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Preliminary report on the petrography of the Upper Jurassic
Morrison Formation, Mariano Lake-Lake Valley Drilling Project,
McKinley County, New Mexico

By

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This report is preliminary and has not been reviewed for conformity with U.S. Geological editorial standards and stratigraphic nomenclature.

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PRELIMINARY REPORT ON THE PETROGRAPHY OF THE UPPER JURASSIC
MORRISON FORMATION, MARIANO LAKE-LAKE VALLEY DRILLING PROJECT,
MCKINLEY COUNTY, NEW MEXICO

By Brenda A. Steele

DESCRIPTION OF PROJECT

The U.S. Geological Survey, in cooperation with the U.S. Bureau of Indian Affairs and the Minerals Department of the Navajo Tribe, conducted a drilling project in the vicinity of Crownpoint, New Mexico to study the Upper Jurassic Morrison Formation. The Morrison Formation in this area contains some of the world's largest sandstone-hosted uranium deposits. Twelve holes were drilled along a northeast line from Mariano Lake to Lake Valley (fig. 1) and were roughly perpendicular to the general trend of the uranium-rich Grants Mineral Belt and parallel to the dip of the Morrison in this area. Core was recovered from holes 1, 3, 4, 5, 6, 7, 7a and 8 with uranium ore bodies intersected in holes 3, 4, 7, and 7a (fig. 2). See Huffman and others (1981a), Huffman and others (1981b), Kirk and others (1981a), Kirk and others 1981b), Kirk and others (1981c), Zech and others (1981a) and Zech and others (1981b) for lithologic descriptions of the core. Core samples and geophysical logs were used for detailed petrologic, sedimentologic, geophysical and geochemical studies of the Morrison. This report precedes a detailed report on the petrography of 209 samples of the Morrison Formation collected from holes 1, 3, 4, 5, 6, 7 and 7a (table 1) and contains only the basic data obtained from this study. All computer work for this report was done under contract by W. Lincoln Materna of Petroleum Information Company.

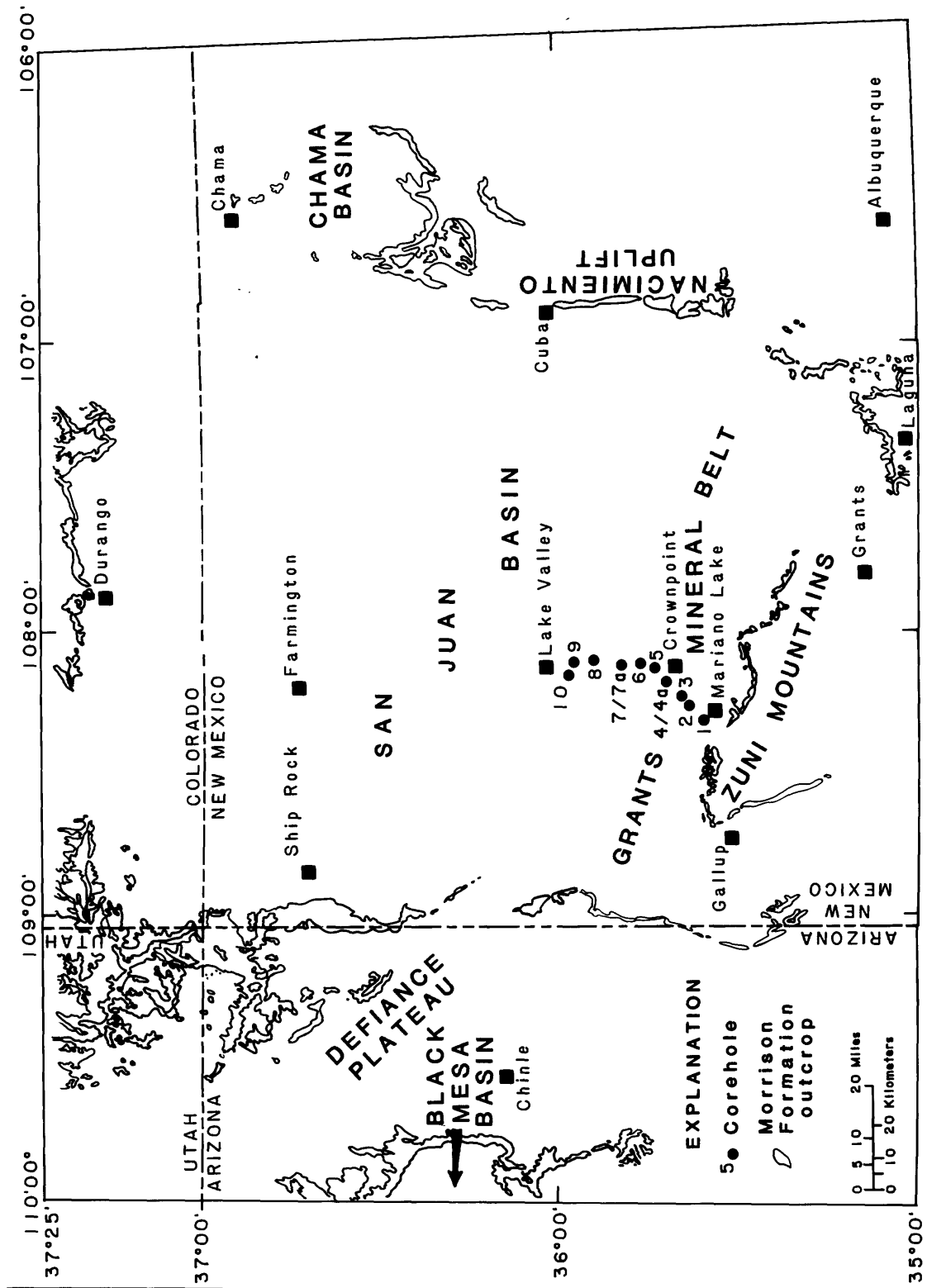


Figure 1.--Index map of study area.



Table 1.--Distribution, by drill hole, of sandstone samples
examined from the Morrison Formation,
Mariano Lake-Lake Valley drilling project cores

	Core 1	Core 3	Core 4	Core 5	Core 6	Core 7	Core 7a
Brushy Basin Member	1	4	2	4	0	5	0
Westwater Canyon Member	14	21	24	16	18	21	17
Recapture Member	<u>11</u>	<u>8</u>	<u>9</u>	<u>6</u>	<u>15</u>	<u>13</u>	<u>0</u>
Total	26	33	35	26	33	39	17

GEOLGY

The Mariano Lake-Lake Valley study area is located in the southwestern portion of the San Juan Basin flanked by the Zuni Mountains to the south and the Defiance Plateau to the west (fig. 1). Jurassic-age rocks, including the Morrison Formation crop out along the southern edge of the basin and dip gently northward away from the Zuni Mountains into the basin center. In the southern part of the study area, the Morrison is conformably underlain by and interfingers with an unnamed Jurassic eolian sandstone that pinches out between holes 2 and 6. North of the pinchout the Morrison is underlain by the Jurassic Summerville(?) Formation. Throughout the study area the Morrison is unconformably overlain by the Upper Cretaceous Dakota Sandstone.

In this region, the Morrison Formation is divided into three members, in ascending order: the Recapture, Westwater Canyon and Brushy Basin (fig. 3). The Recapture Member consists of light-colored, thin, fine-grained sandstone, claystone and mudstone. Depositional environments of the Recapture Member are varied and include eolian, fluvial and lacustrine. The Westwater Canyon Member was deposited largely by fluvial processes and consists of thick, fine-grained to conglomeratic sandstone interbedded with thin, greenish, bentonitic mudstone. The Brushy Basin Member is dominantly gray green, bentonitic mudstone and claystone with a few thin sandstones and was deposited largely by lacustrine processes. For a more detailed discussion of the stratigraphy of the Morrison Formation in this area refer to Craig and others (1955), Freeman and Hilpert (1956), and Harshbarger and others (1957).

METHODS

A total of 209 sandstone samples from seven cores (table 1) were examined in thin section for texture and composition. Fine- to medium-grained portions of individual sandstone units in the Morrison Formation were sampled at approximately 10 to 20 foot intervals with spacing closer in mineralized zones. Thin sections were cut perpendicular to observed bedding in the core. All thin sections were stained with sodium cobaltinitrate to aid in identifying potassium feldspar. Each thin section was also impregnated with blue epoxy to enhance the void spaces. Porosity was considered to be any naturally occurring void space, either primary or secondary. Care was taken to disregard any void that may have been created during sample preparation.

For each sample, 300 points were counted for composition and the longest dimension of 100 grains was measured for average grain-size determination. Sorting values as phi standard deviation were determined as described by Folk (1974). Diagenetic processes have greatly altered the morphology of many of the detrital grains, thus no attempt was made to quantify either roundness or sphericity.

RESULTS

Tables 2-8 (Appendix 1) show selected textural and compositional information for individual samples from each hole. Computer-generated downhole plots of the data in tables 2-8 are on plates 1-7.

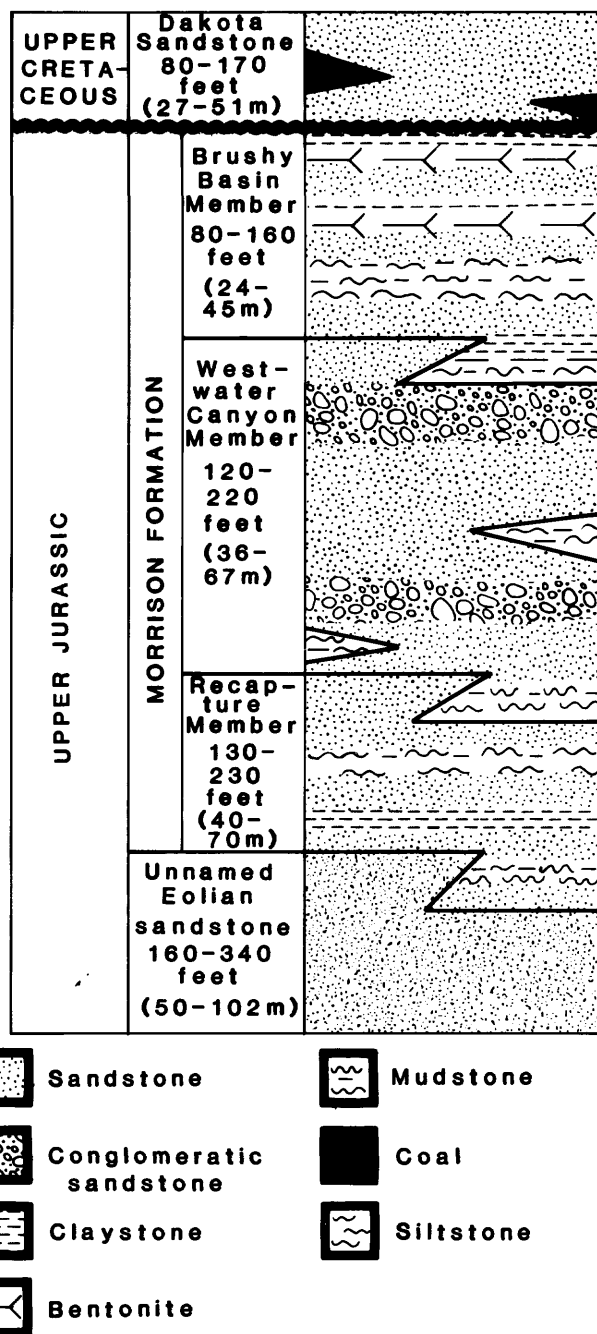


Figure 3.--Generalized stratigraphic column of Upper Jurassic Morrison Formation, southwestern San Juan Basin, New Mexico.(thicknesses from Jacques Robertson oral comunication, 1983)

Framework constituents, in order of decreasing abundance, are quartz, feldspar, rock fragments and miscellaneous accessory mineral grains. Each of these framework constituents has been further divided. Quartz is divided into monocrystalline, polycrystalline, metamorphic, and cryptocrystalline varieties. Monocrystalline quartz is any single-crystal quartz grain. Polycrystalline quartz is any multiple-crystal quartz grain that is not clearly metamorphic or cryptocrystalline. Metamorphic quartz is any multiple-crystal quartz grain with either schistose or stretched metamorphic texture. Cryptocrystalline quartz is also multiple crystal and consists of both chert and chalcedony.

Feldspar is divided into potassium and plagioclase varieties. Potassium feldspar types observed are microcline, orthoclase, sanadine, and perthite. Due to alteration and the lack of properly oriented grains no attempt was made to classify plagioclase feldspar.

Rock fragment interpretation in sediments is difficult and fragments can be easily misidentified. Identification of rock fragments in the core samples is only preliminary and based largely on textural characteristics. Rock fragments have been divided into the following varieties: volcanic igneous, plutonic igneous, metamorphic, sedimentary, unknown altered, and deformed. No attempt has been made to classify the igneous rock fragments but preliminary observations do suggest an intermediate to acidic composition. Metamorphic rock fragments observed are largely schistose but nothing definite can be said about their metamorphic grade. Sedimentary rock fragments are more easily recognizable with silicified sandstone, lime mudstone, siltstone, and claystone fragments identified. Unknown rock fragments are considered to be any grain that is identifiable as a rock fragment but due to alteration its exact origin is questionable. Deformed rock fragments are any grain that is identifiable as a rock fragment but has been deformed to some degree forming what Dickinson (1970) refers to as pseudomatrix. Even though these fragments are often deformed almost beyond recognition, they still should be considered part of the original framework.

Accessory minerals identified in order of decreasing abundance are biotite, muscovite, zircon, tourmaline, apatite, iron-titanium oxides, sphene, and garnet. Refer to Hansley (1983) for a detailed discussion of the nonopaque, detrital heavy mineralogy of the core samples.

Nonframework constituents are composed of cement, matrix, and miscellaneous alteration products. According to this study, cement is considered to be any chemically precipitated mineral material. The following cements have been identified in the core samples: silica in the form of quartz overgrowths, carbonate in the form of both calcite and ferroan carbonate, kaolinite, barite, anhydrite, potassium feldspar in the form of authigenic overgrowths, pyrite, ferric oxide and oxyhydroxide. Also a small amount of cement of unknown types is present.

Matrix material observed consists of undifferentiated mixtures of one or more of the following: detrital and authigenic clay, silt, lime mud, and organic material. No attempt was made to futher divide matrix material.

No detailed work on alteration products was done for this study. Alteration products that have been identified are sericite from altering plagioclase feldspar, ferric oxide and oxyhydroxides from altering iron-titanium oxides and lithic fragments, and leucoxene from altering iron-titanium oxides.

