILTY.
- 3784-3790 SAMPLE: SANDSTONE AS LAST ABOVE, MINOR DARK GRAY SILTSTONE (REAMINGS).
- 3790-3796 SAMPLE: 50% SANDSTONE - GRAY, CALCAREOUS, SILTY, FINE GRAINED, SOME CHLORITE; 50% SILTSTONE - DARK GRAY TO GRAY-BROWN, CALCAREOUS, SANDY IN PART, SOME BROWN CHERT, PORTIONS CONTAIN BROWN TO BLACK CARBONACEOUS SCUM.
- 3796-3800 SAMPLE: 50% SILTSTONE AS LAST ABOVE; 50% LIMESTONE - VERY LIGHT GRAY, WITH BROWNISH STAIN, CONTAINS CONSIDERABLE ANHYDRITE, HAS GOOD OIL ODOR, SOME POROSITY - SMALL VUGS, MAKES RAINBOW ON SAMPLE BUCKET. DISSOLVED OUT SOME GOLDEN BROWN OIL WITH CCL₄.
- 3800-3806 SAMPLE: LIMESTONE - LIGHT BROWNISH-GRAY TO LIGHT GRAY, MICRO-XLN, SANDY AND SILTY, SOME DARK BROWN TO BLACK CARBONACEOUS SCUM OR FILM, MINOR DARK GRAY SILTSTONE.
- 3806-3811 SAMPLE: LIMESTONE - AS LAST ABOVE, BUT MORE SANDY AND SILTY.
- 3811-3815 SAMPLE: SILTSTONE - LIGHT GRAY, CALCAREOUS, HARD, SANDY IN PART. SOME BROWN CHERT AND SOME ANHYDRITE. (SOME DARK SILTSTONE).
- 3815-3823 SAMPLE: SILTSTONE - AS LAST ABOVE, LESS CALCAREOUS.
- 3823-3825 SAMPLE: SILTSTONE - AS LAST ABOVE, WITH SOME BLACK, CALCAREOUS, SILTY SHALE - (POSSIBLY CAVINGS).
- 3825-3830 SAMPLE: SILTSTONE TO SILTY LIMESTONE - LIGHT GRAY, SANDY IN PART, SOME WHITE CHALCEDONY AND GRAY CHERT, SOME WHITE ANHYDRITE. SHOWS SOME OIL STAIN AND GIVES FAIR AMOUNT OF FLOURESCENCE UNDER ULTRA-VIOLET LIGHT.

- 3830-3837 SAMPLE: SILTSTONE TO SILTY LIMESTONE - LIGHT GRAY, GRAY CHERT, WHITE DRITE, WHITE CHALCEDONY, SANDY IN PART.
- 3837-3842 SAMPLE: SILTSTONE - AS LAST ABOVE, BUT SLIGHTLY DARKER IN COLOR.
- 3842-3846 SAMPLE: SILTSTONE AS LAST ABOVE, BUT MORE SANDY AND MORE CALCAREOUS.
- 3846-3851 SAMPLE: SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, SOME WHITE CHALCEDONY, GRAY CHERT - ANHYDRITE. SOME VEINS FILLED WITH WHITE CHALCEDONY.
- 3851-3855 SAMPLE: SILTSTONE - DARK GRAY, CALCAREOUS, SOME WHITE ANHYDRITE.
- 3855-3864 SAMPLE: 20% SILTSTONE - GRAY-BROWN, CALCAREOUS, SOME BROWN CHERT; 40% SANDSTONE - BLACK, CALCAREOUS, CARBONACEOUS; 40% SANDSTONE - GRAY, CALCAREOUS, SILTY, SLIGHTLY MICACEOUS, FINE GRAINED, CALCITE CEMENT. THIS SAMPLE SHOWS SOME FLOURESCENCE, NO CUT WITH ACETONE.
- 3864-3869 SAMPLE: 50% SANDSTONE AS ABOVE, MORE MICACEOUS, FINER GRAIN; 50% SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, SANDY.
- 3869-3877 SAMPLE: 50% SILTSTONE - LIGHT GRAY, DARK GRAY, GRAY-BROWN, CALCAREOUS, SANDY, SOME MINOR BLACK SHALE; 50% SANDSTONE - LIGHT GRAY TO WHITE, CALCAREOUS, SLIGHTLY MICACEOUS, VERY FINE TO FINE GRAIN, SILTY IN PART.
- 3877-3883 SAMPLE: SILTSTONE - LIGHT GRAY TO GRAY, CALCAREOUS, SANDY, SOME SILICEOUS.
- 3883-3890 SAMPLE: SILTSTONE - LIGHT GRAY TO GRAY, CALCAREOUS, SANDY, SOME SILICEOUS, SOME LIGHT GRAY SANDSTONE.
- 3890-3894 SAMPLE: SILTSTONE - GRAY TO LIGHT GRAY, CALCAREOUS, SANDY IN PART, WITH SOME GRAY-BROWN CHERT AND CHALCEDONY.
- 3894-3900 SAMPLE: 60% SILTSTONE - GRAY, CALCAREOUS, HARD; 40% SHALE - DARK GRAY TO BLACK, SLIGHTLY CALCAREOUS, SILTY, SOME PYRITES, SOME ANHYDRITE.
- 3900-3909 SAMPLE: SHALE - DARK GRAY TO BLACK, CALCAREOUS, SILTY, WITH FRAGMENTS OF WHITE CHALCEDONY, HARD.
- 3909-3914 SAMPLE: SHALE - BLACK, CALCAREOUS, SILTY.
- 3914-3917 SAMPLE: SHALE - AS LAST ABOVE, WITH CONSIDERABLE BROWN CHERT AND SOME DARK GRAY SILTSTONE.
- 3917-3925 SAMPLE: SILTSTONE - GRAY-BROWN TO LIGHT GRAY, CALCAREOUS, HARD, WITH MUCH BROWN CHERT, SOME BLACK SHALE.
- 3925-3930 SAMPLE: SILTSTONE - AS LAST ABOVE, GRADING TO DARK GRAY TO BLACK, SILTY SHALE. SOME ODOR, SMALL CUT OF OIL WITH CCl_4 .
- 3930-3936 SAMPLE: 50% SILTSTONE - GRAY TO GRAY-BROWN, CALCAREOUS, SANDY IN PART WITH SOME SILTY SANDSTONE, SOME BROWN AND GRAY CHERT. SOME OIL STAIN SCUM; 50% LIMESTONE; GRAY, LIGHT GRAY, TO GRAY-BROWN, OOLITIC IN PART, WITH SOME CHALCEDONY. NO CUT WITH CCl_4 .
- 3936-3940 SAMPLE: LIMESTONE - LIGHT GRAY TO DOVE-GRAY, SLIGHTLY SILTY, VUGGY IN PART - SHOWS SOME POROSITY, SOME INDICATION OF FRACTURES. DISPLAYS SOME FLOURESCENCE. CONTAINS SOME DARK BROWN TO BLACK CARBONACEOUS MATERIAL ON SOME SURFACES. NO CUT.
- 3940-3952 SAMPLE: LIMESTONE - GRAY TO LIGHT GRAY, VUGGY IN PART - SHOWS SOME POROSITY, SOME FRACTURES. DISPLAYS 10% ULTRA-VIOLET FLOURESCENCE AND FAIR OIL STAIN. SAMPLE HAD GOOD ODOR AND SOME OIL FILM WAS WASHED OUT IN SAMPLE BUCKET. RAINBOW IN DUMP BOX. FAIR CUT WITH ACETONE AND CCl_4 .
- 3952-3957 SAMPLE: LIMESTONE - LIGHT GRAY, SILTY AND SANDY, HARD. CONTAINS SOME DARK BROWN SILT. SOME SHALE AND SILTSTONE REAMINGS. NO SHOW.

