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A PRELIMINARY FIRST STAGE STUDY OF
NEVADA COAL RESOURCES

*This information should be considered preliminary. It
has not been edited, or checked for completeness or accuracy.*

photo copy [redacted]

(This study --- literature search, reconnaissance examination of occurrences, and sampling --- was done principally by Larry J. Garside and Keith G. Papke)

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Final Scientific Report

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A PRELIMINARY FIRST STAGE STUDY OF NEVADA COAL RESOURCE

by John H. Schilling, Principal Investigator

The purpose of this grant was to make a reconnaissance examination of each occurrence of coal in Nevada, and to take samples for analyse by the U. S. Geological Survey.

As a first step a careful search of the literature was made to locate any mentions of coal in Nevada. The resulting bibliography is enclosed as Appendix A.

Eleven areas were examined (all those that could be identified). Six of these areas were sampled and the samples submitted to the U. S. Geological Survey; 12 samples were taken (see Appendix B). Other data collected are given in Appendix C.

Conclusions: It is obvious from this study that Nevada has only minor coal resources; the total tonnage is very small, its quality is poor, and it is mostly in small, difficult-to-mine seams. Only one deposit, the Lewis Mine, seems to hold any promise, and that only for small-scale mining.

Exposures were very poor, and it was impossible to collect fresh, representative samples, or to describe the occurrence in any detail. If more detailed information is needed (geology, tonnage, "grade", and trace element content) it will require extremely expensive trenching and drilling.

It is recommended that a more-detailed study of the Lewis Mine eventually be made; possibly a two-phased effort: geologic surface mapping, followed by trenching and drilling if the mapping indicates any potential.

The Nevada Bureau of Mines and Geology will continue to study Nevada coals on a small scale, and eventually will publish the results as a NBMG Report.

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Wilson (Pine Grove)

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Sample No.	Sample Description
Lewis No. 1A	Channel sample across 36 in. coal bed in Coal Valley Formation, Pliocene. $38^{\circ}30'40''N$, $118^{\circ}54'50''W$ (C S36, T8N, R27E, MDB&M) Lewis Coal Mine, Lyon County, NV. Collected by L. Garside and K. Papke, 24 Nov 76.
Lewis No. 2A	Channel sample across 15 in. coal bed in Coal Valley Formation, Pliocene. $38^{\circ}30'40''N$, $118^{\circ}54'50''W$ (C S36, T8N, R27E, MDB&M) Lewis Coal Mine, Lyon County, NV. Collected by L. Garside and K. Papke, 24 Nov 76.
Coaldale No. 1A	Channel sample across 39 in. coal bed in the Mio-Pliocene Esmeralda Formation ("C-bed") $38^{\circ}00'10''N$, $117^{\circ}52'40''W$ (NE/4 S29, T2N, R37E, MDB&M) Coaldale area, Esmeralda Co., NV. Collected by L. Garside and K. Papke, 21 Sept 76.
Coaldale No. 2A	Channel sample across 36 in. coal bed in the Mio-Pliocene Esmeralda Formation ("D-bed") $37^{\circ}59'50''N$, $117^{\circ}52'40''W$ (SE/4 S29, T2N, R37E, MDB&M) Coaldale area, Esmeralda County, NV. Collected by L. Garside and K. Papke, 21 Sept 76.
Coaldale No. 3A	Channel samples across 30-36 in. coal bed in the Mio-Pliocene Esmeralda Formation ("C-bed") $38^{\circ}00'10''N$, $117^{\circ}52'40''W$ (NE/4 S29, T2N, R37E, MDB&M) Coaldale area, Esmeralda County, NV. Collected by L. Garside and K. Papke, 21 Sept 76.
Gamma No. 1A	Channel sample across 22 in. coal bed in unnamed Pliocene? lacustrine rocks. $39^{\circ}12'35''N$, $117^{\circ}46'50''W$ (C S35, T16N, R37E, MDB&M) lacustrine rocks Gamma prospect, Churchill County, NV. Collected by L. Garside and K. Papke, 6 Oct 76.
Eldorado Canyon Mine No. 1A	A select dump sample of coal from the shaft of the Eldorado Canyon Mine in unnamed Miocene? sedimentary rocks. $39^{\circ}6'10''N$, $119^{\circ}33'30''W$ (SE/4 SW/4 S6, T14N, R22E, MDB&M) Eldorado Canyon Mine, Carson City, NV. Collected by L. Garside and K. Papke, 14 Sept 76.
Eldorado Canyon Mine No. 2A	A select dump sample of coal from the shaft of the Eldorado Canyon Mine in unnamed Miocene? sedimentary rocks. $39^{\circ}6'10''N$, $119^{\circ}33'30''W$ (SE/4 SW/4 S6, T14N, R22E, MDB&M) Eldorado Canyon Mine, Carson City, NV. Collected by L. Garside and K. Papke, 14 Sept 76.

Sample No. Sample description
Verdi 1A Channel sample of coal bed 3.0 ft. thick at top of unnamed coal-bearing sequence of late Tertiary age. In SE 1/4 NW 1/4 NE 1/4 Sec. 9, T19N, R18E, MDB&M; 39°31'50"N, 119°57'30"W, Washoe Co., Nevada. Collected by L. Garside and K. Papke, Aug. 8, 1975.

Sample No. Sample description
Verdi 2A Channel sample of coal bed 2.0 ft. thick in unnamed coal-bearing sequence of late Tertiary age. In NW 1/4 NW 1/4 NE 1/4 Sec. 9, T19N, R18E, MDB&M; 39°32'00"; 119°57'40"; Washoe Co., Nevada. Collected by L. Garside and K. Papke, Aug. 8, 1975.

Sample No. Sample description
Pancake North 1A Grab sample of best coal on dump. Coal bed in Diamond Peak Formation of Mississippian age. In SW 1/4 NE 1/4 Sec. 28, T18N, R56E, MDB&M; 39°24'5", 115°40'15"; White Pine Co., Nevada. Collected by L. Garside and K. Papke, Nov. 4, 1975.

Sample No. Sample description
Elko West 1A Channel sample of coal bed 0.5 ft. thick in oil-shale sequence in Elko Formation of Eocene-Oligocene age. In center NW 1/4 NE 1/4 Sec. 27, T34N, R55E, MDB&M; 40°48'30", 115°45'50"; Elko Co., Nevada. Collected by L. Garside and K. Papke, Nov. 6, 1975.

APPENDIX C - Deposit Descriptions

NAME: Coaldale Area

STATE: Nevada

COUNTY: Esmeralda

QUAD NAME: Coaldale, Nevada QUAD SERIES: 7½ minute

GEOLOGIC BASIN:

COAL FIELD: Coaldale

RANK OF COAL: Sub-bituminous

DATES: (from) 9/21/76 (to)

FIELD NOTE #: (from) (to)

Location: S29, T2N, R37E

Sample Nos.: Coaldale No. 1, 2, 3

Analysis Completed:

FIELD NOTE: Sample Coaldale No. 1 AERIAL PHOTO #
 (Indicates reference to cover notes)

1. SURFACE ALTITUDE: 4,980' 2. DATE: 9 / 21 / 76

3. TYPE OF DESCRIPTION: 4. QUALITY OF EXPOSURE: good

5. ELEVATION OF BED: 6. TOP OR BASE: 7. PRECISION OF ELEVATION:

DESCRIPTION OF COAL BED

8. NAME OF COAL BED: C bed 9. RELIABILITY OF NAME: good

10. NAME OF MINE: 11. NO. OF SAMPLES SUBMITTED FOR USE IN ANALYSIS:

12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 13. KIND OF RASS ANALYSIS REQUESTED: 14. SAMPLE TYPE: channel

15. AVERAGE SLOPE ACROSS BED: 20° 16. AVERAGE SLOPE ABOVE OUTCROP: 20° 17. AVERAGE SLOPE BELOW OUTCROP: 15°

18. THICKNESS OF BED: 39 inches 19. THICKNESS OF PARTINGS: $\frac{1}{2}$ -1 inch 20. THICKNESS COMPLETE?: yes

21. COAL THICKNESS FOR RESOURCE CALCULATION: 36 inches 22. QUALITY OF THE THICKNESS DATA: good

23. LITHOLOGY OF ROOF ROCK: shale 24. CONTACT WITH COAL BED: gradational

25. LITHOLOGY OF FLOOR ROCK: carbonaceous shale 26. CONTACT WITH COAL BED: sharp

27. STRIKE OF CLEAT: 28. DIP OF CLEAT: 29. SCALE OF CLEAT:

30. STRIKE OF CLEAT: 31. DIP OF CLEAT:

DESCRIPTION OF STRUCTURAL FEATURES

32. STRIKE OF BEDDING: N0°E 33. DIP OF BEDDING: 18°E

34. STRUCTURAL FEATURE: 35. DESCRIPTION OF FEATURE:

36. NAME OF FEATURE: 37. POSITION ON FEATURE:

38. STRIKE OF FEATURE: 39. DIP OF FEATURE:

40. STRIKE OF JOINT: 41. DIP OF JOINT: 42. PROMINENCE OF JOINT:

43. STRIKE OF JOINT: 44. DIP OF JOINT: 45. PROMINENCE OF JOINT:

FIELD NOTE: Sample Coaldale No. 2 AERIAL PHOTO #
(Indicates reference to cover notes)

1. SURFACE ALTITUDE: 5,100 2. DATE: 9 / 21 / 76

3. TYPE OF DESCRIPTION: 4. QUALITY OF EXPOSURE: Fair

5. ELEVATION OF BED: 6. TOP OR BASE: 7. PRECISION OF ELEVATION:

DESCRIPTION OF COAL BED

8. NAME OF COAL BED: D bed 9. RELIABILITY OF NAME: very good

10. NAME OF MINE: unknown 11. NO. OF SAMPLES SUBMITTED FOR USE IN ANALYSIS:

12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 13. KIND OF RASS ANALYSIS REQUESTED: 14. SAMPLE TYPE:

15. AVERAGE SLOPE ACROSS BED: 15° 16. AVERAGE SLOPE ABOVE OUTCROP: 15° 17. AVERAGE SLOPE BELOW OUTCROP: 0°

18. THICKNESS OF BED: 36 inches 19. THICKNESS OF PARTINGS: ½ inch 20. THICKNESS COMPLETE: yes

21. COAL THICKNESS FOR RESOURCE CALCULATION: 36 inches 22. QUALITY OF THE THICKNESS DATA: fair

23. LITHOLOGY OF ROOF ROCK: tuff 24. CONTACT WITH COAL BEDS: gradational

25. LITHOLOGY OF FLOOR ROCK: shale 26. CONTACT WITH COAL BEDS: sharp

27. STRIKE OF CLEAT: 28. DIP OF CLEAT: 29. SCALE OF CLEAT:

30. STRIKE OF CLEAT: 31. DIP OF CLEAT:

DESCRIPTION OF STRUCTURAL FEATURES

32. STRIKE OF BEDDING: N30°E 33. DIP OF BEDDING: 35°SE

34. STRUCTURAL FEATURES: 35. DESCRIPTION OF FEATURE:

36. NAME OF FEATURE: 37. POSITION ON FEATURE:

38. STRIKE OF FEATURE: 39. DIP OF FEATURE:

40. STRIKE OF JOINTS: 41. DIP OF JOINTS: 42. PROMINENCE OF JOINTS:

43. STRIKE OF JOINTS: 44. DIP OF JOINTS: 45. PROMINENCE OF JOINTS:

FIELD NOTE: Sample Coaldale No. 3 AERIAL PHOTO #

(Indicates reference to cover notes)

1. SURFACE ALTITUDE: 4,990 2. DATE: 9 / 21 / 1976

3. TYPE OF DESCRIPTION: 4. QUALITY OF EXPOSURE: fair

5. ELEVATION OF BED: 6. TOP OR BASE: 7. PRECISION OF ELEVATION:

DESCRIPTION OF COAL BED

8. NAME OF COAL BED: C bed 9. RELIABILITY OF NAME: good

10. NAME OF MINE: 11. NO. OF SAMPLES SUBMITTED FOR USE IN ANALYSIS:

12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 13. KIND OF RASS ANALYSIS REQUESTED: 14. SAMPLE TYPE: channel

15. AVERAGE SLOPE ACROSS BED: 15° 16. AVERAGE SLOPE ABOVE OUTCROP: 15° 17. AVERAGE SLOPE BELOW OUTCROP: 10°

18. THICKNESS OF BED: 30-36 inches 19. THICKNESS OF PARTINGS: ½-1 inch 20. THICKNESS COMPLETE?: yes

21. COAL THICKNESS FOR RESOURCE CALCULATION: 36 inches 22. QUALITY OF THE THICKNESS DATA: good

23. LITHOLOGY OF ROOF ROCK: carbonaceous shale 24. CONTACT WITH COAL BED: sharp

25. LITHOLOGY OF FLOOR ROCK: carbonaceous shale 26. CONTACT WITH COAL BED: sharp

27. STRIKE OF CLEAT: 28. DIP OF CLEAT: 29. SCALE OF CLEAT:

30. STRIKE OF CLEAT: 31. DIP OF CLEAT:

DESCRIPTION OF STRUCTURAL FEATURES

32. STRIKE OF BEDDING: N0°E 33. DIP OF BEDDING: 22°E

34. STRUCTURAL FEATURES: fold 35. DESCRIPTION OF FEATURE:

36. NAME OF FEATURE:

37. POSITION ON FEATURE:

38. STRIKE OF FEATURE:

39. DIP OF FEATURE:

40. STRIKE OF JOINT: 41. DIP OF JOINT: 42. PROMINENCE OF JOINT:

43. STRIKE OF JOINT: 44. DIP OF JOINT: 45. PROMINENCE OF JOINT:

DESCRIPTION OF ROCK UNIT

*46. FORMATION, MEMBER, OR BED NAME: Esmeralda Fm.