Even though porosity values obtained by point counting can be imprecise (Halley, 1978), no other method for porosity estimation on the core samples was easily available. Thus, porosity values obtained from this study should only be considered as rough approximations. Most of the porosity observed is primary interparticle but some secondary porosity is also present.

Figures 4, 5, and 6 are computer-generated quartz-feldspar-lithic fragment ternary classification diagrams (Folk, 1974) of all Brushy Basin, Westwater Canyon, and Recapture samples, respectively, for the seven holes. Major framework constituents, excluding accessory minerals, were recalculated to 100 percent and allotted to the following poles:

- Q-pole: Monocrystalline quartz, polycrystalline quartz and metamorphic quartz.
- F-pole: Plagioclase feldspar, potassium feldspar plus gneissic and granitic lithic fragments.
- L-pole: All other lithic fragments including cryptocrystalline quartz.

Relatively few Brushy Basin samples were examined. Most are subarkoses or lithic arkoses; a few are arkoses. The Westwater Canyon samples show the greatest diversity. Most samples are classified as arkoses or lithic arkoses; a few samples are classified as subarkoses or feldspathic litharenites. Samples of the Recapture show the closest grouping. Most are subarkoses; a few samples are classified as arkoses, lithic arkoses, or feldspathic litharenites.

Composition plots (figs. 4-6) suggest some compositional differences between the three Morrison members. The reasons for these differences are not yet entirely understood and more work needs to be done on this aspect of the petrology.

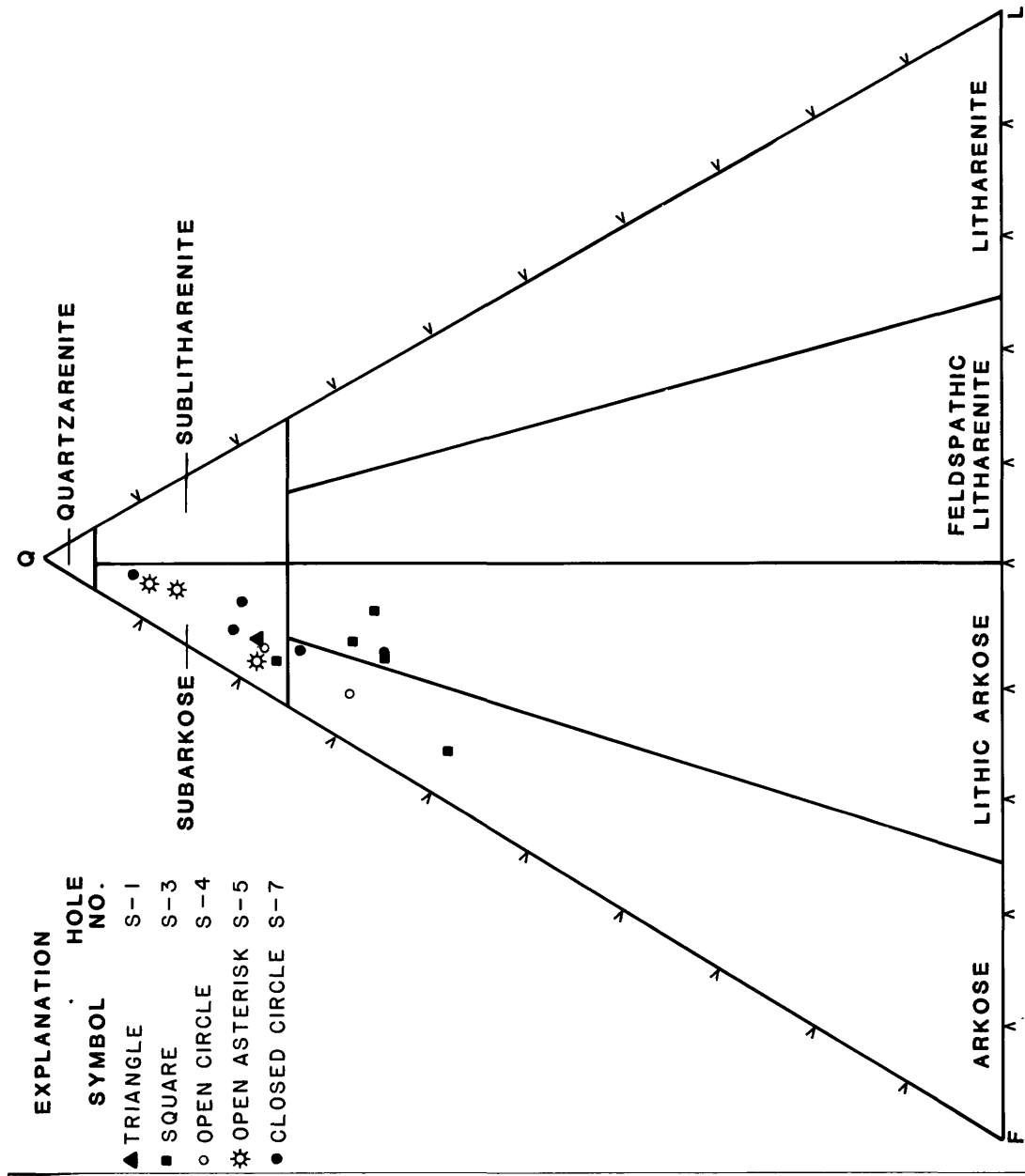


Figure 4.--Quartz-feldspar-lithic fragment ternary diagram, samples from the Brushy Basin Member of the Morrison Formation (after Folk, 1974).

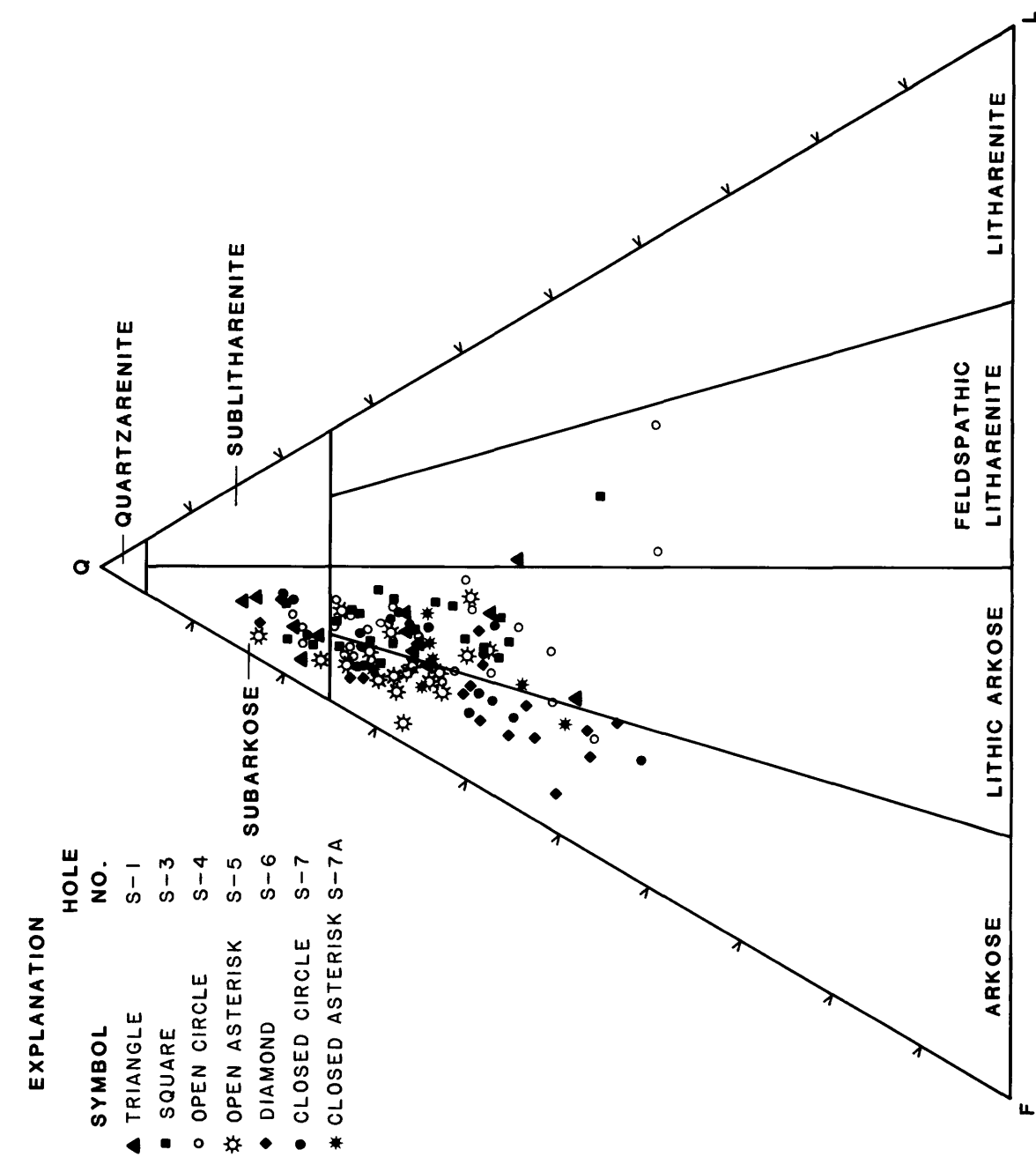


Figure 5.--Quartz-feldspar-lithic fragment ternary diagram, samples from the Westwater Canyon Member of the Morrison Formation (after Folk, 1974).

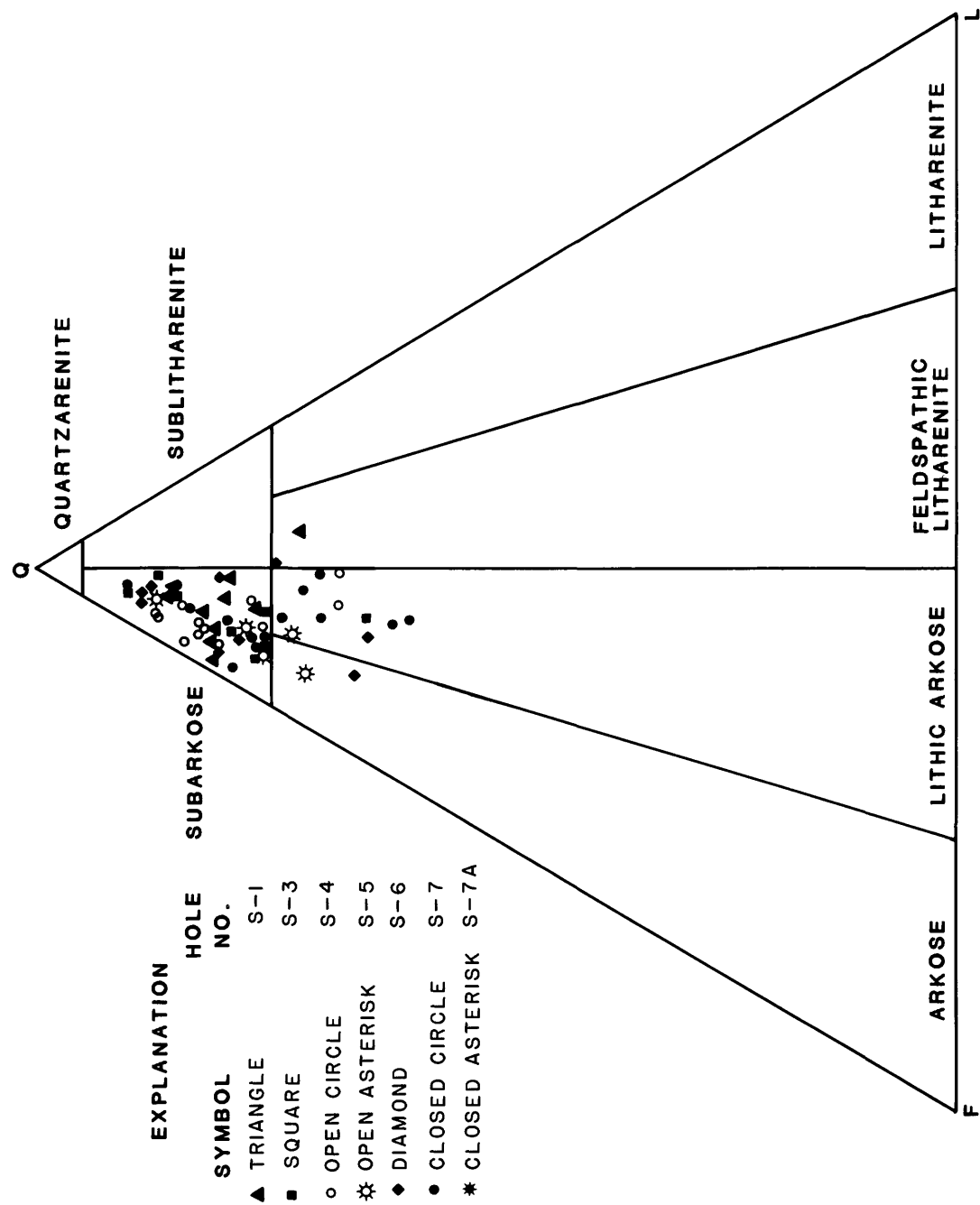


Figure 6.--Quartz-feldspar-lithic fragment ternary diagram, samples from the Recapture Member of the Morrison Formation (after Folk, 1974).

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APPENDIX I

Explanation of computer-generated tables 2-8.

Column no.

1. Sample depth in feet
2. Mean grain size (phi units)
3. Sorting index (phi standard deviation)
4. Total quartz (columns 5-8)
5. Monocrystalline quartz
6. Polycrystalline quartz
7. Cryptocrystalline quartz
8. Metamorphic quartz
9. Total feldspar (columns 10-11)
10. Plagioclase feldspar
11. Potassium feldspar
12. Sample depth in feet
13. Total rock fragments (columns 14-18)
14. Volcanic igneous
15. Plutonic igneous
16. Metamorphic
17. Sedimentary
18. Unknown altered and deformed
19. Accessory minerals
20. Total framework (columns 4, 9, 13 and 19)
21. Sample depth in feet
22. Matrix
23. Total cement (columns 24-31)
24. Silica
25. Carbonate
26. Kaolinite
27. Barite
28. Anhydrite
29. Authigenic potassium feldspar
30. Pyrite
31. Other cements
32. Sample depth in feet
33. Total alteration products
34. Total nonframework (columns 22, 23, 33)
35. Porosity

- NOTE: 1) All compositional values are volume percentages.
2) 0.00 = not observed.
3) Any value in hundredths place represents trace quantity.
4) * = sample taken from zone with uranium mineralization.

Table 2. Computer-generated table of selected textural and compositional data from the Upper Jurassic Morrison Formation, hole S-1, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico.