- 3957-3962 SAMPLE: SANDSTONE - GRAY, CALCAREOUS, SILTY, HARD, LOW POROSITY, MICACEOUS, FINE GRAINED. CONTAINS SOME DARK BROWN RESIDUE. MINOR LIMESTONE AND SILTSTONE. NO SHOW.
- 3962-3966 SAMPLE: 20% SANDSTONE AS ABOVE; 80% LIMESTONE - LIGHT GRAY, HARD, SANDY, TRACES OF BLACK CARBONACEOUS RESIDUE. NO SHOW.
- 3966-3972 SAMPLE: LIMESTONE - GRAY, SANDY, SILTY, CONTAINS CONSIDERABLE GRAY CHERT. MINOR GRAY SANDSTONE.
- 3972-3975 SAMPLE: SILTSTONE - LIGHT GRAY, CALCAREOUS, WITH CONSIDERABLE GRAY CHERT. MINOR GRAY SANDSTONE.
- 3975-3984 SAMPLE: SILTSTONE AS LAST ABOVE, BUT WITH MORE CHERT - 50% OF SAMPLE IS CHERT. SOME FRACTURES.
- 3984-3988 SAMPLE: 50% SILTSTONE AS LAST ABOVE; 50% SANDSTONE - GRAY, CALCAREOUS, SILTY.
- 3988-3993 SAMPLE: 90% SILTSTONE - GRADING TO VERY FINE SANDSTONE - GRAY, CALCAREOUS, CHERTY; 10% SHALE - BLACK, CALCAREOUS, SANDY.
- 3993-3998 SAMPLE: LIMESTONE - GRAY TO LIGHT GRAY, SILTY. SOME GRAY, CALCAREOUS, SILTSTONE. MINOR BLACK SHALE.
- 3998-4000 SAMPLE: LIMESTONE - GRAY TO LIGHT GRAY, SILTY AND SANDY.
- 4000-4006 SAMPLE: LIMESTONE - AS LAST ABOVE, WITH SOME GRAY CHERT AND WHITE ANHYDRITE.
- 4006-4012 SAMPLE: LIMESTONE - GRAY TO BROWNISH-GRAY, SANDY, SOME WHITE ANHYDRITE AND WHITE AND GRAY CHERT. MINOR BLACK SHALE AND HARD, DARK GRAY SANDSTONE.
- 4012-4016 SAMPLE: LIMESTONE - GRAY, BROWNISH-GRAY, BLUISH-GRAY, SANDY AND SILTY, SOME GRAY CHERT, SOME DARK BROWN OIL STAIN. SOME FINE, GRAY, CALCAREOUS, HARD SANDSTONE.
- 4016-4020 SAMPLE: SANDSTONE AND SILTSTONE - INTERGRADED, GRAY AND BROWNISH-GRAY, CALCAREOUS, SOME OIL STAIN, HARD.
- 4020-4024 SAMPLE: AS ABOVE, WITH SOME GRAY CHERT, HARD.
- 4024-4035 SAMPLE: SANDSTONE - GRAY, CALCAREOUS, SILTY, VERY FINE GRAIN, GRADING TO SILTSTONE AND SANDY LIMESTONE, HARD. SOME GRAY CHERT IN LOWER PORTION.
- 4035-4050 SAMPLE: SILTSTONE - GRAY, CALCAREOUS, SANDY, HARD.
- 4050-4053 SAMPLE: SILTSTONE - AS LAST ABOVE, WITH SOME GRAY SANDSTONE.
- 4053-4057 SAMPLE: SILTSTONE - GRAY TO DARK-GRAY, CALCAREOUS, SANDY, SOME WHITE CHALCEDONY IN VEINS, SOME GRAY CHERT.
- 4057-4060 SAMPLE: AS LAST ABOVE, SOME GRAY SANDSTONE.
- 4060-4089 SAMPLE: SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, SANDY, HARD, SOME CHERT.
- 4089-4096 SAMPLE: AS ABOVE, WITH SOME LIMESTONE AND SOME ANHYDRITE.
- 4096-4101 SAMPLE: 25% SILTSTONE - GRAY, CALCAREOUS, SANDY, HARD, SOME GRAY CHERT; 50% ANHYDRITE - WHITE TO LIGHT GRAY, FINELY XLN. 25% SHALE - BLACK, CALCAREOUS.

TOP OF PARADOX

- 4101-4107 SAMPLE: 60% SHALE AS ABOVE)
40% SILTSTONE - AS ABOVE) WITH ANHYDRITE INTERBEDDED, ABOUT 10%.
GOOD ODOR WHEN BAILER DUMPED, NO OTHER SHOW.