*47. POSITION OF UNIT: unknown

*48. LITHOLOGY: volcaniclastic sediments

*49. THICKNESS: unknown

*50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: _____

*51. KIND OF ANALYSIS REQUESTED: _____

*52. SOURCE OF SAMPLE: _____

*53. FRESH ROCK COLOR: yellowish-gray

*54. WEATHERED ROCK COLORS: _____

*55. GRAIN OR XL. SIZE: _____

*56. GRAIN OR XL. SHAPE: _____

*57. BEDDING CHARACTERISTICS: very thin-bedded

*58. UPPER CONTACT: _____

*59. LOWER CONTACT: _____

*60. WEATHERING CHARACTERISTICS: low rolling hills

*61. FOSSIL TYPES: none

*62. FOSSIL SAMPLE SUBMITTED: _____

*63. DESCRIPTIVE SEDIMENTOLOGY: _____

64. COMMENTS OR ADDITIONAL INFORMATION (specify item number if comment relates to only one item above):

Sample Coaldale No. 1 was taken at Area E, northern incline, 120 feet in the incline. Impure coal, slightly iron-stained. Three partings $\frac{1}{4}$ to 1 inch thick. The incline extends approximately 180 feet further. The coal is probably faulted out. Partings are tuff with some pyrite. Some gypsum noted along coal bed.

Sample Coaldale No. 2 is from Area C, 15 feet down a 35 degree incline. A 3 foot thick coal bed, somewhat distorted by folding and faulting. Coal is high in sulfates here near the surface.

Sample Coaldale No. 3 is from Area E, southern incline, from the north wall at the bottom of the stope. Upper half of sample is dense, dark gray, non-vitreous. Lower half is more vitreous. The bed with the coal rolls to vertical at the base of the stope (where sampled).

NAME: Eldorado Canyon Mine

STATE: Mine

COUNTY: Carson City

QUAD NAME: Dayton, Nevada QUAD SERIES: 15 minute

GEOLOGIC BASIN: _____

COAL FIELD: _____

RANK OF COAL: lignite

DATES: (from) 14 Sept., 1976 (to) _____

FIELD NOTE #: (from) _____ (to) _____

Location: SE/4 SW/4 S6, T14N, R22E

Sample Nos.: Eldorado Canyon Mine Nos. 1 and 2

Analysis Completed: _____

<u>FIELD NOTE #</u>		<u>AERIAL PHOTO #</u>			
(Indicates reference to cover notes)					
1. SURFACE ALTITUDE:	5,850'	2. DATE: 14 / 9 / 76			
3. TYPE OF DESCRIPTION:	4. QUALITY OF EXPOSURE: POOR				
5. ELEVATION OF BED:	unknown	6. TOP OR BASE:			
7. PRECISION OF ELEVATION:					
<u>DESCRIPTION OF COAL BED</u>					
8. NAME OF COAL BED:	none	9. RELIABILITY OF NAME:			
10. NAME OF MINE:	Eldorado Canyon Mine	11. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS:			
12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS:	13. KIND OF RASS ANALYSIS REQUESTED:	14. SAMPLE TYPE:			
15. AVERAGE SLOPE ACROSS BED:	unknown	16. AVERAGE SLOPE ABOVE OUTCROP:	unknown	17. AVERAGE SLOPE BELOW OUTCROP:	unknown
18. THICKNESS OF BED:	unknown	19. THICKNESS OF PARTINGS:	unknown	20. THICKNESS COMPLETE:	unknown
21. COAL THICKNESS FOR RESOURCE CALCULATION:	unknown	22. QUALITY OF THE THICKNESS DATA:			
23. LITHOLOGY OF ROOF ROCK:	claystone	24. CONTACT WITH COAL BED:	unknown		
25. LITHOLOGY OF FLOOR ROCK:	claystone	26. CONTACT WITH COAL BED:	unknown		
27. STRIKE OF CLEAT:	unknown	28. DIP OF CLEAT:	unknown	29. SCALE OF CLEAT:	unknown
30. STRIKE OF CLEAT:	unknown	31. DIP OF CLEAT:	unknown		
<u>DESCRIPTION OF STRUCTURAL FEATURES</u>					
32. STRIKE OF BEDDING:	N-S?	33. DIP OF BEDDING:	20°W?		
34. STRUCTURAL FEATURES:	35. DESCRIPTION OF FEATURES:				
36. NAME OF FEATURE:	37. POSITION ON FEATURE:				
38. STRIKE OF FEATURE:	39. DIP OF FEATURES:				
40. STRIKE OF JOINT:	41. DIP OF JOINT:	42. PROMINENCE OF JOINT:			
43. STRIKE OF JOINT:	44. DIP OF JOINT:	45. PROMINENCE OF JOINT:			

DESCRIPTION OF ROCK UNIT

46. FORMATION, MEMBER, OR BED NAME: none
 47. POSITION OF UNIT: unknown
 48. LITHOLOGY: claystones & tuffs 49. THICKNESS: unknown
 50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 51. KIND OF ANALYSIS REQUESTED: 52. SOURCE OF SAMPLE: mine dumps
 53. FRESH ROCK COLORS: 54. WEATHERED ROCK COLORS:
 55. GRAIN OR XL. SIZE: 56. GRAIN OR XL. SHAPE:
 57. BEDDING CHARACTERISTICS:
 58. UPPER CONTACT: 59. LOWER CONTACT:
 60. WEATHERING CHARACTERISTICS:
 61. FOSSIL TYPES: 62. FOSSIL SAMPLE SUBMITTED:
 63. DESCRIPTIVE SEDIMENTOLOGY:
 64. (REMENTS OR ADDITIONAL INFORMATION (specify item number if comment relates to one of items above))

Examined 14 Sept., 1976.

The only evidence of coal was a caved shaft and a fairly large dump located in SE/4, SW/4, S6, T14N, R22E about 200 feet west of the creek in Eldorado Canyon. The creek bottom is boundary between Carson City and Lyon County. The best access is by way of Johnson Lane south of Carson City. Depth of shaft is unknown. Dump overgrown with trees and recently was somewhat bulldozed. No outcrops of coal. Sample No. 1 was hand picked from the lower part of the dump and No. 2 was hand picked from the middle part of the dump. Some claystone on the dump. Tuffs and andesites in the vicinity. Recent exploration in the vicinity on placer claims. Relationship of the coal-bearing sediments to Tertiary andesites is unknown. The coal-bearing rocks are probably Miocene or younger. This is probably the deeper shaft reported in the literature.

Soil from dump was washed from coal and samples were dried at 40°C. No. 1A and 2A are for analysis, 1B and 2B are for NBMG.

NAME: Elko Area

STATE: Nevada

COUNTY: Elko

QUAD NAME: Elko West

QUAD SERIES: 7½ minute

GEOLOGIC BASIN: Elko

COAL FIELD:

RANK OF COAL:

DATES: (from) 6 Nov., 1975

(to)

FIELD NOTE #:

(from)

(to)

Location: NW/4 S27, T34N, R55E

Sample Nos.: Elko West No. 1

Analysis Completed: X

<u>FIELD NOTE</u>		<u>ATRIAL PHOTO #</u>	
(Indicates reference to cover notes)			
1. SURFACE ALTITUDE:	5,270'		
2. DATE:	11	6	
3. TYPE OF DESCRIPTION:	4. QUALITY OF EXPOSURE: fair		
5. ELEVATION OF BED:	5,270	6. TOP OR BASE: base	
7. PRECISION OF ELEVATION: est.			
<u>DESCRIPTION OF COAL BED</u>			
8. NAME OF COAL BED:	Catlin		
9. RELIABILITY OF NAME:			
10. NAME OF NINE:	Catlin		
11. NO. OF SAMPLES SUBMITTED FOR USW ANALYSIS:			
12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS:	13. KIND OF RASS ANALYSIS REQUESTED:	14. SAMPLE TYPES:	
15. AVERAGE SLOPE ACROSS BED:	22°	16. AVERAGE SLOPE ABOVE OUTCROP:	24°
17. AVERAGE SLOPE BELOW OUTCROP:	20°		
18. THICKNESS OF BED:	0.5'	19. THICKNESS OF PARTINGS:	1/8" shaly
20. THICKNESS COMPLETED:	0.5'		
21. COAL THICKNESS FOR RESOURCE CALCULATION:	22. QUALITY OF THE THICKNESS DATA:		
23. LITHOLOGY OF ROOF ROCK:	oil shale		
24. CONTACT WITH COAL BED:	sharp		
25. LITHOLOGY OF FLOOR ROCK:	oil shale		
26. CONTACT WITH COAL BED:	sharp		
27. STRIKE OF CLEAT:	none		
28. DIP OF CLEAT:	none		
29. SCALE OF CLEAT:			
30. STRIKE OF CLEAT:	31. DIP OF CLEAT:		
<u>DESCRIPTION OF STRUCTURAL FEATURES</u>			
32. STRIKE OF BEDDING:	N10°W		
33. DIP OF BEDDING:	30°E		
34. STRUCTURAL FEATURE:	NA		
35. DESCRIPTION OF FEATURE:			
36. NAME OF FEATURE:	37. POSITION ON FEATURE:		
38. STRIKE OF FEATURE:	39. DIP OF FEATURE:		
40. STRIKE OF JOINT:	41. DIP OF JOINT:	42. PROMINENCE OF JOINT:	
43. STRIKE OF JOINT:	44. DIP OF JOINT:	45. PROMINENCE OF JOINT:	

DESCRIPTION OF ROCK UNIT

46. FORMATION, MEMBER, OR BED NAME: Elko Formation
 47. POSITION OF UNITS:
 48. LITHOLOGY: tuffs & oil shales 49. THICKNESS:
 50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 51. KIND OF ANALYSIS REQUESTED:
 52. SOURCE OF SAMPLE:
 53. FRESH ROCK COLOR: olive-gray to olive-black 54. WEATHERED ROCK COLOR: very light gray
 55. GRAIN OR XL. SIZE:
 56. GRAIN OR XL. SHAPE:
 57. BEDDING CHARACTERISTICS: thinly laminated
 58. UPPER CONTACT:
 59. LOWER CONTACT:
 60. WEATHERING CHARACTERISTICS: shaly
 61. FOSSIL TYPES: reeds 62. FOSSIL SAMPLE SUBMITTED:
 63. DESCRIPTIVE SEDIMENTOLOGY:
 64. COMMENTS OR ADDITIONAL INFORMATION (specify item number if comment relates to one of items above)

Location of sampled area is near old Catlin Oil Shale workings and plant. NW/4 S27, T34N, R55E. Large dumps present; old ruins of a retort just to west of extensive waste dumps. To the east are dumps of burned shale. Beds: N10°W, 30°E. Approximately 10 feet of oil shale, 6-8 feet of tuff and then about 10 feet of oil shale above. A few 6 inch beds of low-grade lignite are in the oil shale sequence. The entire sequence is overlain by a thick tuff.