SAMPLE DEPTH (FEET)	PHI MEAN	SORTING INDEX (PHI)	TOTAL QUARTZ	MONOXIAL QUARTZ	POLYXTAL QUARTZ	CRYPTOXIAL QUARTZ	METAMORPHIC QUARTZ	TOTAL FELDSPAR	PLAGIOCLASE FELDSPAR	POTASSIUM FELDSPAR	FORMATION MEMBER
S-1 SAMPLES											
541.0	3.19	0.61	26.41	24.80	1.30	0.01	0.30	6.01	1.70	4.31	BRUSHY BASIN MEMBER
559.0	0.75	0.81	39.40	30.70	4.70	1.70	2.30	25.21	6.30	18.91	
560.0	2.04	0.65	41.10	35.40	3.00	0.70	2.00	12.30	4.00	8.30	
579.0	1.39	0.82	43.40	37.40	2.70	1.00	2.30	13.00	4.30	8.70	WESTWATER CANYON MEMBER
594.0	1.52	0.82	44.70	39.30	2.70	0.70	2.00	14.40	4.70	9.70	
615.0	2.48	0.58	36.30	33.00	1.70	0.30	1.30	14.10	4.30	9.80	
636.0	1.44	0.97	41.91	36.30	3.30	0.01	2.30	16.70	2.30	14.40	RECAPTURE MEMBER
667.0	1.48	0.57	45.50	39.20	3.30	0.70	2.30	13.01	3.30	9.71	
677.0	1.96	0.64	50.90	44.60	3.30	0.70	2.30	13.70	2.30	11.40	
726.0	1.00	1.00	38.11	33.40	2.70	0.01	2.00	19.40	3.70	15.70	RECAPTURE MEMBER
782.0	1.93	0.55	54.40	48.40	3.70	0.30	2.00	7.30	2.70	4.60	
810.0	2.12	0.98	49.80	45.80	1.00	0.70	2.30	11.00	0.70	10.30	
820.0	2.23	0.58	47.51	42.20	1.00	0.01	4.30	11.70	2.00	9.70	RECAPTURE MEMBER
846.0	2.12	0.60	60.51	56.20	2.30	0.01	2.00	7.60	2.00	5.60	
861.0	1.74	0.67	55.00	50.00	2.70	0.30	2.00	10.60	3.00	7.60	
866.0	2.70	0.60	46.70	42.70	1.30	0.00	2.70	10.10	0.70	9.40	RECAPTURE MEMBER
881.0	2.70	0.62	52.41	45.70	2.70	0.01	4.00	10.30	2.30	8.00	
891.0	1.88	0.58	55.61	50.60	3.00	0.01	2.00	9.70	1.30	8.40	
918.0	2.23	0.66	47.00	45.00	0.00	0.30	1.70	7.71	0.70	7.01	RECAPTURE MEMBER
930.0	1.85	0.62	63.40	57.40	1.30	3.00	1.70	8.41	0.01	8.40	
950.0	2.44	0.37	59.40	57.40	0.70	0.30	1.00	6.40	0.70	5.70	
981.0	2.38	0.68	53.21	49.20	1.30	0.01	2.70	9.70	0.70	9.00	RECAPTURE MEMBER
987.0	2.30	0.80	72.01	67.00	1.70	0.01	3.30	8.30	0.70	7.60	
1006.0	2.62	0.80	52.70	48.00	2.70	0.70	1.30	8.30	1.30	7.00	
1020.0	1.81	0.72	54.50	47.80	1.70	1.30	3.70	7.30	1.00	6.30	RECAPTURE MEMBER
1037.0	2.39	0.60	61.01	55.60	1.70	0.01	3.70	6.70	0.70	6.00	

Table 2. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ROCK FRAGS	VOLCANIC IGNEOUS	PLUTONIC IGNEOUS	META- MORPHIC	SEDIMENTARY	ALT & DEFM	ACCESSORY MINERALS	TOTAL FRAMEWORK	FORMATION MEMBER
S-1 SAMPLES									
541.0	1.30	1.30	0.00	0.00	0.00	0.00	0.02	33.73	BRUSHY BASIN MEMBER
559.0	1.10	5.40	5.00	0.30	0.70	2.70	0.01	78.71	
560.0	7.32	3.01	1.30	0.00	0.01	3.00	0.71	61.41	
579.0	8.02	3.01	3.00	1.00	0.01	1.00	0.02	64.42	WESTWATER CANYON MEMBER
594.0	4.01	4.31	2.00	0.00	0.00	1.70	0.02	67.12	
615.0	16.30	8.00	1.00	0.30	0.30	6.70	0.31	67.01	
636.0	14.40	5.00	2.00	0.00	0.70	6.70	0.02	73.03	
667.0	8.30	5.30	1.00	0.00	0.30	1.30	0.31	67.11	
677.0	4.71	3.00	0.70	0.30	0.01	0.70	0.02	69.32	
726.0	7.91	4.30	1.00	0.30	0.01	2.30	0.01	65.42	
782.0	3.31	2.71	0.00	0.00	0.30	0.30	0.02	65.02	
810.0	3.32	2.01	0.70	0.30	0.01	0.30	0.02	64.12	
820.0	1.62	1.01	0.30	0.00	0.01	0.30	0.02	60.83	
846.0	3.61	3.31	0.30	0.00	0.00	0.00	0.02	71.73	RECAPTURE MEMBER
861.0	3.72	2.31	0.70	0.70	0.01	0.00	0.01	69.31	
866.0	0.91	0.30	0.30	0.30	0.01	0.00	0.01	57.71	
881.0	6.42	1.71	0.70	0.00	0.01	4.00	0.02	69.13	
891.0	3.32	1.31	1.70	0.30	0.01	0.00	0.01	68.62	
918.0	4.01	2.00	0.00	0.00	0.01	2.00	0.30	54.00	
930.0	4.61	2.01	0.30	0.30	1.70	0.30	0.01	76.41	
950.0	3.32	1.31	0.00	0.00	0.01	2.00	0.31	69.41	
981.0	2.91	1.31	0.30	0.00	0.30	1.00	0.71	66.52	
987.0	3.62	2.01	0.01	0.30	0.30	1.00	0.02	83.93	
1006.0	2.32	1.01	0.00	0.30	0.01	1.00	0.01	63.31	
1020.0	12.91	4.60	1.00	0.30	0.01	7.00	0.02	74.72	
1037.0	3.31	2.30	0.30	0.00	0.01	0.70	0.31	71.32	

Table 2. (cont.)

SAMPLE DEPTH (FEET)	MATRIX	TOTAL CEMENTS	SILICA	CARBONATE	KAOLINITE	BARITE	ANHYDRITE	AUTHIGENIC POTASSIUM FELDSPAR	PYRITE	OTHER CEMENTS	FORMATION MEMBER
S-1 SAMPLES											
541.0	64.00	2.30	0.00	2.30	0.01	0.00	0.00	0.00	0.00	0.00	BRUSHY BASIN MEMBER
559.0	4.30	5.30	0.01	0.00	2.30	0.00	0.00	3.00	0.00	0.01	
560.0	5.70	2.90	0.01	0.00	1.30	0.00	0.00	1.60	0.00	0.00	
579.0	3.00	4.30	0.01	0.01	2.30	0.00	0.00	2.00	0.00	0.00	
594.0	4.30	5.00	0.00	0.00	2.70	0.00	0.00	2.30	0.00	0.01	
615.0	8.70	3.00	0.00	0.00	1.70	0.00	0.00	1.30	0.00	0.00	
636.0	5.70	6.70	0.01	0.01	5.00	0.00	0.00	1.70	0.00	0.00	
667.0	2.30	6.70	0.01	0.01	4.00	0.00	0.00	2.70	0.01	0.00	
677.0	1.30	4.00	0.01	0.01	2.30	0.00	0.00	1.70	0.00	0.00	
726.0	24.00	0.30	0.01	0.00	0.30	0.00	0.00	0.00	0.00	0.00	
782.0	0.30	1.70	0.00	0.00	0.70	0.00	0.00	1.00	0.00	0.00	
810.0	29.30	0.30	0.00	0.01	0.30	0.00	0.00	0.00	0.00	0.00	
820.0	18.30	1.30	0.01	0.01	0.30	0.00	0.00	1.00	0.00	0.00	
846.0	0.00	1.30	0.01	0.30	0.30	0.00	0.00	0.70	0.00	0.00	
861.0	0.30	3.70	0.01	1.30	1.70	0.00	0.00	0.70	0.00	0.00	
866.0	39.30	2.00	0.01	1.70	0.30	0.00	0.00	0.30	0.00	0.00	
881.0	9.30	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
891.0	0.00	1.70	0.01	0.01	0.70	0.01	0.00	1.00	0.01	0.00	
918.0	13.00	17.00	0.01	16.70	0.00	0.30	0.00	0.00	0.01	0.00	
930.0	0.30	21.00	0.01	21.00	0.00	0.00	0.00	0.00	0.00	0.00	
950.0	0.70	4.90	0.30	3.30	0.01	0.00	0.00	1.30	0.00	0.00	
981.0	0.70	25.70	0.00	25.70	0.00	0.01	0.01	0.00	0.00	0.00	
987.0	2.00	6.70	0.01	6.00	0.00	0.01	0.70	0.00	0.00	0.00	
1006.0	5.00	13.70	0.01	12.70	0.00	0.00	1.00	0.00	0.00	0.00	
1020.0	4.00	1.70	0.01	1.70	0.00	0.01	0.01	0.00	0.00	0.00	
1037.0	1.70	1.30	0.00	1.00	0.00	0.00	0.01	0.30	0.00	0.00	
RECAPTURE MEMBER											

WESTWATER
CANYON
MEMBERRECAPTURE
MEMBER

Table 2-. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ALTERATION PRODUCTS	TOTAL NON- FRAMEWORK	POROSITY	FORMATION MEMBER
BRUSHY BASIN MEMBER				
541.0	0.01	66.31	0.01	
559.0	3.30	12.90	14.70	
560.0	2.00	10.60	28.00	
579.0	2.90	10.20	25.70	
594.0	1.90	11.20	21.70	
615.0	0.70	12.40	20.00	
636.0	2.30	14.70	15.00	
667.0	1.60	10.60	22.30	
677.0	1.70	7.00	23.70	
726.0	0.30	24.60	10.00	
782.0	0.30	2.30	32.70	
810.0	0.60	30.20	5.70	
820.0	0.30	19.60	19.30	
846.0	0.30	1.60	26.70	
861.0	2.00	6.00	24.70	
866.0	0.30	41.60	0.70	
881.0	0.30	9.61	21.30	
891.0	2.70	4.40	27.00	
918.0	0.01	30.01	11.00	
930.0	0.30	21.60	2.00	
950.0	0.70	6.30	24.00	
981.0	1.40	27.80	5.70	
987.0	2.10	10.40	15.70	
1006.0	0.01	18.71	18.00	
1020.0	0.60	6.30	25.00	
1037.0	0.01	3.01	25.70	
WESTWATER CANYON MEMBER				
RECAPTURE MEMBER				

Table 3. Computer-generated table of selected textural and compositional data from the Upper Jurassic Morrison Formation, hole S-3, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico

SAMPLE DEPTH (FEET)	PHI MEAN	SORTING INDEX (PHI)	TOTAL QUARTZ	MONOXTAL QUARTZ	POLYXTAL QUARTZ	CRYPTOXITAL QUARTZ	METAMORPHIC QUARTZ	TOTAL FELDSPAR	PLAGIOCLASE FELDSPAR	FORMATION MEMBER
S-3 SAMPLES										
1645.0	2.61	0.51	41.70	34.00	2.70	2.30	2.70	12.00	5.30	BRUSHY BASIN MEMBER
1679.0	3.08	0.64	17.61	17.00	0.30	0.01	0.30	11.31	5.00	
1681.0	2.77	0.80	33.00	29.10	1.30	0.30	2.30	12.30	1.70	
1714.0	1.50	0.85	26.40	22.70	1.30	0.70	1.70	7.60	1.30	
1724.0	2.35	0.55	50.41	43.40	2.30	0.01	4.70	12.60	2.30	WESTWATER CANYON MEMBER
1738.0	0.37	2.94	36.40	33.70	1.70	0.00	1.00	16.30	3.30	
1783.0	1.14	0.75	40.00	35.00	3.70	0.30	1.00	19.60	7.00	
1798.0	1.72	0.52	52.01	44.40	4.30	0.01	3.30	12.30	2.30	
1808.0	1.01	0.87	47.91	40.90	2.00	0.01	5.00	10.00	3.00	
1833.0	1.38	0.64	43.00	36.00	3.30	0.00	3.70	16.31	3.30	
1855.0	1.25	0.73	53.61	44.30	4.00	0.01	5.30	11.00	2.30	
1863.0	1.62	0.97	53.60	43.70	2.30	0.30	7.30	11.60	3.30	
1864.0	2.14	0.56	55.11	47.10	4.00	0.01	4.00	12.00	1.70	
1866.5	1.42	0.78	46.00	40.00	1.70	0.30	4.00	11.00	2.00	
1868.0	1.14	0.93	42.50	35.20	4.00	0.30	3.00	14.60	2.00	
1874.0	2.03	0.59	47.91	39.90	3.70	0.01	4.30	16.00	5.00	
1882.0	1.44	0.85	55.80	50.10	2.70	0.00	3.00	12.30	3.30	
1892.0	1.16	0.53	49.60	38.60	4.00	0.30	6.70	13.70	4.70	
1905.0	1.13	0.72	39.81	33.80	3.30	0.01	2.70	16.40	3.00	
1916.0	1.26	0.71	44.20	39.50	3.70	0.30	0.70	19.30	7.00	
1939.5	1.79	0.73	38.00	35.70	1.00	0.30	1.00	7.30	1.30	
1943.0	1.57	0.83	41.80	37.10	2.30	0.70	1.70	12.60	0.30	
1957.0	1.45	0.78	55.11	51.10	2.00	0.01	2.00	7.00	2.00	
1978.0	2.61	0.63	53.80	47.50	3.00	1.30	2.00	12.60	2.30	
2005.0	2.44	0.49	48.41	42.70	3.00	0.01	2.70	15.70	4.00	
2016.0	2.28	0.80	54.70	51.40	2.30	0.00	1.00	13.70	2.00	RECAPTURE MEMBER
2046.0	2.27	0.68	46.10	41.40	1.70	0.00	3.00	9.70	2.00	
2059.0	2.02	0.84	46.30	40.30	3.30	0.70	2.00	12.70	3.70	
2074.0	2.46	0.58	49.71	43.10	4.30	0.01	2.30	12.01	5.30	
2101.0	2.55	0.74	59.31	56.60	2.00	0.01	0.70	11.30	2.00	
2114.0	2.08	0.65	63.71	62.40	0.30	0.01	1.00	4.30	1.00	
2155.0	2.23	0.66	58.90	55.60	0.70	0.30	2.30	6.60	1.00	
2169.0	2.61	0.80	57.71	53.40	2.30	0.01	2.00	4.70	0.00	