- 4107-4111 SAMPLE: 20% SHALE - BLACK, SILTY, SLIGHTLY CALCAREOUS; 80% SANDSTONE - GRAY, SILTY, CALCAREOUS, SLIGHTLY MICACEOUS, VERY FINE GRAIN.
- 4111-4117 SAMPLE: 90% SANDSTONE - GRAY, CALCAREOUS, SILTY, VERY FINE GRAIN; 10% SHALE - BLACK, CALCAREOUS, SILTY, PORTIONS SILTY.
- 4117-4124 SAMPLE: SANDSTONE - AS ABOVE, GRADING TO SILTSTONE (75%) - MEDIUM GRAIN SHALE.
- 4124-4131 SAMPLE: SILTSTONE - GRAY TO DARK GRAY, CALCAREOUS, INTERBEDDED WITH SHALE AND ANHYDRITE.
- 4131-4136 SAMPLE: 50% SHALE - BLACK, SILTY, CALCAREOUS, WITH SOME DARK GRAY AND FRAGMENTS OF ANHYDRITE. 50% SANDSTONE - WHITE TO LIGHT GRAY, CALCAREOUS, SILTY, VERY FINE.
- 4136-4143 SAMPLE: 75% SILTSTONE) LIGHT GRAY, SL. MICACEOUS, CALCAREOUS, WITH
25% SANDSTONE) 10% BLACK SHALE.
- 4143-4148 SAMPLE: 10% SILTSTONE - AS ABOVE; 90% ANHYDRITE - WHITE TO LIGHT GRAY, FINELY XLN.
- 4148-4235 SAMPLE: SALT - HALITE, CLEAR-COLORLESS, XLN. MINOR CAVINGS - SHALE.
- 4235-4296 SAMPLE: SALT - AS ABOVE, BUT WITH SOME DISCOLORATION IN PART.
- 4296-4307 SAMPLE: ANHYDRITE - GRAY TO LIGHT GRAY, FINELY XLN.
- 4307-4312 SAMPLE: ANHYDRITE - LIGHT GRAY, SILTY, XLN, A CONSIDERABLE PORTION HAS TRANSFORMED TO GYPSUM. SAMPLE SLIGHTLY CALCAREOUS. SAMPLE HAS GOOD ODOR, LEFT RAINBOW IN DUMP BOX, AND DISPLAYED SOME DARK BROWN FREE OIL ON THE DITCH.
- 4312-4327 SAMPLE: GYPSUM - LIGHT GRAY TO WHITE, EARTHY, XLN IN PART. SAMPLE IS CALCAREOUS.
- 4327-4338 SAMPLE: GYPSUM - WHITE TO LIGHT GRAY, EARTHY, SLIGHTLY CALCAREOUS, FINELY XLN IN PART. SOME OIL STAIN AND FLOURESCENCE. GOOD ODOR. RAINBOW ON DITCH.
- 4338-4343 SAMPLE: MARL - GRAY, SILTY, SLIGHTLY MICACEOUS. SOME OIL STAIN.
- 4343-4349 SAMPLE: MARL - AS LAST ABOVE, MORE FIRMLY CONSOLIDATED.
- 4349-4355 SAMPLE: MARL - AS LAST ABOVE. CONTAINS DARK OIL STAIN AND STRIPS OF BLACK, DEAD OIL.
- 4355-4363 SAMPLE: 35% MARL - AS LAST ABOVE, SOMEWHAT SANDY; 65% SANDSTONE - GRAY, SILTY, CALCAREOUS. GOOD ODOR, OIL FILM AND RAINBOW ON SAMPLE BUCKET.
- 4363-4368 SAMPLE: SHALE - BLACK, CALCAREOUS, SILTY, SOFT. BLEEDS GAS. CAVES BADLY - THIS IS CAUSED BY SPALLING AS RESULT OF EXPANDING GAS AND WATER RUNNING DOWN OVER IT.
- 4368-4372 SAMPLE: SHALE - AS LAST ABOVE, BUT SLIGHTLY FOSSILIFEROUS - SOME CRINOID STEMS. SAMPLE CONTAINS SOME SANDSTONE - LIGHT GRAY TO GRAY-BROWN, CALCAREOUS, FAIR POROSITY AND WITH GOOD OIL STAIN, FINE TO MEDIUM GRAIN.
- 4372-4377 SAMPLE: SHALE - BLACK, CALCAREOUS, SILTY, SOFT, SOME FRAGMENTS OF GYPSUM.
- 4377-4388 SAMPLE: 50% SHALE - AS LAST ABOVE; 50% SANDSTONE - GRAY TO GRAY-BROWN, CALCAREOUS, MICACEOUS, FINE GRAIN.
- 4388-4401 SAMPLE: SANDSTONE - AS LAST ABOVE. THIS SAMPLE IS NEARLY ALL CAVINGS AND ROCK THROWN IN TO ELIMINATE FLAT HOLE.
- 4401-4403 SAMPLE: AS LAST ABOVE, WITH ABOUT 20% GRAY ANHYDRITE WHICH IS FINELY XLN AND PARTIALLY TRANSFORMED TO GYPSUM. THIS CHANGE IN SEC. 4402-4403.

- 4403-4411 SAMPLE: ANHYDRITE - GYPSUM - AS ABOVE. SAMPLE CONTAINS 60% TO 75% CAVINGS.
- 4411-4425 SAMPLE: MOSTLY GYPSUM WITH SOME ANHYDRITE. POSSIBLY SOME GRAY-BROWN SANDSTONE GRADING TO CALCAREOUS, SILTY, SANDY SHALE. SAMPLE IS 60%-70% CAVINGS OF BLACK SHALE, MARL, AND ROCK THROWN IN HOLE.
- 4425-4471 SAMPLE: SALT - HALITE, CLEAR-COLORLESS. AT LEAST 50% CAVINGS AS ABOVE.
- 4471-4475 SAMPLE: COMPLEX MIXTURE. CONSIDERABLE PORTION IS PROBABLY REAMINGS AND RUST FROM SAMPLE PAN. SAMPLE BELIEVED TO BE LIMESTONE, SOME SANDSTONE AND ANHYDRITE, WHITE, GRAY AND DARK GRAY, SANDY, MICACEOUS IN PART. HARD, VERY FINELY CUT. NO VISIBLE OIL STAIN AND NO FLOURESCENCE. HOWEVER, WATER IN DITCH BUBBLED AND FORMED BUBBLES 2" TO 3" IN DIAMETER. NO ODOR.
- 4475-4478 SAMPLE: SAME AS LAST ABOVE. A TENACEOUS, OILY-LOOKING SCUM AND BUBBLES FORMED ON SURFACE OF HCL WHEN TESTING SAMPLE.
- 4478-4498 SAMPLE: SALT - HALITE. SOME CAVINGS FROM BEHIND PIPE.
- 4498-4513 SAMPLE: 50-50 SALT AND GYPSUM. SOME UNALTERED ANHYDRITE WITH COMPLEX MIXTURE OF CAVING FROM BEHIND CASING (8 5/8") HANGING IN 10" HOLE AT 4426.
- 4513-4532 SAMPLE: GYPSUM. SOME ANHYDRITE AND SOME CAVINGS AS LAST ABOVE.
- 4532-4544 SAMPLE: AS LAST ABOVE.
- 4544-4550 SAMPLE: AS LAST ABOVE. (NOTE: THIS SAMPLE APPEARS TO BE 90% CAVINGS FROM AROUND CASING. THERE IS A POSSIBILITY OF HAVING SOME NEW GRAY-BROWN SHALE.)
- 4550-4553 SAMPLE: AS LAST ABOVE, WITH SOME PYRITES AND CRYSTALLINE ANHYDRITE AND GYPSUM.
- 4553-4755 SAMPLE: 30% SALT; 30% GYPSUM-ANHYDRITE; 30% BLACK SHALE; 10% FINE GRAY SANDSTONE.
- 4755-4780 SAMPLE: 50% GYPSUM - XLN; 40% BLACK SHALE W/SOME XLN GYPSUM VEIN FILLING; 10% SALT AND MINOR CAVINGS.
- 4780-4800 SAMPLE: 60% GYPSUM AND ANHYDRITE - INTERMIXED; 40% BLACK TO GRAY, SILTY SHALE, MICACEOUS IN PART.
- 4800-4860 NO SAMPLE: DRILLED SALT.
- 4860-4880 SAMPLE: 40% GYPSUM, FINELY XLN, AND GRAY ANHYDRITE; 40% SHALE - BLACK TO GRAY, SILTY; 20% SANDSTONE - GRAY, VERY FINE TO FINE.
- 4880-4905 SAMPLE: AS LAST ABOVE.
- NOTE: THERE SEEMS TO BE MORE THAN USUAL DRAG IN SAMPLES OR SOME CAVING.
- 4905-4955 SAMPLE: 50-50 BLACK AND GRAY SHALE, AND GYPSUM-ANHYDRITE. SOME XLN VEIN FILLING OF GYPSUM IN SHALE - STAINED CRYSTALS.
- 4955-4980 SAMPLE: 10% BLACK SHALE MIXED WITH SOFT, WHITE, AMORPHOROUS GYPSUM - MIXTURE PARTIALLY CALCAREOUS.
- 4980-5005 SAMPLE: 10% BLACK SHALE; 30% SHALE - GRAY, SOFT, SILTY; 30% GYPSUM-ANHYDRITE (SOFT); 30% SANDSTONE - GRAY, FINE.
- 5005-5493 SAMPLE: SALT - HALITE, WHITE, XLN. MINOR CAVINGS OF SHALE, ETC. PORTIONS OF SALT HAVE REDDISH TO ORANGE TINT. MINOR GRAY SHALE.
- 5493-5523 SAMPLE: SALT - AS ABOVE. SAMPLE CONTAINS CAVINGS OF BLACK SHALE, RED SHALE, CAL-SEAL, ETC., FROM ABOVE.
- 5523-5544 SAMPLE: MIXTURE OF BLACK SHALE AND GYPSUM.