NAME: Gamma Prospect

STATE: Nevada

COUNTY: Churchill

QUAD NAME: Buffalo Summit QUAD SERIES: 7½ minute

GEOLOGIC BASIN: Buffalo Canyon

COAL FIELD:

RANK OF COAL: lignite

DATES: (from) 6 Oct., 1976 (to)

FIELD NOTE #: (from) _____ (to) _____

Location: C, S35, T16N, R37E

Sample Nos.: Gamma No. 1

Analysis Completed: _____

FIELD NOTE # **AERIAL PHOTO #**
(Indicates reference to cover notes)

1. SURFACE
ALTITUDE: 6,280 feet 2. DATE: 10 / 7 / 1976

3. TYPE OF DESCRIPTION: _____ . 4. QUALITY OF EXPOSURE: good .

8. ELEVATION OF BED: 6,280 feet 9. TOP OR BASE: _____ 10. PRECISION OF ELEVATION: fair

DESCRIPTION OF COAL BED

**8. NAME OF
COAL BED:** none **9. RELIABILITY
OF NAME:**

10. NAME OF
MINE: Gamma Prospect 11. NO. OF SAMPLES SUBMIT-
TED FOR USW ANALYSIS:

12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: _____ 13. KIND OF RASS ANALYSIS REQUESTED: _____ 14. SAMPLE TYPE: channel

15. AVERAGE SLOPE ACROSS BED: 25° 16. AVERAGE SLOPE ABOVE OUTCROP: 60° 17. AVERAGE SLOPE BELOW OUTCROP: 20°

18. THICKNESS OF BED: 22 inches 19. THICKNESS OF PARTINGS: 1 inch 20. THICKNESS COMPLETED: no

21. COAL THICKNESS FOR RESOURCE CALCULATION: 2 feet 22. QUALITY OF THE THICKNESS DATA: good

23. LITHOLOGY OF
ROOF ROCK: claystone

24. CONTACT WITH
COAL BED: sharp

*25. LITHOLOGY OF FLOOR ROCK: claystone 26. CONTACT WITH COAL BED: sharp

27. STRIKE OF
CLEAT: 28. DIP OF
CLEAT: 29. SCALE OF
CLEAT:

**30. STRIKE OF
SLEAT** **31. DIP OF
SLEAT**

DESCRIPTION OF STRUCTURAL FEATURES

32. STRIKE OF BEDDING: E-W 33. DIP OF BEDDING: 2° N

*34. STRUCTURAL
FEATURE; *35. DESCRIPTION
OF FEATURE;

36. NAME OF
FEATURE. 37. POSITION ON
FEATURE.

38. STRIKE OF
FEATURES 39. DIP OF
FEATURES

40. STRIKE OF
PONANT 41. DIP OF
PONANT 42. PROMINENCE
OF PONANT

43. STRIKE OF
44. DIP OF
45. PROSINENCE

DESCRIPTION OF ROCK UNIT

*46. FORMATION, MEMBER, OR BED NAME: None

*47. POSITION OF UNIT:

*48. LITHOLOGY: claystones & sandstones

*49. THICKNESS:

*50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS:

*51. KIND OF ANALYSIS REQUESTED:

*52. SOURCE OF SAMPLE:

*53. FRESH ROCK COLOR: yellowish-gray

*54. WEATHERED ROCK COLOR: yellowish gray

*55. GRAIN OR XL. SIZE:

*56. GRAIN OR XL. SHAPE:

*57. BEDDING CHARACTERISTICS: very thin-bedded

*58. UPPER CONTACT:

*59. LOWER CONTACT:

*60. WEATHERING CHARACTERISTICS:

*61. FOSSIL TYPES:

*62. FOSSIL SAMPLE SUBMITTED:

*63. DESCRIPTIVE SEDIMENTOLOGY:

64. COMMENTS OR ADDITIONAL INFORMATION (specify item number if comment relates to one of items above):

The sample locality is C, Sec. 35, T16N, R37E. It is 2,600 feet west-northwest of the Gold Trail Mine.

The lignite beds crop out on the lower slopes in a series of claystones and sandstones. The area is one of badlands topography.

The sample was taken at locality D on fig. 2 in TEM Report 226 (surface outcrop). There were several coal beds over a 3 foot interval. We took a 22 inch channel sample in the central part of the best material.

Radioactivity is up to 4 times background. The bed dips 2° N at the sample area. The main workings at locality A (TEM 226) are an inclined adit on beds at approximately 20°.

NAME: Lewis

STATE: Nevada

COUNTY: Lyon

QUAD NAME: Mt. Grant QUAD SERIES: 15 minute

GEOLOGIC BASIN: Coal Valley

COAL FIELD:

RANK OF COAL: Sub-bituminous

DATES: (from) 24 Nov., 1976 (to)

FIELD NOTE #: (from) (to)

Location: S36, T8N, R27E

Sample Nos.: Lewis No. 1 and No. 2

Analysis Completed:

FIELD NOTE

ATRIAL PHOTO

(Indicates reference to cover notes)

1. SURFACE ALTITUDE: 5,590' 2. DATE: 11 / 24 / 76

3. TYPE OF DESCRIPTION: 4. QUALITY OF EXPOSURE: good

5. ELEVATION OF BED: 5,590' 6. TOP OR BASE: 7. PRECISION OF ELEVATION:

DESCRIPTION OF COAL BED

8. NAME OF COAL BED: none 9. RELIABILITY OF NAME:

10. NAME OF MINE: Lewis Coal Mine 11. NO. OF SAMPLES SUBMITTED FOR USW ANALYSIS:

12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 13. KIND OF RASS ANALYSIS REQUESTED: 14. SAMPLE TYPE: channel

15. AVERAGE SLOPE ACROSS BED: 5° 16. AVERAGE SLOPE ABOVE OUTCROP: 10° 17. AVERAGE SLOPE BELOW OUTCROP: 0°

18. THICKNESS OF BED: 6 feet 19. THICKNESS OF PARTINGS: 20. THICKNESS COMPLETER:

21. COAL THICKNESS FOR RESOURCE CALCULATION: 6 feet 22. QUALITY OF THE THICKNESS DATA: good

23. LITHOLOGY OF ROOF ROCK: light-gray claystone 24. CONTACT WITH COAL BED: sharp

25. LITHOLOGY OF FLOOR ROCK: brownish-gray silt-stone 26. CONTACT WITH COAL BED: sharp

27. STRIKE OF CLEAT: 28. DIP OF CLEAT: 29. SCALE OF CLEAT:

30. STRIKE OF CLEAT: 31. DIP OF CLEAT:

DESCRIPTION OF STRUCTURAL FEATURES

32. STRIKE OF BEDDING: N15°E 33. DIP OF BEDDING: 20°NW

34. STRUCTURAL FEATURE: 35. DESCRIPTION OF FEATURE:

36. NAME OF FEATURE: 37. POSITION ON FEATURE:

38. STRIKE OF FEATURE: 39. DIP OF FEATURE:

40. STRIKE OF JOINT: 41. DIP OF JOINT: 42. PROMINENCE OF JOINT:

43. STRIKE OF JOINT: 44. DIP OF JOINT: 45. PROMINENCE OF JOINT:

DESCRIPTION OF ROCK UNIT

46. FORMATION, MEMBER, OR BED NAME: Coal Valley Formation

47. POSITION OF UNIT: sandstone, diatomaceous

48. LITHOLOGY: shale, adesite tuff 49. THICKNESS: 3,325'

50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 51. KIND OF ANALYSIS REQUESTED: SOURCE OF SAMPLES:

53. FRESH ROCK COLOR: 54. WEATHERED ROCK COLOR: inclined shaft

55. GRAIN OR XL. SIZE: 56. GRAIN OR XL. SHAPE:

57. PIDDING CHARACTERISTICS:

58. UPPER CONTACT: 59. LOWER CONTACT:

60. WEATHERING CHARACTERISTICS:

61. FOSSIL TYPES: aquatic plants (Berry, 1927) 62. FOSSIL SAMPLES SUBMITTED:

63. DESCRIPTIVE SEDIMENTOLOGY:

64. RECORDS OR ADDITIONAL INFORMATION (specify if there is no contact relative to rock unit above):

Examined 24 Nov., 1976

Two coal properties were examined in S36, T8N, R27E. These are shown on the Mt. Grant 15 minute sheet, the south property labeled with the word tunnel and the north having an adit symbol and an abandoned building. Workings at the south property (SW/4, S36) consist of 2 main adits. The lower probably produced most of the coal and has an extensive dump. A coal bin is near this dump. The coal bed attitude is N-S, 22°W. The upper adit on the same bed is approximately 100 feet southeast and 20 feet higher. Both adits are completely caved at the portal. About 4 feet of poorly exposed coal is seen at the surface. Another coal bed is present 300-400 feet west of the adit, but no workings are along it. Several faults are seen in the hills to the southwest.

The north property (C, S36) has an old building and an inclined shaft bearing N70W-12°. The shaft follows down a 6 foot width of coaly material. Samples Lewis No. 1 and 2 were taken on the left wall, 90 feet down, where the incline flattens and the coal disappears into the floor. A nearly horizontal incline continues, but it is impassable. A board in the sheeting of the shed on the property was a sign, possibly for the mine, and says: Mattinson Extension Coal & Oil Co. Two faults were noted in the incline at the north property with offsets of approximately 5 feet, west side down.

Sample Lewis No. 1: channel sample across 36 inch bed, N15E, 20°NW. Footwall is brownish-gray siltstone, sharp contact with coal. Above sampled zone is a 2 inch parting of carbonaceous siltstone (not sampled). Some $\frac{1}{2}$ inch shaly layers in the coal. Gypsum and melaterite present.

DESCRIPTION OF ROCK UNIT

*46. FORMATION, MEMBER, OR BED NAME:		
*47. POSITION OF UNITS:		
*48. LITHOLOGY:	*49. THICKNESS:	
*50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS:	*51. KIND OF ANALYSIS REQUESTED:	*52. SOURCE OF SAMPLES:
*53. FRESH ROCK COLOR:	*54. WEATHERED ROCK COLOR:	
*55. GRAIN OR XL. SIZE:	*56. GRAIN OR XL. SHAPE:	
*57. BEDDING CHARACTERISTICS:		
*58. UPPER CONTACTS:	*59. LOWER CONTACTS:	
*60. WEATHERING CHARACTERISTICS:		
*61. FOSSIL TYPES:	*62. FOSSIL SAMPLE SUBMITTEDS:	
*63. DESCRIPTIVE SEDIMENTOLOGY:		
*64. COMMENTS OR ADDITIONAL INFORMATION (Specify those entries if comment relates to one of items above)		

Lewis cont.

Sample Lewis No. 2: channel sample beginning above the 2 inch parting described in Lewis No. 1. The sampled thickness is 15 inches and the coal is in sharp contact with overlying light-gray claystone. Coal as in Lewis No. 1.

Samples Lewis No. 1A and 2A are for analysis, No. 1B and 2B are for NBMG.

NAME: Pancake Coal Mine

STATE: Nevada

COUNTY: White Pine

QUAD NAME: Pancake Summit QUAD SERIES: 15 minute

GEOLOGIC BASIN:

COAL FIELD:

RANK OF COAL:

DATES: (from) 4 Oct., 1975 (to)

FIELD NOTE #: (from) (to)

Location: S27, 28, T18N, R56E

Sample Nos.: Pancake North No. 1

Analysis Completed: X

<u>FIELD NOTE</u>		<u>ATRIAL PHOTO</u>	
(Indicates reference to cover notes)			
1. SURFACE ALTITUDE:	6,720'	2. DATE:	11 / 4 / 75
3. TYPE OF DESCRIPTION:	4. QUALITY OF EXPOSURE:		
5. ELEVATION OF BED:	6. TOP OR BASE:	7. PRECISION OF ELEVATION:	
<u>DESCRIPTION OF COAL BED</u>			
8. NAME OF COAL BEDS:	9. RELIABILITY OF NAME:		
10. NAME OF MINE:	11. NO. OF SAMPLES SUBMITTED FOR USM ANALYSIS:		
12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS:	13. KIND OF RASS ANALYSIS REQUESTED:	14. SAMPLE TYPE:	
15. AVERAGE SLOPE ACROSS BED:	18°	16. AVERAGE SLOPE ABOVE OUTCROP:	18°
18. THICKNESS OF BED:	19. THICKNESS OF PARTINGS:	20. THICKNESS COMPLETE?:	
21. COAL THICKNESS FOR RESOURCE CALCULATION:	22. QUALITY OF THE THICKNESS DATA:		
23. LITHOLOGY OF ROOF ROCK:	24. CONTACT WITH COAL BED:		
25. LITHOLOGY OF FLOOR ROCK:	26. CONTACT WITH COAL BED:		
27. STRIKE OF CLEAT:	28. DIP OF CLEAT:	29. SCALE OF CLEAT:	
30. STRIKE OF CLEAT:	31. DIP OF CLEAT:		
<u>DESCRIPTION OF STRUCTURAL FEATURES</u>			
32. STRIKE OF BEDDING:	33. DIP OF BEDDING:		
34. STRUCTURAL FEATURES:	35. DESCRIPTION OF FEATURES:		
36. NAME OF FEATURES:	37. POSITION ON FEATURES:		
38. STRIKE OF FEATURES:	39. DIP OF FEATURES:		
40. STRIKE OF JOINTS:	41. DIP OF JOINTS:	42. PROMINENCE OF JOINTS:	
43. STRIKE OF JOINTS:	44. DIP OF JOINTS:	45. PROMINENCE OF JOINTS:	

DESCRIPTION OF ROCK UNIT

46. FORMATION, MEMBER, OR BED NAME: Diamond Peak Fm 6 (Mississippian)
 47. POSITION OF UNIT: near top
 48. LITHOLOGY: congl., sandstone & shale 49. THICKNESS: unknown
 50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS:
 51. KIND OF ANALYSIS REQUESTED:
 52. SOURCE OF SAMPLE:
 53. FRESH ROCK COLOR:
 54. WEATHERED ROCK COLOR:
 55. GRAIN OR XL. SIZE:
 56. GRAIN OR XL. SHAPE:
 57. BEDDING CHARACTERISTICS:
 58. UPPER CONTACT:
 59. LOWER CONTACT:
 60. WEATHERING CHARACTERISTICS:
 61. FOSSIL TYPES: brachiopods & trace fossils 62. FOSSIL SAMPLE SUBMITTED?
 63. DESCRIPTIVE SEDIMENTOLOGY:
 64. COMMENTS OR ADDITIONAL INFORMATION (specify item number if comment relates to rock of strata above)

Pancake Coal Mine, North Workings.