Table 3. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ROCK FRAGS	VOLCANIC IGNEOUS	PLUTONIC IGNEOUS	META- MORPHIC	SEDIMENTARY	ALT & DEPM	ACCESSORY MINERALS	TOTAL FRAMEWORK	FORMATION MEMBER
S-3 SAMPLES									
1645.0	6.01	5.00	0.70	0.30	0.01	0.00	0.02	59.72	BRUSHY BASIN MEMBER
1679.0	1.30	1.30	0.00	0.00	0.00	0.00	0.01	30.22	
1681.0	5.01	4.01	0.70	0.00	0.00	0.30	0.02	50.32	
1714.0	3.70	2.40	1.00	0.30	0.00	0.00	0.01	37.71	
1724.0	7.02	5.71	0.30	0.01	0.00	1.00	0.02	70.03	WESTWATER CANYON MEMBER
1738.0	28.40	3.00	0.70	0.00	19.00	5.70	0.01	81.11	
1783.0	10.70	5.00	1.70	2.00	0.30	1.70	0.01	70.31	
1798.0	6.00	2.30	2.00	0.70	1.00	0.00	0.01	70.32	
1808.0	4.40	1.00	1.70	1.00	0.70	0.00	0.01	62.32	
1833.0	12.10	5.00	2.70	0.00	0.70	3.70	0.01	71.41	
1855.0	12.40	4.70	2.30	1.70	0.70	3.00	2.31	79.32	
1863.0	13.30	5.00	3.30	2.30	0.70	2.00	0.31	78.81	
1864.0	6.91	4.01	1.30	0.00	0.30	1.30	0.02	74.03	
1866.5	12.60	3.60	5.00	1.00	1.00	2.00	0.02	69.62	
1868.0	18.00	6.70	5.30	0.30	3.70	2.00	0.02	75.12	
1874.0	14.00	6.00	1.70	0.30	1.30	4.70	0.31	78.22	
1882.0	10.70	4.00	4.70	0.70	0.30	1.00	0.02	78.82	
1892.0	9.00	2.30	3.00	2.70	0.70	0.30	0.02	72.32	
1905.0	15.70	6.00	4.70	1.00	4.00	0.00	0.01	71.92	RECAPTURE MEMBER
1916.0	12.00	6.70	2.30	0.70	1.00	1.30	0.01	75.51	
1939.5	2.00	1.30	0.70	0.00	0.00	0.00	0.01	47.31	
1943.0	4.70	1.60	1.70	0.70	0.70	0.00	0.60	59.70	
1957.0	7.00	3.30	2.30	0.00	0.70	0.70	0.00	68.11	
1978.0	5.61	3.00	0.01	0.00	2.30	0.30	0.71	72.71	
2005.0	12.30	6.30	0.70	0.30	1.00	4.00	0.02	76.53	
2016.0	3.01	2.31	0.70	0.00	0.00	0.00	1.00	72.40	
2046.0	5.33	3.71	0.30	0.01	0.01	1.30	0.01	61.11	
2059.0	11.91	8.60	3.30	0.01	0.00	0.00	0.02	70.92	
2074.0	4.31	2.31	1.00	0.00	0.30	0.70	0.02	66.03	
2101.0	4.41	3.40	1.00	0.00	0.01	0.00	0.02	75.03	
2114.0	2.70	2.00	0.70	0.00	0.00	0.00	0.01	70.72	
2155.0	3.30	2.00	0.30	0.00	0.70	0.30	0.01	68.81	
2169.0	4.02	3.00	0.01	0.00	0.01	1.00	0.02	66.43	

Table 3. (cont.)

SAMPLE DEPTH (FEET)	MATRIX	TOTAL CEMENTS	SILICA	CARBONATE	KAOLINITE	BARITE	ANHYDRITE	AUTHIGENIC POTASSIUM FELDSPAR	PYRITE	OTHER CEMENTS	FORMATION MEMBER
S-3 SAMPLES											
1645.0	26.00	12.60	0.00	10.30	2.00	0.01	0.00	0.30	0.01	0.00	BRUSHY BASIN MEMBER
1679.0	67.30	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	
1681.0	39.00	10.40	0.01	9.70	0.70	0.00	0.00	0.00	0.01	0.00	
1714.0	57.30	3.60	0.00	0.00	0.30	0.00	0.00	0.00	3.30	0.00	
1724.0	2.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	WESTWATER CANYON MEMBER
1738.0	9.30	2.30	0.00	0.00	2.30	0.00	0.00	0.00	0.01	0.00	
1783.0	0.30	12.00	0.01	8.00	1.30	0.00	0.00	2.70	0.01	0.00	
1798.0	0.00	3.30	0.00	0.00	1.30	0.00	0.00	2.00	0.01	0.00	
1808.0	12.70	2.00	0.01	0.00	1.70	0.00	0.00	0.30	0.01	0.00	RECAPTURE MEMBER
1833.0	0.30	8.00	0.01	3.00	3.70	0.00	0.00	1.00	0.30	0.00	
1855.0	1.30	4.70	0.70	0.00	2.30	0.00	0.00	1.70	0.01	0.00	
1863.0	2.30	0.60	0.01	0.01	0.30	0.00	0.00	0.30	0.01	0.00	
1864.0	2.40	3.00	0.00	0.00	0.00	0.00	0.00	2.00	1.00	0.00	RECAPTURE MEMBER
1866.5	1.70	5.00	0.00	2.70	1.00	0.00	0.00	1.00	0.30	0.00	
1868.0	1.30	3.60	0.00	0.30	1.00	0.00	0.00	2.30	0.01	0.00	
1874.0	3.00	1.40	0.00	0.00	0.70	0.00	0.00	0.70	0.00	0.00	
1882.0	1.00	5.10	0.00	0.70	1.70	0.00	0.00	2.70	0.01	0.00	RECAPTURE MEMBER
1892.0	1.70	10.70	0.01	6.30	0.70	0.00	0.00	3.70	0.00	0.00	
1905.0	1.00	5.70	0.00	2.70	1.30	0.00	0.00	1.70	0.01	0.00	
1916.0	2.70	2.10	0.00	0.70	0.70	0.00	0.00	0.70	0.01	0.00	
1939.5	49.20	0.60	0.00	0.00	0.30	0.00	0.00	0.30	0.00	0.00	RECAPTURE MEMBER
1943.0	33.30	2.00	0.00	0.00	1.30	0.00	0.00	0.70	0.00	0.00	
1957.0	1.00	9.30	0.01	0.70	3.00	0.00	0.00	5.30	0.30	0.00	
1978.0	18.00	0.30	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	
2005.0	3.30	0.30	0.01	0.30	0.00	0.00	0.00	0.30	0.00	0.00	RECAPTURE MEMBER
2016.0	20.70	1.30	0.00	1.30	0.00	0.01	0.00	0.00	0.00	0.00	
2046.0	0.30	0.30	0.01	0.00	0.30	0.00	0.00	0.01	0.00	0.00	
2059.0	0.70	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.00	
2074.0	2.00	3.70	0.01	0.00	0.30	0.00	0.00	2.70	0.01	0.00	RECAPTURE MEMBER
2101.0	7.00	12.30	0.00	12.30	0.00	0.01	0.00	0.00	0.00	0.00	
2114.0	0.00	22.00	0.00	22.00	0.01	0.01	0.01	0.00	0.01	0.00	
2155.0	4.30	9.60	0.00	9.30	0.30	0.01	0.00	0.00	0.01	0.00	
2169.0	2.30	2.60	0.00	2.30	0.30	0.00	0.00	0.01	0.01	0.00	

Table 3. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ALTERATION PRODUCTS	TOTAL NON- FRAMEWORK	POROSITY	FORMATION MEMBER
S-3 SAMPLES				
1645.0	0.01	38.61	1.70	BRUSHY BASIN MEMBER
1679.0	1.20	68.51	1.30	
1681.0	0.01	49.41	0.30	
1714.0	1.00	61.90	0.70	
1724.0	0.30	2.31	27.70	
1738.0	1.00	12.60	6.30	
1783.0	0.70	13.00	16.70	
1798.0	2.40	5.70	24.00	
1808.0	5.00	19.70	18.00	
1833.0	2.30	10.60	16.70	
1855.0	2.00	8.00	17.00	WESTWATER CANYON MEMBER
1863.0	3.00	5.90	15.30	
1864.0	1.90	7.30	18.70	
1866.5	5.00	11.70	18.70	
1868.0	3.00	7.90	17.00	
1874.0	0.70	5.10	16.70	
1882.0	2.40	8.50	12.70	
1892.0	1.60	14.00	13.70	
1905.0	1.40	8.10	19.70	
1916.0	4.00	8.80	15.70	
1939.5	0.60	50.40	2.30	RECAPTURE MEMBER
1943.0	2.00	37.30	3.00	
1957.0	2.30	12.60	18.30	
1978.0	1.00	19.30	8.00	
2005.0	0.30	3.90	19.70	
2016.0	1.30	23.30	4.30	
2046.0	0.30	0.90	38.00	
2059.0	0.70	1.41	27.70	
2074.0	2.00	7.70	26.30	
2101.0	0.01	19.31	5.70	
2114.0	0.30	22.30	7.00	
2155.0	0.01	13.91	17.30	
2169.0	0.00	4.90	28.70	

Table 4. Computer-generated table of selected textural and compositional data from the Upper Jurassic Morrison Formation, hole S-4, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico.

SAMPLE DEPTH (FEET)	PHI MEAN	SORTING INDEX (PHI)	TOTAL QUARTZ	MONOXTAL QUARTZ	POLYXTAL QUARTZ	CRYPTOXITAL QUARTZ	METAMORPHIC		TOTAL FELDSPAR	PLAGIOCLASE	POTASSIUM FELDSPAR	FORMATION MEMBER
							QUARTZ	QUARTZ				

S-4 SAMPLES												
1779.0	2.48	0.76	28.71	27.00	0.70	0.01	1.00	7.00	1.30	5.70	BRUSHY BASIN MEMBER	
1807.0	3.37	0.80	32.41	31.10	1.00	0.01	0.30	8.70	0.70	8.00		
1878.0	1.52	1.01	41.80	36.10	2.00	0.70	3.00	6.70	1.00	5.70		
● 1900.0	1.50	0.69	53.31	48.00	2.30	0.01	3.00	9.30	2.00	7.30		
● 1909.0	1.00	0.76	42.71	37.40	2.30	0.01	3.00	12.01	1.30	10.71		
● 1917.0	0.92	1.05	45.51	36.90	4.30	0.30	4.30	11.60	1.30	10.30		
● 1928.0	1.59	0.66	59.20	52.60	3.00	0.30	2.30	10.60	1.30	9.30		
● 1933.0	0.98	0.97	50.70	46.10	2.30	0.00	2.30	14.40	3.70	10.70		
● 1939.0	1.47	0.66	46.80	42.20	3.00	0.30	1.30	14.30	2.30	12.00		
1964.0	0.33	1.12	34.30	24.00	4.30	0.30	5.70	20.00	2.30	17.70		
1972.0	1.73	0.68	36.91	33.90	1.00	0.01	2.00	17.70	6.70	11.00		
1981.0	0.87	0.88	46.71	40.70	2.70	0.01	3.30	18.00	1.30	16.70		
1990.0	1.29	0.86	31.71	27.70	3.00	0.01	1.00	20.01	6.30	13.71		
2005.0	2.21	0.71	55.00	53.40	1.00	0.30	0.30	14.70	4.00	10.70		
2027.0	1.45	0.67	42.00	36.30	3.70	0.30	1.70	18.30	4.70	13.60		
2030.0	1.91	0.71	55.90	50.20	2.70	0.00	3.00	15.40	1.70	13.70		
2041.0	1.67	0.72	46.21	41.80	1.70	0.01	2.70	11.50	0.50	11.00		
2055.0	1.70	0.60	60.50	52.90	2.30	0.30	5.00	10.60	2.30	8.30		
2071.0	1.84	0.79	51.31	45.00	3.00	0.01	3.30	13.40	3.70	9.70		
2087.0	1.28	0.90	41.80	37.20	3.30	0.30	1.00	19.30	5.30	14.00		
2099.0	2.18	0.73	52.90	46.20	3.70	0.30	2.70	12.40	3.70	8.70		
2123.0	1.91	0.72	60.70	52.40	5.00	0.30	3.00	17.40	3.70	13.70		
2137.0	2.30	0.68	55.10	49.50	2.30	0.30	3.00	14.70	2.70	12.00		
2159.0	0.93	0.89	40.10	34.50	1.30	0.30	4.00	21.30	3.30	18.00		
2176.0	2.29	0.60	61.11	53.80	3.00	0.01	4.30	13.90	4.30	9.60		
2186.0	0.51	1.74	29.81	24.20	2.30	0.01	3.30	11.70	2.00	9.70		
2204.0	1.75	0.96	57.41	53.70	1.00	0.01	2.70	16.01	3.30	10.71		
2214.0	2.38	0.59	57.20	53.20	1.30	0.00	2.70	10.00	3.70	6.30		
2232.0	2.20	0.69	52.30	48.00	1.30	0.00	3.00	11.70	2.00	9.70		
2259.0	2.37	0.69	56.50	48.20	1.30	0.30	6.70	10.40	1.70	8.70		
2249.0	2.93	0.53	55.91	51.20	1.70	0.01	3.00	11.00	2.70	8.30		
2265.0	2.28	0.66	48.81	43.10	2.00	0.01	3.70	12.31	1.30	11.01		
2280.0	2.35	0.70	60.70	55.70	1.70	0.30	3.00	9.30	2.00	5.30		
2293.0	2.80	0.98	59.01	56.00	1.00	0.01	2.00	7.30	0.70	8.60		
2308.0	2.05	0.70	59.40	54.10	1.00	1.00	3.30	6.30	0.30	6.00		
RECAPTURE MEMBER												