- 5544-5667 SAMPLE: SALT - HALITE, AS ABOVE.
- 5667-5698 SAMPLE: 50-50 SALT AND BLACK AND GRAY SHALE, SOFT.
- 5698-5852 SAMPLE: SALT - HALITE.
- 5852-5883 SAMPLE: SALT - HALITE, CLEAR-COLORLESS.
- 5883-5946 SAMPLE: SALT - AS ABOVE WITH STRINGERS OF DARK GRAY TO BLACK, SILTY EARTHY SHALE.
- 5946-5976 SAMPLE: 20% SHALE - BLACK, CARBONACEOUS, SILTY; 70% SANDSTONE - GRAY, SILTY, GRADING TO SILTY SHALE. SOME VEIN FILLING OF GYPSUM; MAGNESIUM CHLORIDE - XLN, HEXAGONAL, CLEAR-COLORLESS.
- 5976-6001 SAMPLE: SALT - HALITE, WHITE, CLEAR TO FROSTED.
- 6001-6037 SAMPLE: SALT - AS ABOVE, W/TRACES OF ORANGE TO PINK KCL AND HEXAGONAL GRAINS OF $MgCl_2$.
- 6037-6068 SAMPLE: SALT - HALITE x/5% BLACK SHALE.
- 6068-6125 SAMPLE: SALT - HALITE WITH TINGES OF PINK, TRACES OF KCL.
- 6125-6165 SAMPLE: SALT - HALITE, CLEAR-COLORLESS.
- 6165-6196 SAMPLE: SHALE - BLACK, SILTY, SLIGHTLY CALCAREOUS, SOME VEINS AND VUGS FILLED WITH GRAY SILT.
- 6196-6227 SAMPLE: 30% SHALE - AS ABOVE; 70% SALT - HALITE, CLEAR-COLORLESS.
- 6227-6258 SAMPLE: SALT - AS ABOVE, ABOUT 20% BLACK SHALE - PROBABLY CAVING FROM ABOVE.
- 6258-6289 SAMPLE: AS LAST ABOVE, W/TRACES OF ORANGE TO PINK KCL.
- 6289-6320 SAMPLE: SALT - HALITE, CLEAR-COLORLESS, W/10% BLACK AND GRAY SHALE.
- 6320-6370 SAMPLE: CAUGHT IMMEDIATELY - 60% SALT; 30% BLACK SHALE; 10% SANDSTONE - GRAY, SILTY, SOFT, FINE.

SAMPLE CONTAINS GAS AND FREE OIL. 100% FLOURESCENCE. LITTLE POROSITY NOTED.

40 MIN. - CIRCULATED AT 6370 T.D. - AS ABOVE WITH PYRITES IN SHALE.

90 MIN. - " " " " - SALT, 10% SHALE, GAS AND OIL SHOWS AS ABOVE.

150 MIN. - CIRCULATED 30 FT. OFF BOTTOM - SAME AS 90 MIN. SAMPLE.

NOTE: 23 DECEMBER 1952, 10:30 P.M.
 To 6355 - DRILLED SALT.
 6355-6358 - DRILLED HARD, ROUGH.
 6358-6368 - DRILLED LIKE SALT.
 6368-6371 - DRILLED FAST (1 MIN./FT).

AFTER DRILLING BREAK, KELLEY WAS DOWN. UPON PULLING UP TO MAKE NEW CONNECTION, DRILLER NOTED MUD BLOWING OVER DRILLING NIPPLE BY HEADS. MUD MAKING GOOD BLOW FROM FLOW LINE ENTERING SHAKER. STRONG ODOR OF GAS AND GOOD SHOW OF FREE OIL (DARK BROWN TO BLACK, 35 GRAVITY).

KELLEY LIFTED 2 FT. OFF BOTTOM - CIRCULATED FROM 10:40 P.M. TO 12:00 A.M.

WITHIN 30 MINUTES AFTER BLOW STARTED SAMPLE HAD GOOD GAS ODOR, FREE OIL, AND 100% FLOURESCENCE. GAS LIFT ON MUD - 200 TO 600 LBS.

CIRCULATED UNTIL 3:00 A.M. 24 DECEMBER 1952.

NO CARRIER FORMATION COULD BE ESTABLISHED. GAS AND OIL BELIEVED TO BE COMING FROM BOTTOM OF BLACK SHALE AND FROM FINE, GRAY, SOFT SANDSTONE.

SHOW DECREASING, DRILLING RESUMED. GAS BLOW AND SHOW OF FREE OIL CONTINUED INTERMITTENTLY TO 6500-6530 - WHERE SHOW INCREASED.