At prospect symbol SW/4 NE/4 S28, T18N, R56E. The only coal observed is on a dump on the lower slope, apparently from a caved adit. The Pancake North No. 1 sample is a character sample of coal from this dump, and was later hand picked. Other workings are about 200 feet west of the caved adit? and about 75 feet higher in elevation. They consist of a caved shaft and dump. The dump consists of fossiliferous limestone, sandy limestone, calcareous sandstone, conglomerate, and siltstone. No coal was noted here. The shaft is inclined slightly to the east. Beds - N10°W, 25°SW. The coal is in limestone, just above a conglomerate. Directly adjoining the coal is a fissile claystone.

Another adit is found approximately 1,400 feet south of the sample locality. A fairly large dump is present, but no coal is exposed; no coal on dump. No coal outcrops between north workings and here.

Panckae Coal Mine, South Worings

NW/4 SE/4 S33, T18N, R56E. Inclined shaft (approx. 40° west) and dump. Only a very small amount of coaly material in a large amount of carbonaceous shale on the dump. Some selenite seen. Beds: due N, 25W.

The "coal" bed seems to be within the conglomerate unit, but nearly at its top. A 3 foot thick conglomerate bed

DESCRIPTION OF ROCK UNIT

46. FORMATION, MEMBER, OR BED NAME: _____

47. POSITION OF UNIT: _____

48. LITHOLOGY: _____ 49. THICKNESS: _____

50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: _____ 51. KIND OF ANALYSIS REQUESTED: _____ 52. SOURCE OF SAMPLE: _____

53. FRESH ROCK COLOR: _____ 54. WEATHERED ROCK COLOR: _____

55. GRAIN OR XL. SIZE: _____ 56. GRAIN OR XL. SHAPE: _____

57. BEDDING CHARACTERISTICS: _____

58. UPPER CONTACT: _____ 59. LOWER CONTACT: _____

60. WEATHERING CHARACTERISTICS: _____

61. FOSSIL TYPES: _____ 62. FOSSIL SAMPLE SUBMITTED: _____

63. DESCRIPTIVE SEDIMENTOLOGY: _____

64. COMMENTS OR ADDITIONAL INFORMATION (specify item number if comment relates to one of items above): _____

Pancake Coal Mine, South Workings cont.

overlies the shale horizon which apparently contains the "coal". Then, above this is fossiliferous limestone. These workings are at nearly the same stratigraphic level as the north workings.

NAME: Verdi

STATE: Nevada

COUNTY: Washoe

QUAD
NAME: Verdi

QUAD
SERIES: 7½ minute

GEOLOGIC
BASIN:

COAL
FIELD:

RANK OF
COAL:

DATES: (from) 25 Aug., 1975 (to)

FIELD
NOTE #: (from) (to)

Location: NE/4 S9, T19N, R18E

Sample Nos.: Verdi: No. 1 and No. 2

Analysis Completed: X

FIELD NOTE: Verdi Sample No. 1A AERIAL PHOTO #
 (Indicates reference to cover notes)

1. SURFACE ALTITUDE: 4,995' 2. DATES 8 / 25 / 75

3. TYPE OF DESCRIPTION: surface exposure 4. QUALITY OF EXPOSURE: weathered

5. ELEVATION OF BED: 4,995' 6. TOP OR BASE: base 7. PRECISION OF ELEVATION: T

DESCRIPTION OF COAL BED

8. NAME OF COAL BED: _____ 9. RELIABILITY OF NAME: _____

10. NAME OF MINES: _____ 11. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 1

12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: 1 13. KIND OF RASS ANALYSIS REQUESTED: 1 14. SAMPLE TYPE: _____

15. AVERAGE SLOPE ACROSS BED: 15° 16. AVERAGE SLOPE ABOVE OUTCROP: 15° 17. AVERAGE SLOPE BELOW OUTCROP: 15°

18. THICKNESS OF BED: 3.0' 19. THICKNESS OF PARTINGS: 1" 20. THICKNESS COMPLETE?: yes

21. COAL THICKNESS FOR RESOURCE CALCULATION: 3.0' 22. QUALITY OF THE THICKNESS DATA: precise

23. LITHOLOGY OF ROOF ROCK: weakly consolidated feldspathic ss. 24. CONTACT WITH COAL BED: sharp & smooth; regular

25. LITHOLOGY OF FLOOR ROCK: same as roof 26. CONTACT WITH COAL BED: sharp & regular

27. STRIKE OF CLEAT: none 28. DIP OF CLEAT: _____ 29. SCALE OF CLEAT: _____

30. STRIKE OF CLEAT: _____ 31. DIP OF CLEAT: _____

DESCRIPTION OF STRUCTURAL FEATURES

32. STRIKE OF BEDDING: N65°E 33. DIP OF BEDDING: 25°NW

34. STRUCTURAL FEATURES: none observed 35. DESCRIPTION OF FEATURES: _____

36. NAME OF FEATURES: _____ 37. POSITION ON FEATURES: _____

38. STRIKE OF FEATURES: _____ 39. DIP OF FEATURES: _____

40. STRIKE OF JOINTS: _____ 41. DIP OF JOINT: _____ 42. PROMINENCE OF JOINTS: _____

43. STRIKE OF JOINTS: _____ 44. DIP OF JOINT: _____ 45. PROMINENCE OF JOINTS: _____

FIELD NOTE: Verdi Sample No. 2A ATRIAL PHOTO #
 (Indicates reference to cover notes)

1. SURFACE ALTITUDE: 5,020' 2. DATE: 8 / 25 / 75

3. TYPE OF DESCRIPTION: Surface exposure 4. QUALITY OF EXPOSURE: weathered

5. ELEVATION OF BED: 5,020' 6. TOP OR BASE: base 7. PRECISION OF ELEVATION: T

DESCRIPTION OF COAL BED

8. NAME OF COAL BED: _____ 9. RELIABILITY OF NAME: _____

10. NAME OF MINER: _____ 11. NO. OF SAMPLES SUBMITTED FOR USE IN ANALYSIS: 1

12. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: _____ 13. KIND OF RASS ANALYSIS REQUESTED: _____ 14. SAMPLE TYPE: channel

15. AVERAGE SLOPE ACROSS BED: 20° 16. AVERAGE SLOPE ABOVE OUTCROP: 20° 17. AVERAGE SLOPE BELOW OUTCROP: 0°

18. THICKNESS OF BED: 2.0' 19. THICKNESS OF PARTINGS: none 20. THICKNESS COMPLETE?: yes

21. COAL THICKNESS FOR RESOURCE CALCULATION: 2.0' 22. QUALITY OF THE THICKNESS DATA: precise

23. LITHOLOGY OF ROOF ROCK: claystone 24. CONTACT WITH COAL BED: sharp

25. LITHOLOGY OF FLOOR ROCK: claystone 26. CONTACT WITH COAL BED: gradational

27. STRIKE OF CLEAT: none 28. DIP OF CLEAT: _____ 29. SCALE OF CLEAT: _____

30. STRIKE OF CLEAT: _____ 31. DIP OF CLEAT: _____

DESCRIPTION OF STRUCTURAL FEATURES

32. STRIKE OF BEDDING: N40°W 33. DIP OF BEDDING: 25°SW

34. STRUCTURAL FEATURES: none observed 35. DESCRIPTION OF FEATURES: _____

36. NAME OF FEATURES: _____ 37. POSITION ON FEATURES: _____

38. STRIKE OF FEATURES: _____ 39. DIP OF FEATURES: _____

40. STRIKE OF JOINTS: _____ 41. DIP OF JOINTS: _____ 42. PROMINENCE OF JOINTS: _____

43. STRIKE OF JOINTS: _____ 44. DIP OF JOINTS: _____ 45. PROMINENCE OF JOINTS: _____

DESCRIPTION OF ROCK UNIT

*46. FORMATION, MEMBER, OR BED NAME: Sandstone of Hunter Creek(?)

*47. POSITION OF UNIT: unknown

*48. LITHOLOGY: shale, diatomite *49. THICKNESS: unknown

*50. NO. OF SAMPLES SUBMITTED FOR RASS ANALYSIS: *51. KIND OF ANALYSIS REQUESTED: *52. SOURCE OF SAMPLE: channel

*53. FRESH ROCK COLOR: medium gray *54. WEATHERED ROCK COLOR: yellowish-gray

*55. GRAIN OR XL. SIZE: variable *56. GRAIN OR XL. SHAPE: variable

*57. BEDDING CHARACTERISTICS: Thinly bedded with coal seams

*58. UPPER CONTACT: *59. LOWER CONTACT:

*60. WEATHERING CHARACTERISTICS:

*61. FOSSIL TYPES: *62. FOSSIL SAMPLE SUBMITTED:

*63. DESCRIPTIVE SEDIMENTOLOGY:

*64. RECENTS OR ADDITIONAL INFORMATION (specify the number of recent relative to each of items above):

Verdi Sample No. 1

Point 5-location of Verdi Sample No. 1, along a stream channel, most of country above covered by alluvium, sparse outcrops of country rock including friable sandstone, diatomaceous shale, possibly of sandstone of Hunter Creek. Sample No. 1 came from upper 3 feet and included 2 or 3 one inch interlayers of sandy material. The entire coal sequence seems to be 20-25 feet thick with mostly thin-bedded coal seams in friable feldspathic sandstone. Strike and dip: N65°E, 25°NW, but is variable. Except for the upper 3 feet, the coal makes up only a small percentage of the rock. No evidence of former workings. Sample locality is about 200 feet north of the northern-most pipeline. The formation also has some pebble beds of andesite fragments. Formerly Truckee or Coal Valley Fm. Possibly correlative with sandstone of Hunter Creek.

Point 13 (in vicinity of). A few thin organic-rich beds, none of them as good as sample No. 1. Striking N60°W, 25°SW. Organic-rich beds are very impure clay plus organic material.

Verdi Sample No. 2

Half way between map points 28 and 29. Only exposures are in canyon- reasonably continuous between 28 and 29. S. of 29 of E. side of canyon is old shaft, caved at 6', no rock exposures. Coal bed sample is 2 feet thick, lower contact somewhat gradational, upper contact somewhat sharper. Most of country rock is claystone. 6 or 8 beds of 1 foot or less of very impure coal. To the west, across the road a short distance, there is a probable fault which terminates the coal-bearing unit.

Sample 2A is for analysis, 2B is for NBMG.

COAL ANALYSIS REPORT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Lewis #1A

Lewis #1A

LAB NO. K73617

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D, D187046, FACE CHANNEL -

CAN NO: -

OPERATOR: -

MINE: LEWIS
STATE: NV COUNTY: LYON
TOWN: -

BED: UNNAMED

LEWIS #1A

DATE OF SAMPLING: 5-17-77 DATE RECEIVED: 5-31-77 DATE OF REPORT: 6-16-77
COLLECTOR: V. SWANSONAIR DRY LOSS 8.0
COAL GAS RECD.1 COAL MOIST FREE! COAL MOIST, ASH FREE!