Table 4. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ROCK FRAGS	VOLCANIC IGNFOUS	PLUTONIC IGNFOUS	META- MORPHIC	SEDIMENTARY	UNKNOWN ALT & DEFM	ACCESSORY MINERALS	TOTAL FRAMEWORK	FORMATION MEMBER
S-4 SAMPLES									
1779.0	1.32	1.31	0.00	0.00	0.01	0.00	0.02	37.03	BRUSHY BASIN MEMBER
1807.0	1.32	1.31	0.00	0.00	0.01	0.00	0.02	42.43	
1878.0	6.61	3.30	3.30	0.00	0.01	0.00	0.00	55.10	
1900.0	9.00	2.60	2.00	0.70	3.00	0.70	0.01	71.62	WESTWATER CANYON MEMBER
1909.0	17.30	4.00	5.30	0.70	4.00	3.30	0.01	72.02	
1917.0	12.60	4.60	5.00	1.00	0.30	1.70	0.01	69.72	
1928.0	5.30	3.00	1.70	0.00	0.30	0.30	0.02	74.12	
1933.0	4.61	1.60	1.00	0.70	0.01	1.30	0.01	69.71	
1939.0	9.01	5.70	1.30	0.00	0.01	2.00	0.02	70.12	
1964.0	19.70	4.70	12.00	0.70	1.30	1.00	0.01	74.01	
1972.0	8.80	6.40	0.70	0.70	0.30	0.70	0.00	63.41	
1981.0	11.30	5.00	4.00	0.30	0.30	1.70	0.01	76.02	
1998.0	30.71	5.01	4.00	0.00	4.00	17.70	0.02	82.43	
2006.0	7.31	2.30	1.00	0.00	0.01	4.00	0.31	77.31	RECAPTURE MEMBER
2027.0	16.71	9.40	3.70	0.30	0.01	3.30	0.01	77.01	
2030.0	4.71	2.00	1.00	0.00	0.01	1.70	0.01	76.01	
2041.0	19.30	5.30	4.70	0.30	0.30	8.70	0.01	77.02	
2055.0	5.01	3.00	0.70	0.00	0.01	1.30	0.01	76.11	
2071.0	9.10	6.00	1.70	0.70	0.00	0.70	0.31	74.12	
2087.0	11.20	4.60	3.30	0.30	1.00	2.00	0.02	72.32	
2099.0	7.12	4.71	0.70	0.01	0.00	1.70	0.02	72.42	
2123.0	4.72	4.00	0.00	0.01	0.01	0.70	0.31	83.11	
2137.0	10.60	2.30	1.00	0.00	0.30	7.00	0.31	80.71	
2159.0	17.31	10.00	4.30	0.70	0.01	2.30	0.02	78.72	RECAPTURE MEMBER
2176.0	3.30	3.00	0.30	0.00	0.00	0.00	0.02	72.33	
2186.0	35.71	2.00	1.70	0.00	0.01	32.00	0.01	77.22	
2204.0	12.00	5.00	1.00	0.70	0.30	5.00	0.31	85.72	
2214.0	2.31	2.01	0.30	0.00	0.00	0.00	0.61	70.11	
2232.0	5.30	1.30	0.70	0.00	0.30	3.00	0.02	65.32	
2239.0	6.20	1.60	0.30	0.00	0.30	4.00	0.01	73.11	
2249.0	2.60	1.60	0.70	0.00	0.00	0.30	0.90	70.41	
2265.0	11.61	4.60	0.00	0.00	0.01	7.00	0.60	73.31	
2280.0	1.31	1.00	0.01	0.00	0.00	0.30	0.01	69.31	
2293.0	1.72	0.71	1.00	0.00	0.01	0.00	0.01	70.02	RECAPTURE MEMBER
2308.0	3.01	3.00	0.01	0.00	0.00	0.00	0.01	68.71	

Table 4. (cont.)

SAMPLE DEPTH (FEET)	MATRIX	TOTAL CEMENTS	SILICA	CARBONATE	KAOLINITE	BARITE	ANHYDRITE	AUTHIGENIC POTASSIUM FELDSPAR	PYRITE	OTHER CEMENTS	FORMATION MEMBER
S-4 SAMPLES											
1779.4	62.70	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	BRUSHY BASIN MEMBER
1807.0	57.30	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
1878.0	3.00	10.30	0.01	0.00	0.00	0.00	0.00	0.30	10.00	0.00	
● 1900.0	0.70	2.00	0.00	0.00	0.30	0.00	0.00	0.30	0.00	0.00	WESTWATER CANYON MEMBER
● 1909.0	4.00	3.00	0.01	0.00	1.30	0.00	0.00	1.70	0.01	0.00	
● 1917.0	2.00	3.40	0.00	0.00	2.70	0.00	0.00	0.70	0.01	0.00	
● 1928.0	1.30	2.70	0.01	0.00	1.70	0.00	0.00	1.00	0.00	0.00	
● 1933.0	2.00	12.70	0.01	11.30	0.70	0.00	0.00	0.70	0.01	0.00	
● 1939.0	1.00	4.60	1.00	0.00	1.30	0.00	0.00	2.30	0.00	0.00	
1964.0	1.00	3.00	0.01	0.00	1.70	0.00	0.00	1.30	0.00	0.00	
1972.0	25.00	0.30	0.30	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
1981.0	0.00	2.30	0.01	0.00	2.00	0.00	0.00	0.30	0.00	0.01	
1998.0	3.00	2.00	0.01	0.00	1.30	0.00	0.00	0.70	0.00	0.00	
2006.0	0.30	0.30	0.01	0.00	0.00	0.00	0.00	0.30	0.01	0.00	
2027.0	1.30	3.30	0.00	0.01	2.30	0.00	0.00	1.00	0.01	0.00	RECAPTURE MEMBER
2030.0	0.30	1.70	0.01	0.00	0.01	0.00	0.00	1.70	0.01	0.00	
2041.0	0.00	0.90	0.01	0.00	0.30	0.00	0.00	0.30	0.00	0.00	
2055.0	0.00	2.30	0.01	0.00	1.00	0.00	0.00	1.30	0.01	0.00	
2071.0	1.30	0.70	0.00	0.00	0.00	0.00	0.00	0.70	0.01	0.00	
2087.0	1.00	5.00	0.01	0.30	2.70	0.00	0.00	1.30	0.70	0.00	
2099.0	0.00	0.30	0.00	0.00	0.30	0.00	0.00	0.00	0.01	0.00	
2123.0	0.70	0.30	0.01	0.70	0.01	0.00	0.00	0.30	0.01	0.00	
2137.0	3.00	0.30	0.30	0.01	0.01	0.00	0.00	0.00	0.00	0.00	
2159.0	1.00	4.30	0.01	3.70	0.30	0.00	0.00	0.30	0.00	0.00	
2176.0	0.00	1.60	0.01	1.00	0.00	0.00	0.00	0.30	0.30	0.00	
2186.0	0.00	18.70	0.01	18.70	0.00	0.00	0.00	0.00	0.00	0.00	RECAPTURE MEMBER
2204.0	4.70	0.90	0.01	0.30	0.30	0.00	0.00	0.30	0.00	0.00	
2214.0	0.00	0.60	0.01	0.30	0.01	0.00	0.00	0.01	0.30	0.00	
2232.0	0.70	1.60	0.01	0.30	1.00	0.00	0.00	0.30	0.01	0.00	
2239.0	1.00	1.60	0.30	0.01	0.01	0.00	0.00	1.30	0.00	0.00	
2249.0	0.30	1.30	0.01	1.00	0.30	0.00	0.00	0.00	0.00	0.00	
2265.0	5.00	1.30	0.01	0.30	0.01	0.00	0.00	1.00	0.00	0.00	
2280.0	2.00	11.00	0.01	11.00	0.00	0.00	0.01	0.00	0.00	0.00	
2293.0	20.70	0.30	0.01	0.01	0.30	0.00	0.00	0.00	0.00	0.00	
2308.0	1.00	0.60	0.30	0.30	0.00	0.00	0.00	0.01	0.00	0.00	

Table 4. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ALTERATION PRODUCTS	TOTAL NON- FRAMEWORK	POROSITY	FORMATION MEMBER
S-4 SAMPLES				
1779.0	0.30	63.01	0.00	BRUSHY BASIN MEMBER
1807.0	0.30	57.61	0.00	
1878.0	0.30	13.60	4.30	
● 1900.0	0.70	3.40	25.00	
● 1909.0	3.70	10.70	17.30	
● 1917.0	2.30	7.70	23.30	
● 1928.0	0.90	4.90	21.00	
● 1933.0	2.30	17.00	13.30	
● 1939.0	2.30	7.90	22.00	
● 1964.0	4.00	8.00	18.00	
1972.0	2.00	27.30	9.30	WESTWATER CANYON MEMBER
1981.0	3.00	5.30	18.70	
1998.0	0.60	5.60	12.00	
2006.0	1.40	2.00	20.70	
2027.0	3.40	8.00	15.00	
2030.0	1.00	3.00	21.00	
2041.0	0.60	1.50	17.00	
2055.0	1.30	3.60	20.30	
2071.0	0.90	2.90	23.00	
2087.0	3.00	9.00	18.70	
2099.0	1.00	1.30	26.30	RECAPTURE MEMBER
2123.0	0.60	1.60	15.30	
2137.0	0.30	3.60	15.70	
2159.0	3.00	8.30	13.00	
2176.0	1.40	3.00	18.70	
2186.0	1.40	20.10	2.70	
2204.0	1.00	6.60	7.70	
2214.0	1.00	1.60	28.30	
2232.0	2.70	5.00	25.70	
2239.0	0.01	2.61	24.30	
2249.0	0.30	1.90	27.70	
2265.0	1.00	7.30	19.70	
2280.0	0.01	13.01	17.70	
2293.0	0.01	21.01	9.00	
2308.0	0.01	1.61	29.70	

Table 5. Computer-generated table of selected textural and compositional data from the Upper Jurassic Morrison Formation, hole S-5, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico.

SAMPLE DEPTH (FEET)	PHI MEAN	SORTING INDEX (PHI)	TOTAL QUARTZ	MONOTAL QUARTZ	POLYXTAL QUARTZ	CRYPTOTXTAL QUARTZ	METAMORPHIC QUARTZ	TOTAL FELDSPAR	PLAGIOCLASE FELDSPAR	POTASSIUM FELDSPAR	FORMATION MEMBER
S-5 SAMPLES											
2323.0	2.83	1.02	22.60	21.00	1.30	0.00	0.30	5.40	0.70	4.70	BRUSHY BASIN MEMBER
2339.0	2.68	0.68	39.71	38.00	1.00	0.01	0.70	18.40	5.00	9.40	
2359.0	1.88	0.63	68.00	65.30	0.30	0.70	1.70	5.30	0.30	5.00	
2367.0	2.34	0.58	61.10	56.10	1.00	0.30	3.70	6.70	1.70	5.00	
2425.0	2.68	0.74	51.70	50.10	0.30	0.00	1.30	20.00	3.30	16.70	WESTWATER CANYON MEMBER
2439.0	1.19	0.72	55.21	48.50	5.00	0.01	1.70	17.60	4.00	13.60	
2454.0	1.54	0.86	40.80	37.10	1.70	0.30	1.70	17.60	11.00	6.60	
2470.0	1.61	0.63	47.80	43.20	2.30	0.00	2.30	18.60	6.30	12.30	
2477.0	2.12	0.86	53.61	48.90	2.70	0.01	2.00	15.40	4.70	10.70	
2488.0	2.43	0.57	46.51	42.50	1.30	0.01	2.70	18.00	5.30	12.70	
2510.0	1.31	1.06	47.10	43.80	1.00	0.00	2.30	12.30	5.70	6.60	
2533.0	2.69	0.70	35.41	32.80	1.30	0.01	1.30	12.40	4.00	8.40	
2547.0	1.99	0.77	49.00	45.70	1.30	0.00	2.00	22.70	6.70	16.00	
2561.0	1.57	0.82	55.30	51.30	1.00	0.30	2.70	16.60	2.30	14.30	
2587.0	1.95	0.85	46.70	42.70	1.70	0.00	2.30	20.30	4.30	16.00	
2622.0	1.81	0.70	55.60	47.90	3.70	0.70	3.30	15.30	3.70	11.60	
2653.0	1.52	0.51	55.41	45.40	3.00	0.01	3.00	13.00	3.30	9.70	
2683.0	1.53	0.59	59.80	55.80	2.30	0.00	1.70	15.30	4.30	11.00	
2698.0	1.12	0.70	49.41	42.10	4.30	0.01	3.00	17.60	4.30	13.30	
2728.0	2.55	0.55	62.71	59.40	1.00	0.01	2.30	10.70	1.70	9.00	RECAPTURE MEMBER
2759.0	2.23	1.15	58.41	51.70	4.70	0.01	2.00	14.90	3.30	11.60	
2778.0	2.21	0.77	48.71	46.70	1.30	0.01	0.70	15.00	5.30	9.70	
2785.0	2.68	0.75	55.11	52.10	0.30	0.01	2.70	14.00	3.00	11.00	
2802.0	2.50	0.72	59.11	55.40	2.00	0.01	1.70	12.00	2.00	10.00	
2824.0	2.59	0.65	58.80	51.20	0.70	0.60	2.30	6.00	2.00	4.00	
2849.0	2.39	0.68	63.00	59.00	1.00	0.30	2.70	6.70	0.70	6.00	

Table 5. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ROCK FRAGS	VOLCANIC IGNEOUS	PLUTONIC IGNEOUS	META- MORPHIC	SEDIMENTARY	UNKNOWN ALT & DEFM	ACCESSORY MINERALS	TOTAL FRAMEWORK	FORMATION MEMBER
S-5 SAMPLES									
2323.0	1.00	0.70	0.30	0.00	0.00	0.00	0.01	29.01	BRUSHY BASIN MEMBER
2339.0	3.31	2.31	1.00	0.00	0.00	0.00	0.02	57.43	
2359.0	1.72	1.70	0.00	0.01	0.01	0.00	0.01	75.01	
2367.0	2.32	2.01	0.01	0.30	0.00	0.00	0.02	70.12	
2425.0	15.32	5.01	0.30	0.00	0.01	10.00	0.01	87.01	WESTWATER CANYON MEMBER
2439.0	6.63	3.31	3.00	0.01	0.01	0.30	0.01	79.42	
2454.0	12.02	6.70	3.00	0.01	0.01	2.30	0.02	70.42	
2470.0	7.91	3.60	2.70	0.30	0.01	1.30	0.01	74.31	
2477.0	4.61	2.01	1.30	0.00	0.30	1.00	0.02	73.63	
2488.0	5.31	4.30	0.30	0.01	0.00	0.70	0.31	70.12	
2510.0	7.31	4.01	3.00	0.00	0.00	0.30	0.01	66.71	
2533.0	3.62	1.01	1.30	0.00	0.01	1.30	0.02	51.43	
2547.0	6.00	5.30	0.70	0.00	0.00	0.00	0.02	77.72	
2561.0	8.00	3.30	4.00	0.00	0.00	0.70	0.00	79.90	
2587.0	10.71	5.00	1.70	0.30	0.01	3.70	0.01	77.71	
2622.0	9.41	5.40	2.70	0.00	0.01	1.30	0.01	80.31	
2653.0	7.00	3.00	2.70	0.30	0.00	1.00	0.01	75.42	RECAPTURE MEMBER
2683.0	3.61	1.60	1.00	0.70	0.01	0.30	0.01	78.71	
2698.0	7.71	2.70	2.00	0.01	0.00	3.00	0.01	74.72	
2728.0	2.30	1.70	0.30	0.00	0.00	0.30	0.02	75.73	
2759.0	7.31	2.71	1.30	0.00	2.00	1.30	0.30	80.91	
2778.0	5.00	1.30	1.70	0.00	0.00	2.00	0.02	68.73	
2785.0	3.90	2.60	0.70	0.30	0.00	0.30	0.02	73.03	
2802.0	5.31	4.00	1.00	0.00	0.01	0.30	0.31	76.72	
2824.0	1.60	1.30	0.00	0.00	0.00	0.30	0.01	62.41	
2849.0	4.01	3.00	0.00	0.00	0.01	1.00	0.31	74.01	

Table 5. (cont.)