- 6371-6381 SAMPLE: SALT - 10% BLACK SHALE. OIL SHOW AS ABOVE.
- 6381-6410 SAMPLE: SALT - HALITE, TRACES OF PYRITE, OIL SHOW - LESS THAN ABOVE.
- 6410-6440 SAMPLE: SALT - HALITE. NO SHOW. BLACK SHALE CAVINGS (?).
- 6440-6471 SAMPLE: SALT - HALITE, 10% SHALE - BLACK, SOFT, SILTY, CARBONACEOUS.
- 6471-6502 SAMPLE: 30% SHALE - AS ABOVE; 70% SALT - HALITE.
- 6502-6533 SAMPLE: 40% SALT - HALITE; 60% SHALE - BLACK, SOFT, SILTY, CARBONACEOUS, WITH PYRITES AND SOME GRAY, FINE, SILTY SOFT SANDSTONE WHICH SHOWS SOME POROSITY. GOOD SHOW OF FREE OIL - EITHER ACCUMULATED ON SAMPLE FROM DRILLING FLUID OR NEW SHOW.
- 6533-6564 SAMPLE: SAME AS LAST ABOVE BUT WITH 20% SHALE AND 80% SALT. CONSIDERABLE PYRITE, SOME OF WHICH IS IN THE SALT.
- 6564-6595 SAMPLE: 40% SALT; 60% SHALE - BLACK TO GRAY, SILTY, SANDY IN PART, SHOWS POROSITY, SOFT, PYRITES. TRACES OF SOFT, GRAY SANDSTONE. SAME OIL SHOW AS ABOVE.
- 6595-6626 SAMPLE: 5% SHALE AS ABOVE; 95% SALT.
- 6626-6771 SAMPLE: SALT - HALITE, 5% BLACK SHALE (PROBABLY CAVE). SAMPLE COATED WITH OIL FROM DRILLING FLUID.
- 6771-6808 SAMPLE: 80% SALT; 20% SHALE - BLACK, SOFT, WITH TRACES OF FINE, POORLY CEMENTED GRAY SAND. THIS SAND IS BELIEVED TO BE PRESENT IN GREATER QUANTITIES AND IN MORE OF THE BREAKS BUT IS GOING THROUGH THE SHAKER AND IS RE-CIRCULATING.
- 6808-6900 SAMPLE: AS LAST ABOVE, BUT WITH 5% SHALE AND SANDSTONE.
- 6900-6992 SAMPLE: SALT - TRACES OF BLACK SHALE AND SANDSTONE (PROBABLY CAVE).
- 6992-7068 SAMPLE: SALT, BLACK AND GRAY SHALE, GRAY SANDSTONE, SOME GYPSUM AND ANHYDRITE, SOME VEIN FILLING, AND SOME PYRITES.
- 7068-7100 SAMPLE: SALT - WITH MINOR CAVINGS FROM ABOVE.
- 7100-7130 SAMPLE: 50-50 SALT AND BLACK SHALE.
- 7130-7220 SAMPLE: SALT - WITH MINOR CAVINGS.
- 7220-7285 SAMPLE: SALT - WITH CONSIDERABLE CAVINGS.
- 7285 SAMPLE: 50% BLACK AND GRAY SHALE; 25% GRAY SANDSTONE; 25% GYPSUM AND ANHYDRITE.
- 7285-7438 SAMPLE: SALT - HALITE, WITH MINOR BLACK SHALE (CAVINGS?).
- 7438-7443 SAMPLE: BLACK SHALE, GRAY SHALE, ANHYDRITE, GYPSUM, ETC. - MIXTURE.
- 7443-7462 CORE: #1. RECOVERED 19 FT.

SALT - MOSTLY HALITE, BUT WITH STRINGERS OF KCL ABOUT EVERY FOOT. CORE WAS OILY - ON OUTSIDE WITH SOME INDICATIONS THAT OIL IS ALSO IN THE SALT.

- 7462-7481 CORE #2. RECOVERED 3 FT.
SALT - AS ABOVE.
- NOTE: CORE #3 WAS ALSO TAKEN IN THIS ZONE. AN ERROR IN MEASUREMENT WAS MADE, AND CORRECTION PUT THE BOTTOM OF CORE #3 AT 7481. IT WAS SALT AS ABOVE.
- 7481-7500 CORE: #4. RECOVERED 19 FT.
SALT - HALITE, CLEAR-COLORLESS, OIL STAINED. HAS DARKER BANDS ABOUT 1 FT. APART (2" TO 3" WIDE) WHICH APPEAR AS DIRTY STREAKS. THIS CORE ALSO INDICATES THAT OIL MAY BE DIRECTLY IN THE SALT (IN FRACTURES AND SEDIMENTARY STREAKS AND CONTACT PLANES).
- 7500-7505 DRILLED: SHALE - BLACK AND GRAY; SALT; GYPSUM AND ANHYDRITE, WITH STRINGERS WHICH APPEAR TO BE GILSONITE.
- 7505-7524 CORE: #5. RECOVERED 5 FT.
1/2' ANHYDRITE; 1/4' SALT - HALITE, CLEAR-COLORLESS; 1/2' ANHYDRITE - GRAY TO GREENISH-GRAY MOTTLED WITH WHITE, HARD, SANDY IN PART. BOTTOM FEW INCHES OF CORE: SANDSTONE - GRAY, FINE, CONTAINS POROSITY, ALMOST PURE QUARTZ. SHOWS ABOUT 30% U/V FLOURESCENCE, NO CUT WITH CCl_4 , ODOR OF GAS. SOME BLACK, SILTY SHALE WHICH CONTAINS GAS. UPON WASHING THIS BOTTOM FEW INCHES GAS COULD BE SEEN AND HEARD ESCAPING.
- 7524-7543 CORE: #6. RECOVERED 2 INCHES.
ANHYDRITE - GRAY WITH WHITE SPOTS, MOTTLES.
- 7543-7550 SAMPLE: INTERBEDDED SALT, BLACK SHALE, GRAY SHALE, GYPSUM AND ANHYDRITE.
- 7550-7600 SAMPLE: 30% SHALE - BLACK, SOFT, CARBONACEOUS, LAMINATED AND FISSILE IN PART. 30% SHALE - GRAY, SOFTY, SILTY; 40% GYPSUM AND ANHYDRITE.
SAMPLE SHOWS ABOUT 20% U/V FLOURESCENCE, OIL STAIN, TRACES OF FINE GRAY SANDSTONE, VEIN FILLING, AND PYRITES.
- 7600-7630 SAMPLE: BLACK SHALE, ANHYDRITE, GYPSUM, ETC. AS ABOVE. SOME GRAY MARL AND GRAY-BROWN, DENSE LIMESTONE. SOME OIL STAIN. SAMPLE FAIRLY CALCAREOUS. SOME WHITE AMORPHOROUS GYPSUM, PYRITES, AND FINE WHITE SANDSTONE.
- 7630-7670 SAMPLE: BLACK SHALE, ANHYDRITE - SOME VERY HARD, GYPSUM, SALT, SILTSTONE - GRAY-BROWN, SOFT, SOME FINE GRAY TO WHITE SANDSTONE. SAMPLE SHOWS ABOUT 15% U/V FLOURESCENCE, CALCAREOUS, SOME VEIN FILLING, SOME PYRITES.
- 7670-7688 SAMPLE: SALT - HALITE.
- 7688-7690 SAMPLE: SAME AS 7630 TO 7670. THIS IS THE SAME COMPLEX MIXTURE WHICH HAS APPEARED CONSISTENTLY FROM THE 4400 FOOT ZONE.
- 7690-7709 CORE: #7. RECOVERED 13 FT.
2' ANHYDRITE - WHITE TO GRAY AND BROWN.
1' SALT.
8' ANHYDRITE - AS ABOVE.
2' BLACK SHALE - SILTY, CARBONACEOUS, SLIGHTLY MICACEOUS.
- 7709-7723 CORE: #8. RECOVERED 10 FT.
1' BLACK SHALE AND ANHYDRITE, INTERBEDDED.
9' ANHYDRITE - AS ABOVE.

WHILE CUTTING THIS CORE RAINBOWS OF LIGHT OIL BROKE ON TOP OF MUD COMING FROM FLOW LINE.

7723-7728

SAMPLE: DRILLED BLACK SHALE.

7728-7747

CORE: #9. RECOVERED 19 FT.