PROXIMATE ANALYSIS

MOISTURE	24.0	N/A	N/A
VOLATILE MATTER	34.6	45.5	68.8
FIXED CARBON	15.6	20.6	31.2
ASH	25.8	33.9	N/A

ULTIMATE ANALYSIS

HYDROGEN	4.9	3.0	4.5
CARBON	25.1	33.0	50.0
NITROGEN	.6	.8	1.2
SULFUR	5.4	7.0	10.7
OXYGEN (IND)	38.2	22.2	33.6

HEATING VALUE(BTU/LB) 4132 5439 8232
ASH - INITIAL DEFORMATION 2005 F 2105 F 2210 F

SULFUR FORMS BY ATOMIC ABSORPTION

SULFATE	3.62	4.77	7.22
PYRITIC	.22	.29	.44
ORGANIC	1.51	1.99	3.01
FREE SWELLING INDEX	.0	.0	.0

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COAL ANALYSIS REPORT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D, D187047, FACE CHANNEL -

OPERATOR: -
STATE: NV COUNTY: LYON
TOWN: -MINE: LEWIS
BED: UNNAMED
TOWNS: Lewis #2DATE OF SAMPLING: 5-17-77 DATE RECEIVED: 5-31-77 DATE OF REPORT: 6-16-77
COLLECTOR: V. SWANSON

AIR DRY LOSS 8.5

COAL
[AS REC'D.] COAL
COAL
[MOIST FREE] COAL
COAL
[MOIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	22.6	N/A	N/A
VOLATILE MATTER	34.5	44.6	56.9
FIXED CARBON	26.1	33.7	43.1
ASH	16.8	21.7	N/A

ULTIMATE ANALYSIS

HYDROGEN	5.5	3.8	4.9
CARBON	36.0	46.5	59.3
NITROGEN	.7	.9	1.2
SULFUR	4.1	5.3	6.7
OXYGEN [IND]	37.0	21.8	27.9

HEATING VALUE [BTU/LB] 5996 7744 9890
ASH - INITIAL DEFORMATION 2110 F
SOFTENING TEMP 2210 F
FLUID TEMP 2300 FSULFUR FORMS BY ATOMIC ABSORPTION
SULFATE 2.02 2.61 3.33
PYRITIC .13 .17 .21
ORGANIC 1.94 2.50 3.20
FREE SWELLING INDEX .0

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COAL ANALYSIS REPORT

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Coal/dale #1A + #3A

Coal/dale #1A + #3A
LAB NO. 73613

(40)

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D, D187048-049, COMPOSITE -

CAN NO: -

MINE: -

Cobbold #1A

BED: "C"

TOWN: -

STATE: NY COUNTY: ESMERALDA

COLLECTOR: V. SWANSON

DATE OF SAMPLING: 5-17-77 DATE RECEIVED: 5-31-77 DATE OF REPORT: 6-16-77

d #3A

AIR DRY LOSS .0 COAL [AS RECD.1] COAL [MOIST FREE] COAL [MDIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	5.2	N/A	N/A
VOLATILE MATTER	26.8	22.0	52.0
FIXED CARBON	19.3	20.3	48.0
ASH	54.7	57.7	N/A

ULTIMATE ANALYSIS

HYDROGEN	2.8	2.4	5.6
CARBON	27.8	29.4	69.5
NITROGEN	.8	.8	1.9
SULFUR	1.9	2.0	4.6
OXYGEN (INDI)	12.0	7.8	18.3

HEATING VALUE/LB/U..... 4701

ASH - INITIAL DEFORMATION 2715 F

SOFTENING TEMP. 2800+F

FLUID TEMP. 2800+F

..... 4960

..... 11723

SULFUR FORMS BY ATOMIC ABSORPTION

SULFATE	.89	.94	2.22
PYRITIC	.55	.58	1.37
ORGANIC	.42	.44	1.05

(40)

COAL ANALYSIS REPORT

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Coaldale #2A

LAB NO. Coaldale #2A
L3620

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D, D187050, OUTCROP FACE -

CAN NO: -

OPERATOR: -

STATE: NY COUNTY: ESMERALDA

MINE: -

TOWN: -

BED: "D"

2

DATE OF SAMPLING: 5-17-77 DATE RECEIVED: 5-31-77 DATE OF REPORT: 6-16-77

COLLECTOR: V. SWANSON

AIR DRY LOSS .0

COAL LAS RECD. I COAL COAL
[MOIST FREE] [MOIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	5.2	.....	N/A	.....	N/A
VOLATILE MATTER	24.2	.....	25.6	.....	51.6
FIXED CARBON	22.8	.....	24.0	.....	48.4
ASH	47.8	.....	50.4	.....	N/A

ULTIMATE ANALYSIS

HYDROGEN	3.0	.....	2.5	.....	5.1
CARBON	30.2	.....	31.9	.....	64.3
NITROGEN	.6	.....	.6	.....	1.2
SULFUR	4.3	.....	4.6	.....	9.2
OXYGEN [IND]	14.1	.....	10.0	.....	20.1

HEATING VALUE(BTU/LB) 5064 5344 10777

ASH - INITIAL DEFORMATION 2505 F
SOTENING TEMP 2605 F
FLUID TEMP 2720 FSULFUR FORMS BY ATOMIC ABSORPTION
SULFATE 1.93 2.04 4.11
PYRITIC 21 22 45
ORGANIC 2.19 2.31 4.66

(4)

COAL ANALYSIS REPORT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Sample # 1A
Gamma # 1A

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D, D187051, OUTCROP FACE -

CAN NO: -

LAB NO. K73621

OPERATOR: -
STATE: NV COUNTY: CHURCHILL
TOWN: -DATE OF SAMPLING: 5-17-77 DATE RECEIVED: 5-31-77 DATE OF REPORT: 6-16-77
COLLECTOR: V. SWANSONAIR DRY LOSS .2
COAL [AS RECD.] COAL MOIST FREE [MOIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	13.3	N/A	N/A
VOLATILE MATTER	33.4	38.6	84.9
FIXED CARBON	6.0	6.8	15.1
ASH	47.3	54.6	N/A

ULTIMATE ANALYSIS

HYDROGEN	3.3	2.1	4.6
CARBON	13.3	15.3	33.7
NITROGEN	.5	.6	1.4
SULFUR	5.6	6.4	14.2
OXYGEN (INDI)	30.0	21.0	46.1

HEATING VALUE(BTU/LB) 1749
ASH - INITIAL DEFORMATION 2355 F
SOFTENING TEMP 2455 F
FLUID TEMP 2555 F

SULFUR FORMS BY ATOMIC ABSORPTION

SULFATE	4.96	5.72	12.60
PYRITIC	.14	.16	.35
ORGANIC	.48	.55	1.22

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COAL ANALYSIS REPORT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D, D187052-053, COMPOSITE -
CAN NO: -
CanyonOPERATOR: -
STATE: NV COUNTY: ORMSBY
TOWN: -DATE OF SAMPLING: 5-17-77 DATE RECEIVED: 5-31-77 DATE OF REPORT: 6-9-77
COLLECTOR: V. SWANSONAIR DRY LOSS 5.9
COAL LAS RECD. 1 COAL COAL
[MOIST FREE] [MOIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	18.6	.....	N/A	.....	N/A
VOLATILE MATTER	28.6	.....	35.2	.....	60.2
FIXED CARBON	19.0	.....	23.3	.....	39.8
ASH	33.8	.....	41.5	.....	N/A

ULTIMATE ANALYSIS

HYDROGEN	4.7	.....	3.3	.....	5.6
CARBON	32.1	.....	39.5	.....	67.5
NITROGEN	.6	.....	.6	.....	1.4
SULFUR	.8	.....	.9	.....	1.6
OXYGEN [IND]	27.9	.....	14.0	.....	23.9

HEATING VALUE[BTU/LB] 5428 6670 11402
ASH - INITIAL DEFORMATION 2245 F
SOFTENING TEMP 2355 F
FLUID TEMP 2445 F

SULFUR FORMS BY ATOMIC ABSORPTION

SULFATE	.080916
PYRITIC	.111424
ORGANIC	.5771	1.21

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COAL ANALYSIS REPORT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Verdi #1A

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D-D179400, COAL, FACE CHAN CAN

OPERATOR: -
STATE: NV COUNTY: WASHOE
TOWN: -

DATE OF SAMPLING: 12/15/75 DATE RECEIVED: 10-13-76 DATE OF REPORT: 11-5-76

COLLECTOR: SWANSON

AIR DRY LOSS 24.9
[AS RECD.] [MOIST FREE] [MOIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	31.2	.....	N/A	.....	N/A
VOLATILE MATTER	17.3	.....	25.2	.....	71.0
FIXED CARBON	7.1	.....	10.3	.....	29.0
ASH	44.4	.....	64.5	.....	N/A

ULTIMATE ANALYSIS

HYDROGEN	4.9	.....	2.0	.....	5.7
CARBON	14.4	.....	20.9	.....	59.0
NITROGEN	.5	.....	.7	.....	1.9
SULFUR	.3	.....	.5	.....	1.4
OXYGEN [INDI]	35.5	.....	11.3	.....	31.9
ASH	44.4	.....	64.5	.....	N/A

HEATING VALUE(BTU/LB) 2278 3309 9335
 ASH - INITIAL DEFORMATION 2160 F
 SOFTENING TEMP 2270 F
 FLUID TEMP 2385 F

SULFUR FORMS BY ATOMIC ABSORPTION

SULPHATE	1	.....	2	.....	.5
PYRITIC	.0	.....	.0	.....	.1
ORGANIC	.2	.....	.3	.....	.8

Verdi #2A

BUREAU OF MINES



LAB NO. K67737 Verdi #2A

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS,D,D179401,COAL,FACE CHAN CAN NO

OPERATOR: -

STATE: NV COUNTY: WASHOE

TOWN: -

MINE: -
BED: UNNAMED

DATE OF SAMPLING: 12/15/75 DATE RECEIVED: 10-13-76 DATE OF REPORT: 11-5-76

COLLECTOR: SWANSON

AIR DRY LOSS 38.3 LAS RECD. []

COAL COAL

COAL

COAL

COAL

COAL

PROXIMATE ANALYSIS

MOISTURE	44.4	N/A	N/A
VOLATILE MATTER	15.7	28.2	66.1
FIXED CARBON	8.0	14.5	33.9
ASH	31.9	37.3	N/A

ULTIMATE ANALYSIS

HYDROGEN	6.3	2.5	5.9
CARBON	14.8	26.5	62.2
NITROGEN	.4	.8	1.6
SULFUR	.3	.5	1.2
OXYGEN [IND]	46.3	12.3	28.9
ASH	31.9	57.3	N/A

HEATING VALUE(BTU/LB) 2458 4420 10356

ASH - INITIAL DEFORMATION 2210 F
SOFTENING TEMP 2310 F
FLUID TEMP 2420 F

SULFUR FORMS BY ATOMIC ABSORPTION

SULPHATE	.0	.0	.0
PYRITIC	.0	.1	.2
ORGANIC	.2	.4	1.0

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COAL ANALYSIS REPORT

DEPARTMENT OF THE INTERIOR
BUREAU OF MINESPoncake No. 2A
Poncake North
IA

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS-D-D179403, COAL, GRAB CAN NO: -

LAB NO. K6773-A
Poncake North
IAOPERATOR: -
STATE: NV COUNTY: WHITE PINE
TOWN: -

DATE OF SAMPLING: 12/15/75 DATE RECEIVED: 10-13-76 DATE OF REPORT: 11-11-76

COLLECTOR: SWANSON

AIR DRY LOSS 2.9
[AS REC'D.] MOIST FREE] MOIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	7.9	N/A	N/A
VOLATILE MATTER	31.4	34.1	39.4
FIXED CARBON	48.4	52.6	60.6
ASH	12.3	13.3	N/A

ULTIMATE ANALYSIS

HYDROGEN	4.4	3.8	4.4
CARBON	69.0	65.2	75.2
NITROGEN	.9	1.0	1.1
SULFUR	2.2	2.4	2.8
OXYGEN [INDI]	20.3	14.3	16.5
ASH	12.3	13.3	N/A

HEATING VALUE[BTU/LB] 10213

ASH - INITIAL DEFORMATION 2170 F

SOFTENING TEMP 2280 F

FLUID TEMP 2405 F

SULFUR FORMS BY ATOMIC ABSORPTION

SULPHATE	.3	.4	.4
PYRITIC	.1	.1	.2
ORGANIC	1.7	1.9	2.2

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(8) QUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS
OF THE ASH

Report No. 77L-HSS0131 For 4-5-77 Vern Swanson Spec. Lab. No. Date 5-30-77
Lot No. 26-019* Analyst Plate No. 711729 Job No. PT 47

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, i.e., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

G = Greater than 10%, or greater than value shown
* = Usual limits of determinations do not apply due to use of dilution techniques
- = Not looked for

H = Interference
N = Not detected, at limit of detection or at value shown
L = Detected, but below limit of determination or below value shown

Field No.	Lewis #1A	Lewis #2A	Coaldale #1A	Coaldale #3A	Coaldale #2A	Gamma #1A	Eldorado Canyon #1A	Eldorado Canyon #2A
Lab No.	D187046	D187047	D187048	D187049	D187050	D187051	D187052	D187053
Fe %	5	5	3.	5.	7	7	5.	5.
Mg %	1.5	1.5	.3	.2	.15	.7	1.	.7
Ca %	3.	2.	.7	1.5	1.5	1.5	7.	3.
Ti %	.15	.15	.15	.3	.15	.15	.3	.3
Mn (ppm)	1500	1500	20	300	30	200	700	700
Ag	N	N	N	N	N	N	N	N
As	7000	7000	N	N	N	N	N	N
Au	N	N	N	N	N	N	N	N
B	100	150	150	150	300	70	70	70
Ba	700	500	500	700	700	200	700	700
Be	N	3	N	N	N	3	3	3
Bi	1	N	1	1	1	N	N	N
Cd	1	N	1	1	1	N	N	N
Co	30	30	N5	20	N5	30	10	15
Cr	30	30	10	15	15	7	50	30
Cu	100	70	30	30	50	30	150	100
La	N	N	N	N	N	N	N	N
Mo	100	70	30	20	N	300	30	30
Nb	20	15	20	20	15	20	N	N
Ni	70	50	5	15	N5	20	70	50
Pb	N	N	15	N	15	N	50	30
Pd	N	N	N	N	N	N	N	N
Pt	1	1	1	1	1	1	1	1
Sb	1	1	1	1	1	1	1	1
Sc	10	10	10	10	7	10	15	15
Sn	N	N	N	N	N	N	N	N
Sr	500	500	500	300	300	150	700	300
Te	N	N	N	N	N	N	N	N
U	N	N	N	N	N	N	N	N
V	300	150	150	150	70	150	300	200
W	300	700	N	N	N	2000	N	N
Y	50	70	50	30	20	70	70	70
Zn	N	N	N	N	N	N	N	N
Zr	100	10	300	150	100	70	150	100