SAMPLE DEPTH (FEET)	MATRIX	TOTAL CEMENTS	SILICA	CARBONATE	KAOLINITE	BARITE	ANHYDRITE	AUTHIGENIC POTASSIUM FELDSPAR	PYRITE	OTHER CEMENTS	FORMATION MEMBER
S-5 SAMPLES											
2323.0	70.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	BRUSHY BASIN MEMBER
2339.0	33.60	5.60	0.01	2.30	3.30	0.00	0.01	0.00	0.00	0.00	
2359.0	0.00	12.30	0.01	0.00	12.00	0.00	0.00	0.30	0.00	0.00	
2367.0	0.00	9.60	0.00	0.00	9.30	0.00	0.00	0.30	0.00	0.00	
2425.0	0.00	0.70	0.00	0.00	0.70	0.00	0.00	0.00	0.01	0.00	WESTWATER CANYON MEMBER
2439.0	0.00	3.00	1.70	0.00	0.30	0.00	0.00	1.00	0.00	0.00	
2454.0	2.00	15.60	0.00	15.30	0.00	0.00	0.01	0.30	0.01	0.00	
2470.0	2.30	1.00	0.01	0.00	0.01	0.00	0.00	1.00	0.00	0.00	
2477.0	20.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RECAPTURE MEMBER
2488.0	4.30	1.30	0.01	0.01	0.00	0.00	0.00	1.30	0.00	0.00	
2510.0	3.30	9.00	0.01	8.70	0.00	0.00	0.01	0.30	0.00	0.00	
2533.0	47.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
2547.0	1.70	0.30	0.30	0.01	0.00	0.00	0.00	0.01	0.00	0.00	
2561.0	2.70	1.40	0.00	0.00	0.70	0.00	0.00	0.01	0.00	0.00	
2587.0	0.30	2.00	0.01	0.00	0.01	0.00	0.00	0.70	0.01	0.00	
2622.0	2.70	2.00	0.00	0.30	0.00	0.00	0.00	2.00	0.00	0.00	
2653.0	0.00	2.30	0.00	0.01	0.01	0.00	0.01	1.70	0.00	0.00	
2683.0	1.30	2.30	0.30	0.01	0.01	0.00	0.00	2.30	0.00	0.00	
2698.0	5.30	1.00	0.01	0.70	0.00	0.01	0.01	2.00	0.01	0.00	
2728.0	0.30	0.70	0.01	0.70	0.00	0.00	0.00	0.30	0.00	0.00	
2759.0	2.00	0.70	0.01	0.01	0.00	0.01	0.01	0.70	0.00	0.00	
2778.0	3.00	10.00	0.01	9.00	0.00	0.00	0.70	0.50	0.00	0.00	
2785.0	0.70	22.30	0.01	1.00	0.00	4.30	17.00	0.00	0.00	0.00	
2802.0	4.00	4.00	0.01	2.00	0.00	0.01	4.00	1.00	0.00	0.00	
2824.0	1.70	1.60	0.00	1.30	0.00	0.00	0.00	0.30	0.00	0.00	
2849.0	1.70	2.30	0.00	1.30	0.00	0.00	0.01	0.70	0.30	0.00	

Table 5. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ALTERATION PRODUCTS	TOTAL NON- FRAMEWORK	POROSITY	FORMATION MEMBER
2323.0	0.70	71.00	0.00	BRUSHY BASIN MEMBER
2339.0	0.70	39.90	2.70	
2359.0	0.01	12.31	12.70	
2367.0	0.01	9.61	20.30	
2425.0	0.30	1.00	9.30	
2439.0	1.30	4.30	16.30	WESTWATER CANYON MEMBER
2454.0	1.70	19.30	10.30	
2470.0	0.70	4.00	21.70	
2477.0	0.70	20.71	5.70	
2488.0	1.00	6.60	23.30	
2510.0	4.00	16.30	17.00	
2533.0	0.60	47.61	1.00	
2547.0	1.30	3.30	19.00	
2561.0	1.00	5.10	15.00	
2587.0	0.30	2.60	19.70	
2622.0	0.70	5.40	14.30	RECAPTURE MEMBER
2653.0	1.00	3.30	21.30	
2683.0	1.00	4.60	16.70	
2698.0	2.30	8.60	16.70	
2728.0	0.01	1.01	23.30	
2759.0	0.70	3.40	15.70	
2778.0	0.01	13.01	18.30	
2785.0	1.30	24.30	2.70	
2802.0	2.00	10.00	13.30	
2824.0	0.30	3.60	34.00	
2849.0	0.01	4.01	22.00	

Table 6. Computer-generated table of selected textural and compositional data from the Upper Jurassic Morrison Formation, hole S-6, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico.

SAMPLE DEPTH (FEET)	PHI MEAN	SORTING INDEX (PHI)	TOTAL QUARTZ	MONOXTAL QUARTZ	POLYXTAL QUARTZ	CRYPTOXTAL QUARTZ	METAMORPHIC QUARTZ	TOTAL FELDSPAR	PLAGIOCLASE FELDSPAR	POTASSIUM FELDSPAR	FORMATION MEMBER

S-6 SAMPLES											
2518.0	2.08	0.70	38.01	34.30	1.00	0.01	2.70	28.70	5.70	23.00	WESTWATER CANYON MEMBER
2532.0	1.46	0.90	45.10	37.80	3.30	0.30	3.70	22.40	7.70	14.70	
2540.0	1.48	0.63	45.80	41.50	2.30	0.00	2.00	23.00	8.30	14.70	
2549.0	1.00	0.79	33.70	30.10	1.00	0.30	2.30	27.00	6.70	21.00	
2574.0	1.85	0.82	48.01	46.00	0.30	0.01	1.70	17.70	7.70	10.00	
2575.0	1.93	0.62	46.31	43.30	1.70	0.01	1.30	22.70	7.30	15.40	
2580.0	1.66	1.07	46.11	41.40	2.70	0.00	2.00	19.31	3.70	15.61	
2584.0	1.21	0.71	46.60	40.00	3.30	0.00	3.30	24.61	6.30	18.31	
2604.0	2.24	0.54	50.11	46.40	0.70	0.01	3.00	16.00	5.70	10.30	
2616.0	0.56	0.90	33.10	26.10	2.00	0.00	5.00	22.90	7.30	15.60	
2641.0	1.99	0.52	51.71	47.70	0.00	0.01	4.00	16.60	9.30	7.30	
2651.5	1.14	0.70	51.31	48.60	2.00	0.01	4.70	21.70	4.70	17.00	
2653.0	2.17	0.72	63.00	56.00	1.00	0.30	5.70	9.70	3.70	6.00	
2686.0	1.02	1.14	44.00	40.30	1.70	0.00	2.00	15.30	5.30	10.00	
2702.0	0.63	0.69	41.61	36.30	2.00	0.01	3.30	26.00	7.70	18.30	
2729.0	1.19	0.66	43.41	38.40	2.70	0.01	2.30	26.31	9.30	17.01	
2744.0	1.85	0.74	56.40	51.50	1.30	0.30	3.30	16.61	5.00	11.61	
2751.0	2.11	0.66	63.10	58.80	2.00	0.30	6.00	9.30	2.70	6.60	
2759.0	2.88	0.60	54.40	50.50	1.30	0.30	2.30	12.00	1.00	11.00	
2783.0	2.81	0.78	63.20	58.60	2.00	0.30	2.30	13.30	3.30	10.00	
2808.0	2.27	0.72	59.90	55.80	1.70	0.70	1.70	8.00	3.00	5.00	
2826.0	1.78	0.94	44.91	40.60	1.30	0.01	3.00	16.10	3.70	12.40	
2845.0	2.66	0.48	57.51	50.50	3.70	0.01	3.30	10.00	1.00	9.00	
2867.0	2.13	1.49	53.51	47.30	1.30	0.01	5.30	8.00	2.30	5.70	
2886.0	1.68	0.67	48.70	42.70	3.00	0.70	2.30	16.60	4.30	12.30	
2907.0	2.81	0.70	54.41	52.10	1.30	0.01	1.00	5.00	0.70	4.30	
2934.5	1.73	0.61	56.70	53.10	0.30	0.30	3.00	4.70	0.00	4.70	
2950.0	2.16	0.70	62.00	58.30	1.30	0.70	1.70	7.00	1.00	6.00	
2980.0	2.16	0.75	66.70	61.50	2.30	0.60	2.30	8.30	1.30	7.00	
2999.0	2.19	0.78	60.70	57.10	1.00	0.30	2.30	6.70	2.00	4.70	
3018.0	2.02	0.62	67.11	62.80	2.00	0.01	2.30	6.30	0.30	6.00	
3055.0	2.87	0.52	60.60	54.90	2.70	0.30	2.70	4.60	2.30	7.30	
3068.0	3.46	0.51	55.11	51.70	1.70	0.01	1.70	14.61	1.30	13.31	

Table 6. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ROCK FRAGS	VOLCANIC IGNEOUS	PLUTONIC IGNEOUS	META- MORPHIC	SEDIMENTARY	UNKNOWN ALT & DEFM	ACCESSORY MINERALS	TOTAL FRAMEWORK	FORMATION MEMBER
S-6 SAMPLES									
2518.0	14.70	7.70	5.70	1.30	0.00	0.00	0.02	81.43	WESTWATER CANYON MEMBER
2532.0	13.20	4.30	8.30	0.30	0.00	0.30	1.30	82.00	
2540.0	7.00	3.70	1.00	1.30	0.00	1.00	0.01	75.81	
2549.0	10.70	3.30	4.70	0.70	0.30	1.70	0.30	72.40	
2574.0	8.91	3.31	2.30	0.30	0.00	3.00	0.01	74.62	
2575.0	10.31	8.00	1.00	0.00	0.01	1.30	0.01	79.32	
2580.0	12.01	5.40	5.00	0.30	0.01	1.30	0.02	77.43	
2584.0	8.22	3.31	3.30	0.30	0.01	1.30	0.60	80.00	
2604.0	4.90	3.60	0.70	0.30	0.00	0.30	0.02	71.03	
2616.0	20.11	4.40	9.70	1.70	0.01	4.30	0.00	76.10	
2641.0	2.62	2.01	0.30	0.00	0.01	0.30	0.02	70.93	
2651.5	8.70	3.70	2.30	2.00	0.00	0.70	0.02	81.73	
2653.0	5.32	1.71	0.30	0.01	0.00	3.30	0.02	78.02	
2686.0	15.71	7.70	4.70	1.00	0.01	2.30	0.02	75.02	
2702.0	11.70	4.70	5.70	1.00	0.00	0.30	0.00	79.31	
2729.0	11.61	7.00	3.30	1.00	0.01	0.30	0.01	81.32	
2744.0	5.31	1.31	2.70	1.00	0.30	1.00	0.02	78.32	
2751.0	3.60	1.30	1.30	1.00	0.00	0.00	3.00	79.00	
2759.0	2.72	2.71	0.00	0.01	0.00	0.00	0.31	69.41	RECAPTURE MEMBER
2783.0	1.63	1.31	0.30	0.01	0.01	0.00	0.02	78.12	
2808.0	2.42	1.71	0.01	0.00	0.00	0.70	0.00	70.30	
2826.0	9.01	5.00	1.00	0.30	0.01	2.70	10.70	80.71	
2846.0	2.91	2.31	0.30	0.30	0.00	0.00	0.02	70.43	
2867.0	10.60	1.60	1.00	0.00	5.30	2.70	0.31	72.82	
2886.0	8.00	4.00	3.30	0.00	0.00	0.70	0.02	73.32	
2907.0	2.03	1.31	0.01	0.01	0.70	0.00	0.31	61.72	
2934.5	2.91	2.00	0.30	0.01	0.30	0.30	0.01	64.31	
2950.0	4.41	2.01	1.70	0.00	0.70	0.00	0.01	73.41	
2980.0	1.00	0.70	0.00	0.00	0.30	0.00	0.02	76.02	
2999.0	8.31	4.31	1.70	0.30	0.30	1.70	0.01	75.71	
3018.0	2.21	1.60	0.30	0.00	0.01	0.30	0.02	75.63	
3055.0	3.31	2.30	0.70	0.00	0.01	0.30	0.31	73.81	
3068.0	2.31	2.00	0.00	0.00	0.01	0.30	0.02	72.03	

Table 6. (cont.)