- 8' ANHYDRITE - GRAY TO BLUE-GRAY, MOTTLED, WITH BLACK SHALE STRINGERS.
 1' BLACK SHALE - HARD, CARBONACEOUS, PYRITES, FOSSILIFEROUS - PRINTS OF FISH SCALES.
 2' ANHYDRITE - AS ABOVE.
 3' BLACK SHALE.
 3' ANHYDRITE.
 1' BLACK SHALE.
 1' ANHYDRITE.
 ANHYDRITE, ABOVE - HARD.
 BLACK SHALE - FAIRLY HARD, CARBONACEOUS, ODOR OF PETROLEUM, FRACTURED IN PART, MOST VEINS FILLED WITH ANHYDRITE. HAS PYRITES IN SOME BEDDING PLANES WHICH IS DEPOSITED AS A THIN FILM IN FOSSIL PRINTS OF FISH SCALES OR BRYOZOA (?).
 QUITE A LOT OF INTERBEDDING OF SHALE AND ANHYDRITE.

7747-7766

CORE: #10. RECOVERED 12 FT.

- 4' SILTSTONE - SOFT, GRAY WITH BLACK LAMINATIONS, CALCAREOUS.
 3' BLACK SHALE - HARD.
 4' ANHYDRITE - GRAY MOTTLED, HARD, INTERBEDDED WITH BLACK SHALE.

7766-7777

CORE: #11. RECOVERED 8 FT.

- 4' BLACK SHALE - SOFT, SILTY, HAS APPEARANCE AND ODOR OF OIL - NO CUT WITH CCl_4 , IN PART A MIXTURE OF CUTTINGS AND CAVINGS.
 4' SILTSTONE - DARK GRAY TO BLACK, HARD, CALCAREOUS, GRADING TO HARD BLACK SHALE IN PART.

7777-7787

DRILLED: BLACK SHALE AND SILTSTONE AS ABOVE.

7787-7805

CORE: #12. RECOVERED 6 FT.

- 4' BLACK SHALE - VERY SILTY, CALCAREOUS, HARD, GRADING TO SILTSTONE.
 1' ANHYDRITE.
 1' BLACK SHALE TO SILTSTONE AS LAST ABOVE.

7805-7824

CORE: #13. RECOVERED 6 FT.

- 3' SHALE - BLACK, SILTY, CARBONACEOUS, SOFT, GRADING TO SILTSTONE, SLIGHTLY CALCAREOUS.
 2' SHALE - BLACK, SILTY, THICKLY LAMINATED, CALCAREOUS, MICACEOUS, HARD.

TOP OF LEADVILLE Ls. (MISSISSIPPIAN)

7824-7825

LIMESTONE - GRAY TO GRAY-BROWN, FINELY XLN, OIL STAINED IN PART, SLIGHTLY FOSSILIFEROUS - PRINTS OF FISH SCALES (EITHER FISH SCALES OR PORTIONS OF CRINOIDS).

7825-7826

DRILLED: 1' CIRCULATED. LIMESTONE - AS ABOVE. BUT SAME COMPLEX MIXTURE ENCOUNTERED EACH TIME.

WHILE DRILLING AND CORING 7787 TO 7825 LIGHT GAS BUBBLED FROM FLOW LINE INTERMITTENTLY.

7825-7835

CORE: #14. RECOVERED 2 FT.

LIMESTONE - GRAY TO GRAY-BROWN, FINELY XLN, OIL STAINED (LIGHT) IN PART.

7835-7850

CORE: #15. RECOVERED 15 FT.

POOR COPY

7827 - LIMESTONE - FAIR TO COARSE XLN, GRAY TO CLEAR-COLORLESS,
OIL STAINED IN PART, VUGGY IN PART - TAP
AS ABOVE.
7833 - LIMESTONE - AS ABOVE.
7844 - LIMESTONE - GRAY TO VERY LIGHT GRAY, XLN - FINE TO COAR
OIL STAINED AND SATURATED IN PART. POROSITY

7850-7870 CORE: #18. RECOVERED 20 FT.

7853 - LIMESTONE - GRAY TO LIGHT GRAY, FINELY XLN, OIL STAINED
7854 - LIMESTONE - AS ABOVE.
7855 - LIMESTONE - GRAY TO GRAY-BROWN, XLN, SHOWS POROSITY, OIL
STAINED TO ALMOST SATURATED IN PART.
7859 - LIMESTONE - LIGHT GRAY TO GRAY-BROWN, FINELY XLN, INTERBEDD
ED (SUB-SHARED) WITH GRAY TO GREEN, SHINY, EN
SATURATED, CAL. FREED SHALE.
7860 - LIMESTONE - LIGHT GRAY-BROWN, FINELY XLN, STREAKS OF OIL
STAINING AND SATURATION. SOME PYRITES.
7865 - LIMESTONE - SAME AS 7859.
7868 - LIMESTONE - LIGHT GRAY-BROWN, XLN, SOME SHINEY GRAY TO GREEN
SHALE AS ABOVE, OIL STAINED IN PART. SOME FOSS
SIL PRINTS.

7870-7880 CORE: #17. RECOVERED 6 FT.

7871-7872 LIMESTONE - GRAY, XLN, OIL STAINED IN PART, CRINOIDAL IN PART,
SHOWS POROSITY AND SATURATION, VUGGY IN PART.
7877 - LIMESTONE - GRAY-BROWN, AS ABOVE - POSSIBLY DOLOMITIC.
7880 - LIMESTONE - AS LAST ABOVE.

NOTE: THE ENTIRE ZONE OF LEADVILLE LIMESTONE FROM 7821 TO 7881 CONTAINS
ZONES OF POROSITY, OIL STAINING TO SATURATION. MORE THAN HALF THE
ZONE HAS BLEEDING CORES TO SATURATED CORES. SEVERAL CORES FAILED
TO GIVE FULL RECOVERY - PART OF THIS IS BELIEVED TO BE DUE TO
ZONES OF POROSITY. PORTIONS SHOW TRACES OF CRINOIDS BUT ZONE IS
ONLY SLIGHTLY FOSSILIFEROUS.

CORE #17 (7870-7880) HAS GOOD POROSITY - IS QUITE VUGGY AND
OOLITIC, AND CONTAINS QUITE A LOT OF SATURATION.

THIS OIL IS GREEN, HIGH GRAVITY (42.9 - 43.0), AND CONTAINS
CONSIDERABLE VOLATILE MATERIAL.

7880-7887 CORE: #18. RECOVERED 7 FT.

LIMESTONE - GRAY, DARK GRAY, AND LIGHT GRAY; FINELY XLN, XLN,
NODULAR TO OOLITIC; SOME DARK STRINGERS AND BLACK
BANDS. SHOWS U/V FLOURESCENCE THROUGHOUT.

7880-7882 - FAIR POROSITY, BLEEDS LIGHT GREEN OIL.

7882-7883 - GOOD POROSITY - POSSIBLY CAVERNOUS, SATURATED WITH
GREEN OIL, NODULAR TO OOLITIC AND GRANULAR

7886-7887 - FAIR POROSITY - BLEEDS OIL AS ABOVE, HARD DENSE
VERY LIGHT GRAY.

7888-7891 CORE: #17. RECOVERED 4 FT.

Dolomite - ...
- GRAY - BREAKS HARD, MOSTLY DENSE ...
1 FT. IN MIDDLE OF CORE SHOWS FAIR ...
- IS SATURATED WITH GREEN OIL ...
GRAY, BLUE-GRAY TO BROWN SMOKEY ...