Approved

Ray H. Swanson
Project Leader

Approved

R. E. L. Loewen
Branch of Analytical Laboratories

SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS (CONTINUED)

Report No. _____

Job. No. _____ PT 47

Field No.	Lewis #1A	Lewis #2A	Coaldale #1A	Coaldale #3A	Coaldale #2A	Gamma #1A	Eldorado Canyon #1A	Eldorado Canyon #2A
Lab. No.	D187046	D187047	D187048	D187049	D187050	D187051	D187052	D187053
Si %	—	—	—	—	—	—	—	—
Al %	10.	10.	7.	10.	7.	7.	6	6
Na %	—	—	—	—	—	—	—	—
K %	N	N	3.	1.5	7.	N	1.5	N
P %	N	N	N	N	N	N	N	N
Ce (ppm)	N	N	N	N	N	N	N	N
Ga	20	15	15	15	15	15	20	30
Ge	30	N	70	N	N	70	N	N
Hf	N		N		N	N	1	1
In	N		N	1	1	N	1	1
Li	N	N	N	N	N	N	N	N
Re	N	N	N	N	N	N	N	N
Ta								
Th								
Tl								
Yb	7	7	7	5	3	7	7	7
Looked for only when La or Ce found								
Pr								
Nd								
Sm								
Eu	N	N	N	N	N	N	N	N
Looked for only when Y is found above 50 ppm								
Gd	N	N	N	N	N	N	N	N
Tb								
Dy								
Ho								
Er								
Tm								
Lu								
Looked for only when Pd or Pt found								
Ir							Swanson - 2	
Os							Hatch	
Rh							Medlin	
Ru							RASS	
Looked for only when requested								
Cs							Flanagan - 2	
Rb							Spec. Lab.	
F								
Hg								

(4)

OF THE ASH

Report No.

For

Spec. Lab. No.

Date

71ASS0012

7/16/76

Vern Swanson

6-24-76

Lot No.

Analyst

Plate No.

Job No.

26-031*

Harriet H. Newman

II 7120

PN 54

Si, Al, Fe, Mg, Ca, Na, K, Ti, and P are reported in %; all others in ppm. Results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets, 1., 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one bracket at 68%, or two brackets at 95% confidence.

Symbols used are:

G = Greater than 10%, or

greater than value shown

* = Usual limits of determinations do not apply due to use of dilution techniques

- = Not looked for

H = Interference

N = Not detected, at limit of detection or at value shown

L = Detected, but below limit of determination or below value shown

Field No.	Verdi 1A	Verdi 2A	EIKO West 1A	Pancake North 1A				
Lab No.	D179400 *	D179401 *	D179402 *	D179403 *				
Fe %	3.	5.	2.	5.				
Mg %	1.	1.	.07	.7				
Ca %	7.	5.	.1	3.				
Ti %	.2	.3	.03	.3				
Mn (ppm)	500	150	20	50				
Ag	N	N	N	N				
As	N	N	N	N				
Au	N	N	N	N				
B	N	N	N	500				
Ba	700	500	700	500				
Be	N	3	N	20				
Bi	N	N	N	N				
Cd	N	N	N	N				
Co	15	20	7	N				
Cr	30	50	15	150				
Cu	70	100	30	.30				
La	N	N	N	N				
Mo	10	15	20	100				
Nb	N	20	20	20				
Ni	.30	30	10	30				
Pb	N	20	N	50				
Pd	N	N	N	N				
Pt	N	N	N	N				
Sb	N	N	N	N				
Sc	10	20	N	15				
Sn	N	N	N	N				
Sr	700	500	100	300				
Te	N	N	N	N				
U	N	N	N	N				
V	300	700	50	1000				
W	N	N	N	N				
Y	20	30	50	100				
Zn	N	N	N	N				
Zr	70	150	70	150				

Approved

Ray H. Hawes

Project Leader

Approved

R. E. M. Jansen

Branch of Analytical Laboratories

SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS (CONTINUED)

PN 54

Report No. _____

Job. No. _____

Field No.	Verdi 1A	Verdi 2A	EIKO West 1A	Pancake North 1A			
Lab. No.	D179400*	D179401*	D179402*	D179403*			
Si %	—	—	—	—			
Al %	10.	G	2.	G			
Na %	—	—	—	—			
K %	N	N	N	1.5			
P %	N	N	N	N			
Ce (ppm)	N	N	N	N			
Ga	20	30	N	50			
Ge	N	N	1	150			
Hf	1	1	1	N			
In	1	1	1	1			
Li			100				
Re			N				
Ta			1				
Th			1				
Tl			1				
Yb	2	3	7	15			
Looked for only when La or Ce found							
Pr							
Nd							
Sm							
Eu	N	N	N	N			
Looked for only when Y is found above 50 ppm							
Gd				N			
Tb				1			
Dy				1			
Ho				1			
Er				1			
Tm				1			
Lu				1			
Looked for only when Pd or Pt found							
Ir							
Os							
Rh							
Ru							
Looked for only when requested							
Cs							
Rb							
F							
Hg							

Copy to: L Swanson - 2
 Hatch
 Medlin
 RASS
F Flanagan - 2
 Spec. Lab.

JOB NO. - PT47

REQUESTED BY - V.E. SWANSON

LAB NO.	FIELD NO.	AL203
0187 46	Lewis #1A	10.
0187 47	Lewis #2A	11.
0187 48	Coolidge #1A	8.7
0187 49	Coolidge #3A	12.
0187 50	Coolidge #2A	7.6
0187 51	Granma #1A	7.9
0187 52	Eldorado Canyon #1A	13.
0187 53	Eldorado Canyon #2A	13.

CL	SG3
4	4.8
4	4.0
4	4.0
4	4.0
4	4.0
4	4.0
4	4.0
4	4.0
4	4.0

CL	SG2	SG3	TG2	TG3
4	2.8	4.8	1.0	1.7
4	4.5	4.5	1.0	1.9
4	7.8	7.8	1.0	1.9
4	7.0	7.0	1.0	1.0
4	7.0	7.0	1.0	1.0
4	6.6	6.6	1.0	1.0
4	5.9	5.9	1.0	1.0
4	5.4	5.4	1.0	1.0
4	5.7	5.7	1.0	1.0

DATE - 12/22/76

REPORT NO. T74ANR0120
4-19-77

ANALYST - JSW, JGB

METHOD - LI26407(TE)

APPROVED: J.S. WAHLBERG
(PROJECT LEADER)

TOTAL FE AS FE203, TOTAL S AS SG3 OR S.
ALL ANALYSES ARE OF ASH EXCEPT SE.

ONLY TWO FIGURES ARE SIGNIFICANT

APPROVED: R.E. VAN LOENEN
(SAMPLE CONTROL)

JOB NO. - PT47

JOB NO. - PT47

DATE - 12/22/76

REQUESTED BY - V.E. SWANSON

REPORT NO.

LAB NO.	FIELD NO.	FE203	K20
0187 46	Lewis No. 1A	21	2
0187 47	Lewis	15	.82
0187 48	Cold Lake #1A	3.1	.91
0187 49	Cold Lake #34	5.0	1.9
0187 50	Cold Lake #2A	6.3	1.6
0187 51	Gamma #1A	7.6	3.0
0187 52	Eldorado Canyon #1A	5.4	4.2
0187 53	Eldorado Canyon #2A	5.6	1.3

ANALYST - J.S. WAHLBERG

METHOD - LI2B407(TE)

APPROVED: J.S. WAHLBERG
(PROJECT LEADER)TOTAL FE AS FE203, TOTAL S AS SO3 OR S.
ALL ANALYSES ARE OF ASH EXCEPT SE.

ONLY TWO FIGURES ARE SIGNIFICANT

APPROVED: R.E. VAN LOEHN
(SAMPLE CONTROL)

JOB NO. - PT47

JOB NO. - PN54

REQUESTED BY - V. E. SWANSON

LAB NO. FIELD NO.

Verdi /A	D179406	SE	PPM
Verdi 2A	D179401	1.0	7.3
E/Keweenaw	D179402	1.8	
Panco K North /A	D179403	2.3	

C C C O C O O O O O

DATE - 1/21/76

REPORT NO. 264X00244. 6/21/76

XRF ANALYSIS

ONLY TWO FIGURES ARE SIGNIFICANT

APPROVED: R.E. VAN LOENEN
(SAMPLE CONTROL)

TOTAL FE AS FE203, TOTAL S AS SG3 OR S.

ANALYST - JSW, RJB, JWB METHOD - HORTEL(SEE)

APPROVED: J.S. WAHLBERG
(PROJECT LEADER)

JOB NO. - PN54

Shawnee
MNL AYR 0120 9-22-77
REPORT NO. 77 LAY RAO/66, 9/26/77

XRF ANALYSIS

JOB NO. - PT47
REQUESTED BY - V. E. SWANSON

LAB NO.	FIELD NO.	SE
D187 46	Lewis #1A	PPM 1.5
D187 47	Lewis #1A	?
D187 48	Coaldok #3A	INSUFFICIENT SAMPLE FOR ANALYSIS
D187 49	Coaldok #3A	.1

JOB NO. - PT47

DATE - 12/22/76
REPORT NO. 77 LAY RAO/66, 9/26/77

ANALYST - JSW, JWB *g/w*
METHOD - NOREL(Se)
APPROVED: J. S. WAHLBERG
(PROJECT LEADER)
TOTAL Fe AS Fe2O3. TOTAL S AS SO3 OR S.

ONLY TWO FIGURES ARE SIGNIFICANT
R.E.C. VAN LOENEN
APPROVED *R.E.C. VAN LOENEN*
(SAMPLE CONTROL)

JOB NO. - PT47

(Rev. July 1962)

**UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
LABORATORY REPORT**

REPORT NO.	77LAPC0162	FOR	Vern Swanson	DATE	Sept. 20, 1977
JOB NO.	PT 47	PROJECT OR ORGANIZATION	OER-Coal 9420-20106	G&G of Coal	
LOT NO.	26-019*	REFER TO OTHER REPORTS	77LANA0085, 77IASS0131, 77LAXR0120		

Three (3) samples from group of Eight (8) Additional Work. from Nevada.

Serial No.	Field No.	COAL AS RECEIVED	
		As ppm	Sb ppm
D187046	Lewis #1A	1650 ✓	.21.9 ✓
D187047	Lewis #2A	890	12.9
D187049	Coaldale #3A	140	1.47

As determined by graphite furnace - atomic absorption method by J. G. Crock & G. Riddle
 Sb determined by Rhodamine-B method by George Burrow.

REVan Leonen:bc
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 Medlin
 Flanagan-2
 RASS

By Chemical Analysis

Wayne Mountjoy
 for Project Leader: Claude Huffman, Jr.

APPROVED

R. E. Van Leonen
 Sample Control
 Branch of Analytical Laboratories

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
LABORATORY REPORT

REPORT NO.	77LAPC0162	FOR	Vern Swanson	DATE	3/21/77
JOB NO.	PT 47	PROJECT OR ORGANIZATION	OER-Coal 9420-20106 Geol. & Geochem. of Coal		
LOT NO.	26-019*	REFER TO OTHER REPORTS	77LANA0085, Semi-Quant and X-ray pending.		