SAMPLE DEPTH (FEET)	MATRIX	TOTAL CEMENTS	SILICA	CARBONATE	KAOLINITE	BARITE	ANHYDRITE	AUTHIGENIC POTASSIUM FELDSPAR	PYRITE	OTHER CEMENTS	FORMATION MEMBER

S-6 SAMPLES											
2518.0	1.00	0.60	0.30	0.00	0.01	0.00	0.01	0.30	0.00	0.00	WESTWATER CANYON MEMBER
2532.0	1.00	0.30	0.01	0.00	0.30	0.00	0.01	0.01	0.01	0.00	
2540.0	0.30	1.90	0.30	1.30	0.30	0.00	0.01	0.00	0.01	0.00	
2549.0	1.00	3.00	0.01	2.70	0.00	0.00	0.30	0.00	0.00	0.00	
2574.0	19.70	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
2575.0	0.70	0.60	0.30	0.01	0.30	0.00	0.01	0.30	0.01	0.00	
2580.0	20.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	
2584.0	1.30	0.30	0.01	0.30	0.01	0.00	0.01	0.01	0.00	0.00	
2604.0	1.70	12.00	10.00	2.00	0.00	0.00	0.00	0.01	0.00	0.00	
2616.0	6.00	3.60	0.01	3.00	0.30	0.00	0.01	0.30	0.00	0.00	
2641.0	0.70	16.70	15.70	0.70	0.30	0.00	0.00	0.00	0.00	0.00	
2651.0	0.30	1.00	0.00	0.70	0.01	0.00	0.00	0.30	0.00	0.00	
2653.0	1.70	0.30	0.30	0.00	0.01	0.00	0.01	0.00	0.00	0.00	
2686.0	0.70	2.00	0.30	0.01	0.70	0.30	0.00	0.70	0.00	0.00	
2702.0	1.70	2.30	0.70	0.30	1.30	0.00	0.01	0.00	0.00	0.00	
2729.0	2.00	1.00	0.01	0.01	1.00	0.00	0.01	0.01	0.00	0.00	
2744.0	6.00	4.60	2.30	2.30	0.00	0.00	0.01	0.00	0.00	0.00	
2751.0	2.70	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2759.0	0.00	29.00	0.01	28.70	0.30	0.00	0.01	0.00	0.00	0.00	
2783.0	12.30	0.30	0.01	0.00	0.00	0.30	0.00	0.00	0.00	0.00	
2808.0	3.70	1.30	0.01	0.30	0.70	0.00	0.01	0.30	0.00	0.00	
2826.0	4.00	5.30	0.30	3.00	1.70	0.01	0.01	0.01	0.30	0.00	
2846.0	0.00	1.90	0.01	0.30	1.30	0.00	0.00	0.30	0.00	0.00	
2867.0	4.00	3.60	0.30	3.00	0.30	0.00	0.01	0.01	0.00	0.00	
2886.0	0.30	4.40	0.00	2.70	1.70	0.01	0.01	0.01	0.00	0.00	
2907.0	0.00	37.30	0.00	36.00	0.30	0.00	1.00	0.01	0.00	0.00	
2934.5	0.70	33.30	0.00	33.30	0.00	0.00	0.01	0.00	0.01	0.00	
2950.0	4.30	17.00	0.00	16.70	0.30	0.00	0.01	0.00	0.00	0.00	
2980.0	3.30	10.70	0.00	10.70	0.00	0.01	0.01	0.00	0.00	0.00	
2999.0	4.00	2.30	0.01	2.00	0.30	0.00	0.01	0.00	0.00	0.00	
3018.0	1.00	2.40	0.01	1.70	0.70	0.00	0.00	0.00	0.00	0.00	
3055.0	0.30	3.90	0.01	3.00	0.30	0.00	0.30	0.30	0.00	0.00	
3068.0	0.30	27.00	0.01	27.00	0.00	0.00	0.01	0.00	0.00	0.00	
RECAPTURE MEMBER											

Table 6. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ALTERATION PRODUCTS	TOTAL NON- FRAMEWORK	POROSITY	FORMATION MEMBER
S-6 SAMPLES				
WESTWATER CANYON MEMBER				
2518.0	2.30	3.90	14.70	
2532.0	3.00	4.30	13.70	
2540.0	2.00	4.20	20.00	
2549.0	2.60	6.60	20.70	
2574.0	0.70	20.41	5.00	
2575.0	2.60	4.20	16.00	
2580.0	1.60	21.61	1.00	
2584.0	2.40	4.00	16.00	
2604.0	0.60	14.30	14.70	
2616.0	2.40	12.00	11.30	
2641.0	1.40	18.80	10.30	
2651.5	2.30	3.60	14.70	
2653.0	1.30	3.30	18.70	
2686.0	2.30	5.00	15.00	
2702.0	3.00	7.00	13.70	
2729.0	3.00	6.00	12.70	
2744.0	1.40	12.00	9.70	
2751.0	5.00	7.71	13.30	
2759.0	0.90	29.90	0.70	
2783.0	1.20	13.80	12.00	
2808.0	1.00	6.00	23.70	
2826.0	2.00	11.30	17.70	
2846.0	1.00	2.90	26.70	
2867.0	0.30	7.90	19.30	
2886.0	1.00	5.70	21.00	
2907.0	0.01	37.31	1.00	
2934.5	0.01	34.01	1.70	
2950.0	0.01	21.31	4.30	
2980.0	0.01	14.01	10.00	
2999.0	0.01	6.31	18.00	
3018.0	0.01	3.41	21.00	
3055.0	0.01	4.21	22.00	
3068.0	0.70	28.00	0.00	
RECAPTURE MEMBER				

Table 7. Computer-generated table of selected textural and compositional data from the Upper Jurassic Morrison Formation, hole S-7, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico

SAMPLE DEPTH (FEET)	PHI MEAN	SORTING INDEX (PHI)	TOTAL QUARTZ	MONOXTAL QUARTZ	POLYXTAL QUARTZ	CRYPTOXTAL QUARTZ	METAMORPHIC QUARTZ	TOTAL FELOSPAR	PLAGIDCLASE FELOSPAR	FORMATION MEMBER
S-7 SAMPLES										
2855.0	2.58	0.72	36.31	32.60	1.70	0.01	2.00	6.40	0.00	BRUSHY BASIN MEMBER
2896.0	2.73	0.56	47.11	44.10	1.30	0.01	1.70	9.30	1.70	
2907.0	2.28	0.59	68.70	62.10	1.70	0.60	4.30	4.30	0.30	
2928.0	2.15	0.80	44.40	39.80	2.00	0.30	2.30	15.00	5.70	
2941.0	3.05	0.83	27.71	26.70	0.30	0.01	0.70	7.70	0.70	
2978.0	2.16	0.70	48.11	46.10	1.00	0.01	1.00	12.30	2.70	
2985.0	1.59	0.71	53.80	49.10	1.70	0.30	2.70	12.60	5.00	
3028.0	2.70	0.85	46.50	42.80	1.00	0.70	2.00	15.70	4.70	
3038.0	0.40	0.77	31.11	23.10	5.30	0.01	2.70	24.30	9.30	
3050.0	3.09	0.74	48.70	46.10	0.30	0.00	2.30	7.60	1.30	
3068.0	2.17	0.81	52.41	46.10	4.00	0.01	2.30	21.30	7.30	
3091.0	1.84	0.76	57.81	52.80	2.00	0.01	3.00	12.30	5.00	
3106.0	2.04	0.71	51.81	49.80	1.00	0.01	1.00	14.60	6.00	
3133.0	1.40	0.71	45.61	41.20	1.70	0.01	2.70	22.40	7.00	
3155.0	1.70	0.84	53.30	48.60	2.00	0.70	2.00	13.70	8.00	
3179.0	2.22	0.96	43.60	39.00	2.00	0.30	2.30	11.30	2.70	
3190.0	1.14	0.87	43.40	36.80	3.30	0.00	3.30	15.41	4.00	
3194.0	1.82	0.60	59.41	54.70	2.00	0.01	2.70	16.00	5.00	
3213.0	2.20	0.67	52.71	45.70	4.00	0.01	3.00	15.50	4.30	
3223.0	1.73	0.77	46.91	43.50	0.70	0.01	2.70	11.70	1.70	
3227.0	2.33	0.69	55.40	49.70	2.00	0.00	3.70	8.40	2.00	
3229.0	1.73	0.81	51.80	45.80	1.00	0.30	4.70	9.30	3.30	
3247.0	1.48	0.73	52.21	43.50	3.00	0.01	5.70	15.30	3.00	
3258.0	1.10	0.65	48.70	42.40	3.00	0.30	3.00	19.70	6.00	
3259.0	2.20	0.76	58.31	55.00	1.00	0.01	2.30	11.30	1.30	
3263.0	2.04	0.64	44.10	39.10	2.00	0.00	3.00	19.01	6.30	
3267.0	2.31	0.58	63.31	56.60	4.00	0.01	2.70	14.70	1.70	
3271.0	2.23	0.60	55.30	50.30	1.00	0.30	3.70	12.60	2.00	
3282.0	2.01	0.79	48.60	45.00	1.00	0.30	2.30	10.10	2.70	
3296.0	2.01	0.79	46.61	42.00	1.30	0.01	3.30	16.00	5.30	
3302.5	2.14	0.87	46.40	43.00	0.70	0.00	2.70	16.00	2.70	
3320.0	2.59	0.71	54.41	50.40	2.00	0.01	2.00	12.71	2.00	
3336.0	2.27	0.65	50.71	46.40	3.00	0.01	1.30	11.00	3.00	
3358.0	2.25	0.71	47.91	43.20	2.00	0.01	2.70	13.90	4.30	
3374.0	1.71	0.67	57.51	53.80	1.70	0.01	2.00	12.40	4.70	
3388.0	2.61	0.73	53.20	48.90	2.00	0.30	2.00	12.30	3.00	
3400.0	2.48	0.60	53.10	50.80	1.00	0.30	1.00	3.60	1.00	
3420.0	2.53	0.59	47.40	41.70	1.70	0.01	3.00	8.70	1.70	
3438.0	2.38	0.50	64.50	59.60	2.30	0.60	2.00	9.30	0.30	
WESTWATER CANYON MEMBER										
RECAPTURE MEMBER										

Table 7. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ROCK FRAGS	VOLCANIC IGNEOUS	PLUTONIC IGNEOUS	META- MORPHIC	SEDIMENTARY	UNKNOWN ALT & DEFM	ACCESSORY MINERALS	TOTAL FRAMEWORK	FORMATION MEMBER
S-7 SAMPLES									
2855.0	3.00	0.70	0.00	0.00	0.00	2.30	0.01	45.72	BRUSHY BASIN MEMBER
2896.0	2.00	2.00	0.00	0.00	0.00	0.00	0.02	58.43	
2907.0	2.03	2.01	0.01	0.01	0.00	0.00	0.01	75.01	
2928.0	8.31	6.31	2.00	0.00	0.00	0.00	0.02	67.72	BRUSHY BASIN MEMBER
2941.0	2.00	1.30	0.00	0.00	0.70	0.00	0.02	37.43	
2978.0	6.61	3.30	1.30	0.00	0.01	2.00	0.70	67.71	
2985.0	5.30	4.30	1.00	0.00	0.00	0.00	0.31	72.01	BRUSHY BASIN MEMBER
3028.0	9.21	4.60	1.00	0.30	0.01	3.30	0.71	72.11	
3038.0	20.90	5.00	12.30	0.30	0.30	3.00	0.30	76.61	
3050.0	4.41	3.71	0.00	0.00	0.00	0.70	0.02	60.72	WESTWATER CANYON MEMBER
3068.0	9.31	3.30	2.70	0.00	0.01	3.30	0.02	83.03	
3091.0	8.31	3.00	1.30	0.00	0.01	4.00	0.02	78.43	
3106.0	10.61	7.00	1.30	0.00	0.01	2.30	0.31	77.32	WESTWATER CANYON MEMBER
3133.0	11.71	6.00	4.70	0.00	0.01	1.00	0.31	80.02	
3155.0	9.72	3.71	2.00	0.00	0.01	4.00	0.02	76.72	
3179.0	5.41	3.70	1.70	0.00	0.01	0.00	0.02	60.32	WESTWATER CANYON MEMBER
3190.0	13.61	4.30	9.00	0.30	0.01	0.00	0.31	72.71	
3194.0	8.00	4.00	3.70	0.30	0.00	0.00	0.02	83.43	
3213.0	4.30	3.30	1.00	0.00	0.00	0.00	0.02	72.93	WESTWATER CANYON MEMBER
3223.0	7.00	5.00	1.70	0.00	0.00	0.30	0.01	65.62	
3227.0	6.30	3.30	1.00	0.00	0.00	2.00	0.31	70.41	
3249.0	5.00	2.00	1.70	0.00	0.00	1.30	0.01	66.11	WESTWATER CANYON MEMBER
3247.0	11.20	5.60	5.00	0.30	0.00	0.30	0.01	78.72	
3256.0	14.00	4.60	7.00	0.00	0.70	1.70	0.01	82.41	
3259.0	5.72	3.00	2.00	0.01	0.01	0.70	0.02	75.33	WESTWATER CANYON MEMBER
3263.0	14.62	6.01	2.00	0.30	0.01	6.30	0.02	77.72	
3267.0	6.02	4.01	1.00	0.00	0.01	1.00	0.02	84.03	
3271.0	9.63	3.01	0.30	0.01	0.01	6.30	0.01	77.51	RECAPTURE MEMBER
3282.0	4.31	1.30	1.30	0.00	0.01	1.70	0.01	63.01	
3296.0	13.31	6.30	2.70	0.30	0.01	4.00	0.02	75.93	
3302.5	15.32	6.31	3.30	0.00	0.01	5.70	0.02	77.72	RECAPTURE MEMBER
3320.0	4.31	3.01	1.00	0.00	0.00	0.30	0.31	71.72	
3336.0	11.43	2.01	0.70	0.01	0.01	8.70	0.02	73.13	
3358.0	7.61	4.60	0.01	0.00	0.00	3.00	0.02	69.43	RECAPTURE MEMBER
3374.0	8.42	4.71	1.70	0.00	0.01	2.00	0.01	78.32	
3388.0	1.60	0.60	1.00	0.00	0.00	0.00	0.60	67.70	
3400.0	2.00	1.70	0.30	0.00	0.00	0.00	0.01	58.71	RECAPTURE MEMBER
3420.0	2.32	2.01	0.30	0.00	0.01	0.00	0.01	58.41	
3438.0	2.90	2.60	0.00	0.00	0.00	0.30	0.01	76.71	

Table 7. (cont.)