7891-7919 DRILLED: DOLOMITE - LIGHT GRAY TO WHITE, FINELY XLN. ...
CENCE. OIL STAINED WITH SOME FREE OIL. POROSITY ...
BECAUSE OF FINENESS OF CUTTINGS. FOR DRILLING ...
TIME LOG OF THIS WELL.

POOR COPY

- 7920-7942 SAMPLE: LIMESTONE - WHITE TO DARK GRAY, FINELY XLN TO XLN. DOLOMITE STAINED IN PART. LOW POROSITY.
- 7942-7960 SAMPLE: LIMESTONE - GRAY TO VERY LIGHT GRAY, XLN TO FINELY XLN, TRAIL OIL STAIN. LOW POROSITY.
- 7960-7972 CORE: #20. RECOVERED 10 FT.
LIMESTONE AND DOLOMITE - GRAY (LIGHT TO VERY DARK), INTERBEDDED WITH BLACK SHALE AND SHINEY GRAY SHALE, FINELY XLN TO XLN, LOW POROSITY. 1 FT FROM 7962 TO 61 FT FROM YELLOW-GREEN OIL.
- 7972-7984 SAMPLE: LIMESTONE - VERY LIGHT GRAY TO WHITE, FINELY XLN.
- 7984-7998 SAMPLE: LIMESTONE - WHITE MOTTLED WITH GRAY, FINE TO COARSE XLN. CONTAINS BLACK, CARBONACEOUS SILT. LOW POROSITY.
- 7998-8009 SAMPLE: LIMESTONE - WHITE, XLN TO MICRO-XLN. 10% DARK GRAY MOTTLED.
- 8009-8029 CORE: #21. RECOVERED 20 FT.
8009-13 LIMESTONE - DOLOMITIC, GRAY-BROWN WITH DARK GRAY TO BLACK VEINS, FINELY XLN, LOW POROSITY.
8013-14 LIMESTONE - DOLOMITIC, DARK GRAY, VUGGY, HIGH POROSITY, LOOKS WET.
8014-20 As 8009 to 8013.
8020-21 DOLOMITE - DARK GRAY, XLN, FAIR POROSITY, OIL STAINED OR WET.
8021-29 As 8009-8013.
WHILE TAKING THIS CORE GAS BUBBLES APPEARED FROM FLOW LINE AND RAINBOWS OF LIGHT OIL APPEARED.
- 8029-8044 CORE: #22. RECOVERED 15 FT.
DOLOMITE - GRAY, GRAY-BROWN TO WHITE, XLN-FINE TO COARSE, 8029 TO 8034 FRACTURED IN PART BUT HARD AND DENSE; 8034 TO 8044 HAS EXCELLENT POROSITY AND PERMEABILITY - VUGGY (UP TO 1/4" TO 1/2" IN DIA.), CONTAINS A DARK GRAY TO BLACK IMPURITY OF CARBONACEOUS MATERIAL - LOOKS LIKE GRAPHITE OR DEAD OIL (NO CUT) GIVING CORE A BLUE-GRAY TO BLUE-BLACK COLOR IN PART. THIS CORE CARRIES WATER. TRACES OF CRINOID MOLDS.
RAN DST - PACKER SET @8026, OPEN 4 HOURS, GOOD BLOW - 75 MIN., FAIR BLOW 25 MIN., NO BLOW AFTER 4 HOURS. FLOW PRESSURE 2750 LBS. PSI. APPROXIMATELY 6000 FT. OF FLUID RISE - FIRST PART OIL AND GAS CUT. TEST RE-RUN - GOT GOOD BLOW FOR 90 MIN. 6000 FT. OF FLUID, SALT WATER. NO OIL OR GAS.
DURING ABOVE DST (4 TO 8 HOURS) APPROXIMATELY 30 BARRELS OF OIL FLOWED THROUGH ANNULUS AND ACCUMULATED ON MUD TANKS. THIS IS THE SAME OIL FROM 6350-6370 AND IS COMING THROUGH A HOLE IN THE CASING ABOVE 4200 FT.
- 8044-8061 CORE: #23. RECOVERED 9 FT
DOLOMITE - WHITE, XLN - FINE TO COARSE, VUGGY, LOOKS WORM-EATEN, HIGH POROSITY AND PERMEABILITY, CONTAINS A SHINEY BLACK CARBONACEOUS IMPURITY. LOOKS WET.
- 8061-8081 CORE: #24. RECOVERED 10 FT.
DOLOMITE - AS LAST ABOVE, LESS VUGGY, MORE CARBONACEOUS MATERIAL ESPECIALLY 8061-62 WHICH APPEARS TO HAVE A STREAK OF SOFT BLACK CARBONACEOUS SHALE. A FEW CRINOID MOLDS.

POOR COPY

- 8081-8083 DRILLED: DOLOMITE AS ABOVE.
- 8083-8088 CORE: #25. RECOVERED 5 FT.
- DOLOMITE - GRAY TO BLUE-GRAY, HARD-DENSE, CONTAINING IRREGULAR WRINKLED STREAKS OF BLACK CARBONACEOUS MATERIAL - SOME GRAY SHALE - GYPSUM. SOME PYRITES WITH THE BLACK CARBONACEOUS MATERIAL, PORTIONS HAVE PINK COLOR. WHOLE CORE APPEARS TO HAVE BEEN IRREGULARLY BEDDED AND CONTORTED IN PART. A FEW CRINOID FRAGMENTS NEAR TOP OF CORE.
- 8088-8105 SAMPLE: DOLOMITE - GRAY WITH PINK TO REDDISH AND LAVENDER PORTIONS, HARD-DENSE, MUGGY IN PART, SOME PYRITES.
- 8105-8116 CORE: #26. RECOVERED 6 FT.
- TOP OF DEVONIAN
- 8105-15 DOLOMITE - GRADING BACK AND FORTH TO HARD BLACK SHALE AND SILTSTONE. DARK GRAY-BROWN TO BLACK. FINE-SILICEOUS - BRYDZOA. PORTIONS CONTORTED. TRACES OF OIL RAINBOWS ON OUTSIDE OF A FEW PIECES - APPEARS TO BE SMEARED ON. SOME U/V FLOURESCENCE DUE TO OIL IN DRILLING FLUID - NONE INSIDE. A FEW VEG. HARD-DENSE, FINELY XLN, SOME OF THIS DOLOMITE IS GRAY-BROWN WITH THIN, UNEVEN LAMINATIONS OF HARD BLACK SHALE.
- 8115-16 DOLOMITE - AS ABOVE BUT GRADING TO A PINKISH-LAVENDER.
- 8116-8120 SAMPLE: DOLOMITE - GRAY, GRAY-BROWN, TO PINK - LAVENDER - AND WHITE, XLN, HARD-DENSE.
- 8120-8125 SAMPLE: DOLOMITE - PASTEL COLORED - GRAY, GRAY-BROWN, BROWN, PINKISH TO LAVENDER TO WHITE; XLN - COARSER THAN ABOVE. SOME GRAY AND BROWN SMOKEY CHERT. SOME PYRITES. SILTY IN PART. MUCH OF SAMPLE APPEARS SUGARY. TRACES OF BLACK CARBONACEOUS MATERIAL.
- 8125-8138 CORE: #27. RECOVERED 8 FT.
- 2' DOLOMITE - GRAY, HARD-DENSE, WITH 6" BANK OF BLACK INTER-BEDDED WITH SHALE AND DOLOMITE (CONTORTED).
- 6' DOLOMITE - DARK GRAY (PORTIONS HAVE LAVENDER TINT), FRACTURED IN PART, YUGGY, DENSE EXCEPT FOR VUGS, VEINS AND FRACTURES CONTAIN BLACK CARBONACEOUS MATERIAL. TRACES OF FOSSIL PRINTS. NO SHOW. LOOKS LIKE DEVONIAN REEF AS IN T-W 74-11 WELL.
- 8138-8145 SAMPLE: DOLOMITE - AS 8116 TO 8120.
- 8145-8152 SAMPLE: DOLOMITE - GRAY (WITH TINGES OF WHITE, PINK, LAVENDER AND AMBER), FINELY XLN - SUGARY, LOW POROSITY, TRACES OF BLACK SILTSTONE, TRACES OF PYRITES, SOME GRAY WAXY SHALE.
- 8152-8155 CORE: #28. RECOVERED 3 FT.
- GRAY DOLOMITE INTERBEDDED WITH 1/2" TO 1" THIN LAMINATIONS OF GRAY SILICEOUS SHALE. DOLOMITE HARD AND DENSE. CHERT, SHALE AND DOLOMITE IRREGULARLY BEDDED, PARTIALLY CONTORTED, BEDDING PLANES WRINKLED AND DIPPING 20 DEGREES IN PART.
- 8155-8160 SAMPLE: DOLOMITE - VERY LIGHT GRAY TO GRAY, XLN, LOW POROSITY.
- 8160-8167 SAMPLE: DOLOMITE - LIGHT GRAY TO GRAY-BROWN, APPEARS OIL STAINED, PYRITES
- 8167-8172 SAMPLE: DOLOMITE - LIGHT GRAY TO VERY LIGHT GRAY, FINELY XLN, GRANULAR - SHOWS SOME POROSITY, CARBONACEOUS MATERIAL AND MN STAIN