COAL AS RECEIVED

<u>Serial No.</u>	<u>Field No.</u>	<u>% Ash</u>	<u>F</u> <u>ppm</u>	<u>Hg</u> <u>ppm</u>
D187046	Lewis #1A	36.2	135	.15
D187047	Lewis #2A	23.4	280	.12
D187048	Coaldale #1A	49.6	45	.15
D187049	Coaldale #3A	63.9	115	.20
D187050	Coaldale #2A	52.5	85	.26
D187051	Gamma #1A	56.1	200	.05
D187052	Eldorado			
	Canyon #1A	36.7	85	.04
D187053	Eldorado			
	Canyon #2A	39.8	95	.05

% Ash determined gravimetrically ashed at 525°C by G. D. Shipley. *NPS*,
F determined by specific ion electrode method by Harriet Neiman and
Pat Guest. *Hgs*

Hg determined by wet oxidation + atomic absorption method by J. A. Thomas. *JAT*

(Rev. July 1962)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
LABORATORY REPORT

REPORT NO. 77LAPC0162 FOR Vern Swanson DATE 3/21/77

JOB NO. PT 47 PROJECT OR ORGANIZATION OER-COAL
9420-20106

LOT NO. 26-019* REFER TO OTHER REPORTS Semi-quant and X-ray Pending

Serial No.	Field No.	ON THE ASH								
		MgO %	Na ₂ O %	Cd	Cu	Li	Mn	Pb	Zn	
D187046	Lewis #1A	2.20	1.79	<1	69	36	1150	<25	118	
D187047	Lewis #2A	2.70	2.04	<1	56	52	1990	<25	108	
D187048	Coaldale #1A	.38	.64	<1	23	65	20	<25	24	
D187049	Coaldale #3A	.34	1.46	<1	26	57	180	<25	134	
D187050	Coaldale #2A	.27	.64	<1	66	25	50	<25	21	
D187051	Gamma #1A	1.11	1.11	<1	26	<10	230	<25	155	
D187052	Eldorado									
D187053	Canyon #1A	1.60	1.70	2.0	123	22	520	35	119	
	Eldorado									
	Canyon #2A	1.03	1.74	3.0	106	17	635	30	168	

MgO, Na₂O, and Mn determined by atomic absorption by Violet Merritt.
Cd, Cu, Li, Pb and Zn determined by atomic absorption by G. D. Shipley. AHS,

REVan Loenen: bc
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Hatch
Medlin
Flanagan - 2
RASS

BY Chemical Analysis C. Huff
Project Leader: Claude Huffman, Jr.

APPROVED

R. E. Van Loenen
R. E. Van Loenen
Sample Control

Branch of Analytical Laboratories

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

LABORATORY REPORT

REPORT NO. 7TLAPC0054 FOR Vern Swanson DATE August 12, 1976
 JOB NO. PN 54 PROJECT OR ORGANIZATION 9420-20106 Geol. & Geochem. of coal
 LOT NO. 26-031* REFER TO OTHER REPORTS OER-Coal
 76LAXR0244, 76LAXR0244
 7TLASS0012, U & Th pending

Four (4) samples from various locations in Nevada.

<u>Serial No.</u>	<u>Field No.</u>	COAL AS RECEIVED				
		% Ash	As ppm	F ppm	Hg ppm	Sb ppm
D179400	Verdi 1A	53.5	11	100	0.08	0.9
D179401	Verdi 2A	51.2	7.0	155	0.11	1.4
D179402	Elko West 1A	83.3	220	✓ 100	0.52	1.1
D179403	Pancake North 1A	13.2	1.0	145	0.08	0.2

% ash determined gravimetrically ashed at 525°C by G. D. Shipley. *JAS*,
 As determined by graphite furnace - atomic absorption method by G. O. Riddle and
 J. G. Crock. *JAC*

F determined by specific ion electrode method by Johnnie Gardner. *JG*,
 Hg determined by wet oxidation + atomic absorption method by J. A. Thomas and
 G. O. Riddle. *JAT*.

Sb determined by Rhodamine-B method by G. T. Burrow. *JTB*

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

LABORATORY REPORT

54

REPORT NO. 7TLAPC0054

FOR Vern Swanson

DATE August 12, 1976

JOB NO. PN 54

PROJECT OR ORGANIZATION

LOT NO. 26-031*

REFER TO OTHER REPORTS

ON THE ASH

<u>Serial No.</u>	<u>Field No.</u>	<u>MgO %</u>	<u>Na₂O %</u>	<u>Cd ppm</u>	<u>Cu ppm</u>	<u>Li ppm</u>	<u>Mn ppm</u>	<u>Pb ppm</u>	<u>Zn ppm</u>
D179400	Verdi 1A	1.33	1.15	<1	67	17	650	<25	53
D179401	Verdi 2A	1.48	0.58	<1	92	19	160	<25	68
D179402	Elko West 1A	0.08	0.15	<1	40	87	50	<25	23
D179403	Pancake North 1A	1.10	0.26	<1	37	43	70	60	292

MgO, Na₂O, and Mn determined by atomic absorption by Violet Merritt. *V.M.*
 Cd, Cu, Li, Pb, and Zn determined by atomic absorption by G. D. Shipley. *G.D.S.*

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 RASS
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By Chemical Analysis *C. Huffman*

Project Leader: Claude Huffman, Jr., Jr.

APPROVED BY

R.E. Van Loenen

Sample Control

Branch of Analytical Laboratories

R.E. Van Loenen

LABORATORY REPORT

INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS

REPORT NO.

FOR

DATE

JOB NO. pt47

PROJECT OR ORGANIZATION

LAB NO. = Lewis #1A
d187046Lewis #2A
d187047Coal date # 1A
d187048

FIELD NO. =

ELEMENT	PPM	CV(%)	PPM	CV(%)	PPM	CV(%)
as =	0.00	0. high Ash(Na)	6.00	0. High Ash(Na)	11.50	0.
se =	0.00	0.	0.90	7.	0.00	0.
sb =	19.40	1.	9.02	0.	0.41	4.
cr =	11.00	2.	7.90	8.	0.00	0.
co =	12.50	1.	7.25	0.	2.07	2.
th =	3.36	1.	1.74	1.	4.25	1.

ANALYST: RJ Knight

- NOTES: 1) CV= coeff. of variation one standard deviation, based on counting statistics as percentage of concentration
 2) Concentrations with CV greater than 30% should not be considered reliable
 3) A 0.00 value for ppm represents none detected, >>0.1 ppm, unless otherwise noted.

LABORATORY REPORT

INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS

REPORT NO.

FOR

DATE 12/23/77

JOB NO. pt47

PROJECT OR ORGANIZATION

Coal date #3A
LAB NO. = d187049Coal date #2A
d187050Gamma #1A
d187051

FIELD NO. =

ELEMENT	PPM	CV(%)	PPM	CV(%)	PPM	CV(%)
as =	0.30	High Ash ⁽ⁿ⁾	200.00	2.	105.00	2.
se =	0.00	0.	0.00	0.	0.00	0.
sb =	1.06	4.	13.70	1.	14.50	1.
cr =	8.24	3.	6.82	16.	4.36	7.
co =	14.20	0.	1.81	0.	25.20	1.
th =	3.17	1.	4.98	1.	2.23	1.

ANALYST: _____

R.J. Knight

- NOTES: 1) CV= coeff. of variation one standard deviation, based on counting statistics as percentage of concentration
 2) Concentrations with CV greater than 30% should not be considered reliable
 3) A 0.00 value for ppm represents none detected, >>0.1 ppm, unless otherwise noted.

LABORATORY REPORT

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INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS

REPORT NO. FOR

12/23/77

JOB NO. pt47 PROJECT OR ORGANIZATION

El Dorado Canyon #1A

El Dorado Canyon #2A

LAB NO. = d137052

d137053

FIELD NO. =

ELEMENT	PPM	CV(%)	PPM	CV(%)	PPM	CV(%)
as =	45.70 ✓	0.	51.00 ✓	2.	0.00	0.
se =	2.03	3.	1.76	22.	0.00	0.
sb =	2.10	1.	1.94	0.	0.00	0.
cr =	15.80	2.	16.00	5.	0.00	0.
co =	4.28	0.	9.89	1.	0.00	0.
th =	3.25	1.	3.15	1.	0.00	0.

ANALYST:

RJ Knight

- NOTES: 1) CV= coeff. of variation one standard deviation, based on counting statistics as percentage of concentration
2) Concentrations with CV greater than 30% should not be considered reliable
3) A 0.00 value for ppm represents none detected, >>0.1 ppm, unless otherwise noted.

7741NA0183 8/31/76
C
DELAYED URON DETERMINATIONS OF U AND TH

REPORT NO.: FOR: V. SWANSON DATE: 01-8170 8/27/76
 C
 JOB NO.: PN54 PROJECT OR ORGANIZATION: 6-9420-20106
 C
 IRRADIATION NO.: TH-P9-47
 C

DT	BLKS	LAB NO.	WT(GMS)	PCT O, CV	PPM TH, CV	PPM U, CV	TH/U
115,	376	D179400(Verdi 1A)	4.5068(58.20)32.	— 2.84) 66.	5.75	3.	0.49
116,	377	D179401(Verdi 2A)	4.8925(69.77)41.	— 0.00) 50.	27.50	1.	0.00
117,	378	D179402(Elkowitz 1A)	6.3436 69.38 19.	— 1.29) 97.	3.24	4.	0.40
118,	379	D179403(Pancake North 1A)	5.0402(26.91)67.	— 0.43) 99.	11.98	2.	0.04

All Th values should
read 3.0L

ANALYSTS: H.T.MILLARD, R.J.KNIGHT, A.J.BARTEL,
J.P. HEMMING, R.J.WHITE, R.J.VINNOLA, E.BRANDT

NOTES: 1) CV=COEFF. OF VARIATION = ONE STANDARD DEVIATION, BASED ON
COUNTING STATISTICS, EXPRESSED AS PERCENTAGE OF CONCENTRATION.
2) CONCENTRATIONS WITH CV >30% ARE ENCLOSED IN PARENTHESES AND
SHOULD NOT BE CONSIDERED RELIABLE.

64

LABORATORY REPORT

DELAYED NEUTRON DETERMINATIONS OF U AND TH

REPORT NO.: FCT: V.SVANSON DATE: 2/14/77

77LANA0085 2/18/77
JOB NO.: FT47 PROJECT OR ORGANIZATION: 9420-20106

IRRADIATION NO.: TH-F9-67

DT BLKS	LAB NO.	WT(GMS)	FCT O,CV	PPM TH,CV	PPM U,CV	TH/U
206,497	D187046 Lewis #1A	5.6600	54.86 24.	5.47 23.	2.49 5.	2.19
207,498	D187047 Lewis #2A	5.1000	49.41 19.0	0.00)50.	2.12 6.	0.00
208,499	D187048 Coalidak #1A	5.7600	(38.47)32.0	3.18)38.	2.63 5.	1.21
209,500	D187049 Coalidak #3A	5.7900	(41.25)33.0	0.00)50.	7.56 3.	0.00
210,501	D187050 Coalidak #2A	5.7400	49.55 25.	5.02 24.	2.22 6.	2.26
211,502	D187051 Gamma #1A	3.9200	(0.00)50.0	0.00)50.	✓129.53 1.	0.00
212,503	D187052 Canyon #1A	5.7800	72.92 17.0	2.27)50.	1.89 6.	1.20
213,504	D187053 Eldorado Canyon #2A	5.7600	51.05 29.0	4.30)33.	3.74 4.	1.15

ANALYSTS: H.T.MILLARD, JR., A.J.BARTEL, R.J.KNIGHT, C.L.SHIELDS,
C.M.ELLIS, R.L.NELMS, C.A.RAMSEY

NOTES: 1) CV=COEFF. OF VARIATION = ONE STANDARD DEVIATION, BASED ON COUNTING STATISTICS, EXPRESSED AS PERCENTAGE OF CONCENTRATION.
2) CONCENTRATIONS WITH CV >30% ARE ENCLOSED IN PARENTHESES AND SHOULD NOT BE CONSIDERED RELIABLE.



60
IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Office of Energy Resources
Branch of Oil and Gas Resources

Mail Stop 940
May 16, 1979

Dr. James Firby
Department of Geology
University of Nevada - Reno
Reno, Nevada 89507

Dear Jim:

I am sending to you a copy of the report of results of Platt Bradbury's analysis of pollen and diatoms in samples from Neogene samples in Nevada. The samples were given to me by Larry Garside of the NBM and they represent a suite of samples from coal bearing rocks in Nevada.

I think they will be of interest to you in light of your work with the Coal Valley, Verdi and Esmeralda Formations. I am sure you will be able to judge the real value of many of the speculative conclusions offered by Platt. Both Platt and I would like to receive a copy of your recent SEPM paper on these rocks.

Jim, my current plans are to visit China in June and hopefully visit Nevada sometime after the 4th of July. Platt Bradbury, Bob Mary, and Barry Solomon have all expressed interest in visiting some sites of mutual interest and I hope that my schedule problems have not precluded you from joining us. I plan to bring my family for a week or two and I will contact you in late June about mutually beneficial dates if you are interested.

Best wishes with your work and I look forward to seeing you this summer.

Sincerely,

Thomas D. Fouch, Geologist

Enclosure

Copy to:
Larry Garside
J. Platt Bradbury

REPORT ON REFERRED FOSSILS

STRATIGRAPHIC RANGE	Miocene-Pliocene	SHIPMENT NUMBER	0&G-77-5Da
GENERAL LOCALITY	STATE, COUNTRY, OCEAN, ETC.	REGION	(COUNTRY PROVINCE, STATE, ETC.)
QUADRANGLE OR AREA	Nevada: Washoe, Nye, Esmeralda, Churchill, Lyon		Carson City
KINDS OF FOSSILS	Pollen and diatoms	DATE RECEIVED	MO DAY YR 2/23/77
REFERRED BY	T. D. Fouch	STATUS OF WORK	Complete
REPORT PREPARED BY	J. Platt Bradbury	DATE REPORTED	MO DAY YR 5/10/79

Six samples from various localities in Nevada were examined for pollen and diatoms. Sample Verdi No. 1 B is a coal from the sandstone at Hunter Creek (Truckee Fm.?). Its locality is SE 1/4, NW 1/4 NE 1/4 Sec 9, T19N, R18E, latitude 39 degrees 31 minutes, 15 seconds north, longitude 119 degrees 57 minutes, 30 seconds west. The sample was assigned pollen locality number D5718, and diatom locality number 23II7-1.