SAMPLE DEPTH (FEET)	MATRIX	TOTAL CEMENTS	SILICA	CARBONATE	KAOLINITE	BARITE	ANHYDRITE	AUTHIGENIC POTASSIUM FELDSPAR	PYRITE	OTHER CEMENTS	FORMATION MEMBER
S-7 SAMPLES											
2855.6	28.00	18.30	0.00	17.00	1.30	0.00	0.00	0.00	0.00	0.00	BRUSHY BASIN MEMBER
2896.0	40.00	1.60	0.00	1.30	0.01	0.01	0.00	0.00	0.00	0.00	
2907.0	0.00	25.00	0.01	25.00	0.01	0.00	0.01	0.00	0.00	0.00	
2928.0	0.00	21.70	0.00	21.00	0.70	0.00	0.01	0.00	0.00	0.00	WESTWATER CANYON MEMBER
2941.0	61.60	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	
2978.0	18.30	1.70	0.01	0.00	1.70	0.00	0.00	0.00	0.00	0.00	
2985.0	0.00	3.30	0.00	1.30	1.30	0.00	0.01	0.70	0.01	0.00	RECAPTURE MEMBER
3028.0	17.70	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
3038.0	1.70	1.30	0.00	0.00	0.30	0.00	0.01	1.00	0.00	0.00	
3050.0	33.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	BRUSHY BASIN MEMBER
3068.0	2.70	0.30	0.30	0.00	0.01	0.00	0.01	0.01	0.00	0.00	
3091.0	6.30	0.30	0.01	0.01	0.01	0.00	0.00	0.30	0.00	0.00	
3106.0	3.70	1.00	0.01	0.00	0.70	0.00	0.01	0.30	0.00	0.00	WESTWATER CANYON MEMBER
3133.0	0.00	1.00	0.01	0.70	0.30	0.00	0.01	0.00	0.00	0.00	
3155.0	4.30	7.00	0.01	6.00	0.01	0.00	0.01	1.00	0.00	0.00	
3179.0	38.00	0.30	0.01	0.01	0.30	0.00	0.00	0.00	0.00	0.00	RECAPTURE MEMBER
3190.0	2.30	3.30	0.01	2.30	0.01	0.01	0.00	1.00	0.00	0.00	
3194.0	6.30	1.00	0.01	0.01	0.30	0.00	0.01	0.70	0.00	0.00	
3213.0	2.70	9.00	0.00	8.30	0.01	0.00	0.01	0.70	0.00	0.00	BRUSHY BASIN MEMBER
3223.0	3.30	23.40	0.01	22.70	0.01	0.00	0.01	0.70	0.00	0.00	
3227.0	20.70	0.60	0.30	0.00	0.30	0.00	0.00	0.01	0.00	0.00	
3229.0	15.70	0.60	0.00	0.30	0.00	0.00	0.00	0.30	0.00	0.00	WESTWATER CANYON MEMBER
3247.0	6.30	2.40	0.01	1.70	0.01	0.00	0.01	0.70	0.00	0.00	
3258.0	2.00	3.30	0.00	2.30	0.30	0.00	0.00	0.70	0.01	0.00	
3259.0	2.70	1.70	0.01	0.01	0.00	0.00	0.01	1.70	0.00	0.00	RECAPTURE MEMBER
3263.0	2.00	3.00	0.01	2.00	0.00	0.01	0.30	0.70	0.01	0.00	
3267.0	0.70	2.00	0.01	0.01	0.00	0.01	1.70	0.30	0.00	0.00	
3271.0	0.30	21.60	0.00	0.00	0.00	5.30	16.30	0.00	0.00	0.00	BRUSHY BASIN MEMBER
3282.0	0.30	36.00	0.01	30.00	0.01	0.00	5.30	0.01	0.00	0.00	
3296.0	3.70	4.70	0.01	2.00	0.01	0.00	1.00	1.70	0.00	0.00	
3302.5	3.70	1.60	0.01	0.30	0.60	0.00	0.01	0.30	0.00	0.00	RECAPTURE MEMBER
3320.0	3.30	3.00	0.01	1.00	0.30	0.70	0.00	1.00	0.00	0.00	
3336.0	2.00	3.00	0.01	0.30	2.70	0.00	0.00	0.01	0.00	0.00	
3358.0	0.30	14.60	0.30	13.30	0.30	0.01	0.01	3.70	0.00	0.00	BRUSHY BASIN MEMBER
3374.0	0.70	3.30	0.01	0.01	3.30	0.00	0.00	0.00	0.01	0.00	
3388.0	2.70	2.30	0.01	1.30	1.00	0.01	1.00	0.00	0.00	0.00	
3400.0	1.00	34.60	0.00	34.30	0.30	0.00	0.01	0.00	0.00	0.00	RECAPTURE MEMBER
3420.0	0.30	38.00	0.00	36.70	0.00	0.00	1.30	0.00	0.00	0.00	
3438.0	1.30	12.30	0.01	9.30	0.00	3.00	0.00	0.00	0.01	0.00	

Table 7. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ALTERATION PRODUCTS	TOTAL NON- FRAMEWORK	POROSITY	FORMATION MEMBER
S-7 SAMPLES				
BRUSHY BASIN MEMBER				
2855.0	8.00	54.30	0.01	
2896.0	0.01	41.61	0.00	
2907.0	0.01	25.01	0.00	
2928.0	1.30	23.00	9.30	
2941.0	0.01	62.61	0.00	
2978.0	1.30	21.30	11.00	
2985.0	0.01	5.31	24.70	
3028.0	0.60	18.31	8.30	
3038.0	3.40	6.40	17.00	
3050.0	0.01	33.02	6.30	
3068.0	0.70	3.70	13.30	
3091.0	1.30	7.90	13.70	
3106.0	1.00	5.70	17.00	
3133.0	1.00	2.00	18.00	
3155.0	1.30	12.60	10.70	
3179.0	0.70	39.00	0.70	
3190.0	3.00	8.60	18.70	
3194.0	1.00	8.30	8.30	
3213.0	1.70	13.40	13.70	
3223.0	1.00	27.70	6.70	
3227.0	0.30	21.60	8.00	
3229.0	3.30	19.60	14.30	
3247.0	1.60	10.30	11.00	
3258.0	3.30	8.60	9.00	
3259.0	1.30	5.70	19.00	
3263.0	0.30	5.30	17.00	
3267.0	1.00	3.70	12.30	
3271.0	0.30	22.20	0.30	
3282.0	0.70	37.00	0.00	
3296.0	1.70	10.10	14.00	
3302.0	1.30	6.60	15.70	
3320.0	0.30	6.60	21.70	
3336.0	0.60	5.60	21.30	
3358.0	1.00	15.90	14.70	
3374.0	0.70	4.70	17.00	
3388.0	1.00	6.00	26.30	
3400.0	0.01	35.61	5.70	
3420.0	0.01	38.31	3.30	
3438.0	0.00	13.60	9.70	
WESTWATER CANYON MEMBER				
RECAPTURE MEMBER				

Table 8. Computer-generated table of selected textural and compositional data from the Upper Jurassic Morrison Formation, hole S-7a, Mariano Lake-Lake Valley drilling project, McKinley County, New Mexico.

SAMPLE DEPTH (FEET)	PHI MEAN	SORTING INDEX (PHI)	TOTAL QUARTZ	MONOXTAL QUARTZ	POLYXTAL QUARTZ	CRYPTOXTAL		METAMORPHIC		TOTAL FELDSPAR	PLAGIOCLASE		POTASSIUM FELDSPAR	FORMATION MEMBER
						QUARTZ	QUARTZ	QUARTZ	QUARTZ					

S-7A SAMPLES														
2949.0	0.81	0.86	42.40	36.10	1.30	3.00	2.00	17.01	1.30	15.71				
2954.0	1.79	0.80	49.80	42.40	3.70	1.00	2.70	14.00	4.00	10.00				
2971.0	1.96	0.61	46.41	41.40	2.00	0.01	3.00	18.70	4.70	14.00				
● 2997.0	3.04	0.54	38.80	35.20	1.30	0.30	2.00	10.60	2.00	8.60				
3030.0	1.76	0.64	48.71	43.00	3.00	0.01	2.70	19.70	3.30	16.40				
3042.0	0.57	0.74	38.41	30.80	4.30	0.01	3.30	25.00	7.00	18.00				
3062.0	2.29	0.68	52.71	49.10	1.30	0.01	2.30	20.30	5.30	15.00				
3072.0	1.23	0.63	46.71	43.70	0.70	0.01	2.30	15.70	3.30	12.40				
3108.0	1.63	0.83	54.11	50.10	1.30	0.01	2.70	15.70	2.30	13.40				
3110.0	0.46	0.71	48.71	43.10	1.30	0.01	4.30	17.60	3.00	14.60				
● 3136.0	1.24	0.66	44.31	39.70	1.30	0.01	3.30	24.60	6.30	18.30				
● 3140.0	1.24	0.67	50.10	44.80	2.00	0.00	3.30	15.40	3.70	11.70				
● 3156.0	1.88	0.64	58.80	53.80	0.30	0.00	4.70	18.70	3.70	15.00				
● 3164.0	1.45	0.73	59.50	56.10	0.70	0.00	2.70	13.00	3.70	9.30				
● 3168.0	1.58	0.72	59.01	52.40	3.30	0.01	3.30	15.70	3.30	12.40				
3180.0	2.03	0.62	57.00	52.70	1.00	0.00	3.30	14.00	2.30	11.70				
3199.0	1.44	0.88	53.61	48.90	2.00	0.01	2.70	19.00	4.30	14.70				

WESTWATER
CANYON
MEMBER

Table 8. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ROCK FRACS	VOLCANIC IGNEOUS	PLUTONIC IGNEOUS	META- MORPHIC	SEDIMENTARY	ALT & DEFM	UNKNOWN	ACCESSORY MINERALS	TOTAL FRAMEWORK	FORMATION MEMBER
S-7A SAMPLES										
2949.0	12.80	3.40	7.30	0.70	0.70	0.70	0.70	0.01	72.21	WESTWATER CANYON MEMBER
2954.0	12.01	5.00	2.70	0.30	0.01	4.00	4.00	0.02	75.82	
2971.0	6.32	2.01	2.00	0.30	0.01	2.00	2.00	0.00	71.41	
● 2997.0	3.01	3.00	0.00	0.00	0.01	0.00	0.00	0.31	52.71	
3030.0	7.72	3.30	0.70	0.01	0.01	3.70	3.70	0.02	76.13	
3042.0	15.00	5.30	6.70	1.00	0.00	2.00	2.00	0.30	78.71	
3062.0	6.70	3.40	0.70	0.30	0.00	2.30	2.30	0.01	79.72	
3072.0	11.71	3.70	5.70	1.30	0.01	1.00	1.00	0.30	74.41	
3108.0	12.60	7.00	3.00	0.30	0.00	2.30	2.30	0.01	82.42	
3110.0	8.70	3.30	4.00	0.70	0.00	0.70	0.70	0.02	75.03	
● 3136.0	11.61	3.60	5.00	1.30	0.01	1.70	1.70	0.01	80.52	
● 3140.0	12.42	6.40	4.00	0.01	0.01	2.00	2.00	0.01	77.91	
3156.0	5.91	4.00	1.30	0.30	0.01	0.30	0.30	0.01	83.41	
● 3164.0	8.20	2.60	1.00	0.30	0.00	4.30	4.30	0.02	80.72	
● 3168.0	6.00	2.30	2.00	0.70	0.00	1.00	1.00	0.00	80.71	
● 3180.0	6.80	3.40	1.70	0.70	0.00	1.00	1.00	0.01	77.81	
3199.0	10.00	5.40	1.00	0.00	0.30	3.30	3.30	0.01	82.62	

Table 8. (cont.)

SAMPLE DEPTH (FEET)	MATRIX	TOTAL CEMENTS	SILICA	CARBONATE	KAOLINITE	BARITE	ANHYDRITE	AUTHIGENIC POTASSIUM FELDSPAR	PYRITE	OTHER CEMENTS	FORMATION MEMBER
S-7A SAMPLES											
2949.0	1.70	24.70	0.00	24.70	0.01	0.00	0.01	0.00	0.00	0.00	WESTWATER CANYON MEMBER
2954.0	3.00	9.60	0.01	0.30	7.30	0.00	0.01	0.00	0.01	0.00	
2971.0	2.30	2.60	0.01	0.00	2.30	0.00	0.00	0.30	0.00	0.00	
● 2997.0	46.00	0.30	0.01	0.00	0.30	0.00	0.00	0.00	0.00	0.00	
3030.0	0.00	4.30	3.30	0.00	0.01	0.00	0.00	1.00	0.00	0.00	
3030.0	0.00	7.00	2.30	2.00	2.00	0.01	0.01	0.70	0.00	0.00	
3042.0	0.00	5.30	5.00	0.00	0.01	0.30	0.01	0.01	0.01	0.00	
3062.0	0.00	6.30	0.01	5.00	1.00	0.00	0.01	0.30	0.00	0.00	
3072.0	0.00	0.30	0.30	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
3108.0	0.30	1.70	0.01	0.01	0.00	0.01	0.01	1.70	0.00	0.00	
3110.0	0.30	0.70	0.30	0.00	0.01	0.30	0.01	0.30	0.01	0.00	
● 3136.0	0.00	6.90	0.01	0.70	0.00	0.00	0.01	0.70	0.01	0.00	
● 3140.0	0.00	1.40	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
3156.0	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	
● 3164.0	0.00	2.00	0.70	1.30	0.00	0.01	0.01	0.00	0.01	0.00	
● 3168.0	0.70	1.30	0.01	0.30	0.30	0.00	0.00	0.70	0.00	0.00	
3180.0	1.30	1.60	0.01	0.30	0.01	0.00	0.00	1.30	0.00	0.00	
3199.0	0.70	1.30	0.01	0.30	0.01	0.00	0.01	1.00	0.00	0.00	

Table 8. (cont.)

SAMPLE DEPTH (FEET)	TOTAL ALTERATION PRODUCTS	TOTAL NON- FRAMEWORK	POROSITY	FORMATION MEMBER
S-7A SAMPLES				
WESTWATER CANYON MEMBER				
2949.0	1.40	27.80	0.01	
2954.0	1.30	13.90	10.30	
2971.0	1.00	5.90	22.70	
● 2997.0	0.01	46.31	1.00	
3030.0	2.60	6.90	17.00	
3042.0	2.00	9.00	12.30	
3062.0	0.30	5.60	14.70	
3072.0	2.00	8.30	17.30	
3108.0	1.70	2.30	15.30	
3110.0	4.30	6.30	18.70	
● 3136.0	1.60	9.20	10.30	
● 3140.0	2.30	3.70	18.70	
3156.0	0.30	0.31	16.50	
● 3164.0	0.01	2.01	17.30	
● 3168.0	1.00	3.00	16.30	
3180.0	1.60	4.50	17.70	
3199.0	1.70	3.70	13.70	

APPENDIX II

Explanation of computer generated downhole plots.
Column no.

1. Mean grain size (phi units)
2. Sorting index (phi standard deviation)
3. Total quartz (columns 4-7)
4. Monocrystalline quartz
5. Polycrystalline quartz
6. Cryptocrystalline quartz
7. Metamorphic quartz
8. Total feldspar (columns 8-9)
9. Plagioclase feldspar
10. Potassium feldspar
11. Total rock fragments (columns 11-15)
12. Volcanic igneous
13. Plutonic igneous
14. Metamorphic
15. Sedimentary
16. Unknown altered and deformed
17. Accessory minerals
18. Total framework (columns 3, 8, 11 and 16)
19. Matrix
20. Total cement
21. Silica
22. Carbonate
23. Kaolinite
24. Barite
25. Anhydrite
26. Authigenic potassium feldspar
27. Pyrite
28. Other cements
29. Total alteration products
30. Total nonframework (columns 19, 20 and 29)
31. Porosity

- NOTE:
- 1) All compositional values volume percentages.
 - 2) MZ = zone of uranium mineralization.
 - 3) X = constituent observed (when against zero line observed as trace quantity).
 - 4) 0 = constituent not observed.
 - 5) + = value of constituent greater than maximum value on scale.