POOR COPY

8172-8175

CORE: #29. RECOVERED 3 FT.

DOLOMITE - GRAY TO DARK GRAY, XLN, VUGGY IN PART, SHOWS POROSITY - VUGS AND GRANULAR, CONTAINS BLACK CARBONACEOUS MATERIAL AND MN STAIN IN VUGS. NO CUT WITH CCl_4 .

8175-8182

SAMPLE: DOLOMITE AS ABOVE, SOFTER.

8182-8202

CORE: #30. RECOVERED 16 FT.

DOLOMITE - DARK GRAY, DULL-DIRTY LOOKING, INTERBEDDED WITH DARK GRAY TO BLACK SHALE, VUGGY AND FINELY HONEY-COMBED, DRY, INCLUSIONS OF BLACK SHALE-PYRITES-CHERT, CONTORTED OR SLUMPED IN PART. FOSSILIFEROUS IN PART - BRACHIOPODS.

8202-8213

CORE: #31. RECOVERED 6 FT.

DOLOMITE - GRAY TO DARK GRAY, MOSTLY HARD AND DENSE, FRACTURED IN PART, SOME BLACK SHALE AND CHERT INCLUSIONS, SOME CONTORTED OR IRREGULARLY BEDDED PORTIONS. STILL DEVONIAN REEF.

TOTAL DEPTH: 8213 FEET.

SCHLUMBERGER "DIP-METER" SURVEY

7810-7840	30 DEGREES	N 46 W
7840-7870	38 "	N 19 W
7870-7900	30 "	N 32 W
7900-7930	38 "	N 23 W
8020-8050	36 "	N 5 W

(RESULTS OF ABOVE SURVEY ARE OF DOUBTFUL RELIABILITY.)



United States Department of the Interior

OFFICE OF THE SOLICITOR

SUITE 6201, FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138

February 26, 1980

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

King Oil Company
Attention: Mr. Bocell
c/o Energy Resources Oil & Gas Corp.
2735 Villa Creek Drive, Suite 165
Dallas, Texas 75234

Re: Wells Nos. 1 and 1A, Sec. 11,
T. 26 S., R. 19 E., Grand County,
Utah, Lease No. SL-066103

Wells Nos. 1, 2, and 3, Secs. 14 and
23, T. 26 S., R. 19 E., Grand County,
Utah, Lease No. SL-067043

Gentlemen:

This is to advise you that in response to a request from the U. S. Geological Survey, we are hereby issuing a formal demand that the above-referenced abandoned locations be properly plugged and restored. Numerous letters on this matter have been directed to your company, its surety, and its legal counsel by U.S.G.S. since 1972. To date, there has been no response assuring results.

Your company's failure to live up to the terms of the now terminated leases makes this formal demand necessary. Geological Survey has been more than patient in its attempts to have these plugging and restoration obligations satisfied. Patience, however, has its limits, and we feel it imperative that we receive a response setting up a satisfactory schedule for the completion of this work. Failure to do so will result in the initiation of legal proceedings.

If you have any questions concerning this matter, please feel free to contact us. We look forward to your response.

Very truly yours,

REID W. NIELSON
Regional Solicitor

Roland G. Robison Jr.

By

ROLAND G. ROBISON, JR.
Assistant Regional Solicitor

cc: Dee Dearth, Geological Survey, 2000 Administration Bldg.,
1745 West 1700 South, SLCU 84104
Siegfried Insurance, Attn: Peggy Borneman, P. O. Box 3308,
Tulsa, OK 74101

2-27-80

COPIES SENT TO:

*BLM, MORB
USGS, VERNAL
USGS, GED. I.C.T.
WELL FILES (5)*



United States Department of the Interior

GEOLOGICAL SURVEY
Conservation Division
2000 Administration Building
1745 West 1700 South
Salt Lake City, Utah 84104

October 23, 1980

United States Department of the Interior
Office of the Solicitor
Suite 6201, Federal Building
125 South State Street
Salt Lake City, Utah 84138

Re: Well Nos. 1 and 1A, Section 11,
Township 26S, Range 19E
Grand County, Utah
Lease No. SL - 066103

Well Nos. 1, 2, and 3, Section 14
and 23, Township 26S, Range 19E
Grand County, Utah
Lease No. SL - 067043

Gentlemen:

Personnel from this office inspected the referenced locations on October 16, 1980. No progress has been made by Energy Resources Oil and Gas Corporation to comply with your demand letter dated February 26, 1980 (see attached letter).

According to Energy Resources Oil and Gas Corporation's reply letter dated February 29, 1980 (see letter attached) they proposed to comply with the Federal requirements as soon as feasibly possible.

Sufficient time has elapsed to complete this work; therefore, we feel further action will be necessary for compliance.

If additional information or assistance is required, please contact Dee Dearth at this office.

Sincerely yours,
(ORIG. SGD.) E. W. GYNN

E. W. Gynn
District Oil and Gas Supervisor

Attachments

cc: BLM, Moab, Utah w/attachment
Utah State Oil and Gas w/attachment

RECEIVED

OCT 27 1980

DIVISION OF
OIL, GAS & MINING