This sample has abundant, well-preserved pollen. The following types were recognized.

- Cupressaceae
- FAGUS?
- QUERCUS
- ABIES
- PINUS (common)
- GRAMINEAE
- ARTEMISIA (common)
- SALIX
- Chenopodiaceae
- Compositae
- EPHEDRA
- JUGLANS?
- FRAXINUS
- Cyperaceae

The siliceous microfossils are represented by diatoms, sponge spicules and chrysomonad cysts. The latter dominate and the diatoms are poorly preserved. The following types were seen.

- DESMOGONIUM sp. cf. D. RABENHORSTIANUM
- NAVICULA SEMEN
- EUNOTIA PECTINALIS
- PINNULARIA
- HANTZSCHIA AMPHIOXYS v. VIVAX
- EUNOTIA PECTINALIS v. MINOR
- EUNOTIA PECTINALIS v. UNDULATA
- STAURONEIS PHOENICENTRON

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REPORT ON REFERRED FOSSILS

STRATIGRAPHIC RANGE		SHIPMENT NUMBER	O&G-77-5Da
GENERAL LOCALITY	STATE, COUNTRY, OCEAN, ETC.	REGION	ICOUNTY, PROVINCE, SEA, ETC.
QUADRANGLE OR AREA		DATE RECEIVED	MO DAY YR
KINDS OF FOSSILS		STATUS OF WORK	
REFERRED BY		DATE REPORTED	MO DAY YR
REPORT PREPARED BY			

EUNOTIA PRAERUPTA
 PINNULARIA aff. P. CYMBELLOIDES
 CYMBELLA MEXICANA

The pollen from this sample suggests an upper Tertiary age for the deposit. The comparative abundance of conifer species, particularly PINUS, and large amounts of ARTEMISIA pollen indicates that a generally dry environment prevailed. A few mesophytic species, such as JUGLANS and FRAXINUS are still present, however. Based on the general and perhaps simplistic model of climatic change through time in western Nevada, this flora should postdate sample Lewis No. 1 B of the Coal Valley Formation which contains larger numbers of temperate mesophytic plant pollen types. My guess is that it could be early Pliocene in the old sense of the term (which was used to establish the model just mentioned). Wolfe (1964) shows the Verdi flora of this area to be of Hemphillian age which sounds reasonable. The only problem is that it is not clear if the sample analyzed came from the Coal Valley Formation, the Truckee Formation (as suggested in the submittal form), or from the Verdi plant locality. Axelrod (1958) reports lignites in the Coal Valley Formation, but does not document their stratigraphic distribution. The good preservation of pollen and the abundance of diatomites in these sections makes them interesting for further study.

Because there are so few studied diatomites of known age, it is not possible to interpret the occurrence of PINNULARIA sp. aff. P. CYMBELLOIDES in a biostratigraphic sense. This taxon is known from the Pliocene of southeastern USSR, but the closely related P. CYMBELLOIDES is also reported from the Miocene of the same region.

The diatoms in general indicate shallow, swampy water of low pH.

Sample Tonopah SF-2 was found to be barren of pollen. It was not examined for diatoms. This sample came from 38 degrees, 11 minutes, 45 seconds north latitude and 117 degrees, 15 minutes, 20 seconds west longitude. Its location is in Nye County, Nevada, T4N, R42E, Section 15 (unsurveyed). It was from near the Barstovian locality of Henshaw (1942) and collected from the Siebert Tuff of Miocene-Pliocene age. @

REPORT ON REFERRED FOSSILS

STRATIGRAPHIC RANGE		SHIPMENT NUMBER	08G-77-5Da
GENERAL LOCALITY	(STATE, COUNTRY, OCEAN, ETC.)	REGION	(COUNTY, PROVINCE, SEA, ETC.)
QUADRANGLE OR AREA		DATE RECEIVED	MO DAY YR
KINDS OF FOSSILS		STATUS OF WORK	
REFERRED BY		DATE REPORTED	MO DAY YR
REPORT PREPARED BY			

Sample Tonopah SF-2 (continued)

The sample locality is located on the Tonopah 2 degree quadrangle.

Sample El Dorado Canyon Mine No. 1 B was examined for pollen and diatoms. It was assigned pollen locality number D5719, and diatom locality number 23II77-2. The sample came from a coal dump of the El Dorado Canyon Coal Mine from presumed Miocene sedimentary rocks. The locality is on the Reno 2 degree quadrangle in T14N, R22E; Latitude 36 degrees 6 minutes, and 10 seconds north, longitude 119 degrees, 33 minutes, and 30 seconds west. The pollen in this sample is poorly preserved, but the following types could be recognized.

- PINUS (dominant)
- PICEA
- ABIES?
- QUERCUS (common)
- ALNUS
- Cupressaceae type
- Compositae

The sample has very poorly preserved diatoms. Some rather corroded, ghost-like specimens of NAVICULA SEMEN have apparently been preserved by an organic coating which they acquired sometime after deposition. Today this species is found in aquatic moss vegetation, and in swamps or swampy meadows which would appear to be appropriate environments for the formation of coal.

The pollen does not refute a Miocene age for the sample, but the lack of temperate deciduous tree species implies a somewhat younger age for this sample than Lewis No. 1 B. It is possible that the floristic differences could be explained by paleo elevation.

REPORT ON REFERRED FOSSILS

STRATIGRAPHIC RANGE		SHIPMENT NUMBER	O&G-77-5Da		
GENERAL LOCALITY	STATE, COUNTRY, OCEAN, ETC.	REGION	(COUNTY, PROVINCE, SEA, ETC.)		
QUADRANGLE OR AREA		DATE RECEIVED	MO	DAY	YR
KINDS OF FOSSILS		STATUS OF WORK			
REFERRED BY		DATE REPORTED	MO	DAY	YR
REPORT PREPARED BY					

Sample Coaldale No. 1 B came from the NE 1/4 of Section 29, T2N, R37E. Its longitude is 117 degrees, 52 minutes, 40 seconds west; and its latitude is 30 degrees, 00 minutes, and 10 seconds north. It is located on the Tonopah 2 degree quadrangle in Esmeralda County, Nevada. The sample is a coal from the outcrop of the Esmeralda Formation of Miocene or Pliocene age.

The sample was barren of diatoms. The sample contained poorly preserved (degraded) pollen. The following types were noted.

PINUS
PICEA
QUERCUS
ALNUS
MYRICA type

Other pollen types may be present, but the preservation is too poor to permit reliable identification.

The Esmeralda formation is considered to be Clarendonian in age (Wolfe, 1964). The pollen evidence does not refute this possibility, but the apparent lack of temperate deciduous tree types suggests a slightly drier climate than is characteristic of the Coal Valley Formation. This may be due to local geographic or climatic differences, or the Esmeralda Formation may be somewhat younger than the Coal Valley Formation. Unfortunately, the poor pollen preservation makes such comments quite tentative.

Sample Gamma No. 1 B came from T16N, R37E, center of section 36 in Churchill County, Nevada. It is from longitude 117 degrees, 46 minutes, 50 seconds west, and latitude 39 degrees 12 minutes, 35 seconds north. The locality is on the Millett 2 degree quadrangle. The sample was collected from an outcrop of presumed Pliocene sedimentary rocks; the lithology is coal. It has been assigned pollen locality number D5721 and diatom locality number 23II77-3. @

REPORT ON REFERRED FOSSILS

STRATIGRAPHIC RANGE		SHIPMENT NUMBER	08G-77-5Da
GENERAL LOCALITY	(STATE, COUNTRY, OCEAN, ETC.)	REGION	(COUNTY, PROVINCE, SEA, ETC.)
QUADRANGLE OR AREA		DATE RECEIVED	MO DAY YR
KINDS OF FOSSILS		STATUS OF WORK	
REFERRED BY		DATE REPORTED	MO DAY YR
REPORT PREPARED BY			

Sample Gamma No. 1 B (continued)

This sample contains well preserved, abundant pollen. The following types were recognized.

- PINUS (common)
- PICEA
- ABIES (common)
- PTEROCARIA
- MYRICA type
- QUERCUS (common)
- GRAMINEAE (very common)
- SALIX?
- SPARGANIUM-TYPHA
- BETULA
- CARYA
- ALNUS
- ULMUS-ZELKOVA

The pollen assemblage suggest a mid Miocene age for the sample. It is similar in many respects to the assemblage from Lewis No. 1 B, and may be time correlative to it. Because it is seldom possible to exactly relate a pollen assemblage to a megafossil floral assemblage, it may be somewhat misleading to suggest age assignments from pollen data alone. It would be worthwhile to look for plant megafossils in this area.

Diatoms are abundant and well preserved. The following species were recognized.

- PINNULARIA VIRIDIS (compare with P. ANGULOCOSTATA)
- PINNULARIA sp. aff. P. CYMBELLOIDES
- STAURONEIS ANCEPS
- STAURONEIS PHENICENTRON f. GRACILIS
- STAURONEIS LAURENBURGIANA
- PINNULARIA NODOSA
- EUNOTIA CURVATA
- FRAGILARIA VIRESSENS
- NAVICULA SEMINULUM

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REPORT ON REFERRED FOSSILS

STRATIGRAPHIC RANGE		SHIPMENT NUMBER	0&G-77-5Da
GENERAL LOCALITY	(STATE, COUNTRY, OCEAN, ETC.)	REGION	(COUNTY, PROVINCE, SEA, ETC.)
QUADRANGLE OR AREA		DATE RECEIVED	MO DAY YR
KINDS OF FOSSILS		STATUS OF WORK	
REFERRED BY		DATE REPORTED	MO DAY YR
REPORT PREPARED BY			

NAVICULA sp. cf. N. FRAGILARIOIDES
 NAVICULA ELGINENSIS?
 ACHNANTHES EXIGUA
 MELOSIRA ITALICA ssp. subarctica
 MELOSIRA sp. cf. M. INTERRUPTA
 GOMPHONEMA PARVULUM v. MICROPUS
 GOMPHONEMA DICHOTOMUM
 NITZSCHIA VITREA

The MELOSIRA species dominate the sample, and FRAGILARIA VIRESSENS is quite abundant. These species suggest the presence of slightly deeper water nearby than can be inferred for some of the other coaly samples. The several species of PINNULARIA and specimens of EUNOTIA indicate somewhat acidic water. Some species appear to be related to Mio-Pliocene forms from the USSR, but at present they provide little information about the age of the sample.

Sample Lewis No. 1B was examined for pollen and diatoms. It was assigned pollen locality number D5722 and diatom locality number 23II77-4. The sample was collected from a coal deposit in the Lewis Coal Mine, located at 38 deg. 30 min. 40 sec. north latitude, 118 deg. 54 min. 50 sec. west longitude. It is on the Walker lake 2 degree quadrangle in T8N, R27E, section 36 near the center of the section, Lyon County, Nevada. The sample is from the Coal Valley Formation. The sample contains comparatively well-preserved pollen; the following types were noted.

SPARGANIUM or TYPHA very common
 QUERCUS very common
 ULMUS-ZELKOVA common
 Gramineae very common
 PTEROCARYA
 JUGLANS
 Myricaceae
 ALNUS
 Cyperaceae
 ABIES

CONTINUED IN 0&G-77-5Db

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REPORT ON REFERRED FOSSILS

STRATIGRAPHIC RANGE	Miocene-Pliocene	SHIPMENT NUMBER	O&G-77-5Db
GENERAL LOCALITY	STATE, COUNTRY, OCEAN, ETC.	REGION	(COUNTRY, PROVINCE, SEA, ETC.)
QUADRANGLE OR AREA	Nevada: Washoe, Nye, Esmeralda, Churchill, Lyon	DATE RECEIVED	2/23/77
KINDS OF FOSSILS	Pollen and diatoms	STATUS OF WORK	Complete
REFERRED BY	T. D. Fouch	DATE REPORTED	5/10/79
REPORT PREPARED BY	J. Platt Bradbury		

CONTINUED FROM O&G-775Da

PICEA common
PINUS
EPHEDRA
CARYA
FRAXINUS

This pollen assemblage shows similarities to several Miocene microfossil floras of this region in Nevada--see Wolfe, 1964. The closest relationships seem to be with the Fingeroock and Stewart Spring floras which are considered to be Hemingfordian and Barstovian in age respectively. Wolfe (1964) indicates that the Coal Valley Formation is Clarendonian in age. Probably these deposits will float around a bit until radiometric ages are available for them. The pollen data suggests that this sample, which came from the Coal Valley Formation is likely to be of pre-Clarendonian age.

The diatom flora is moderately well preserved. The following types were recognized.

PINNULARIA sp. aff. P. CYMBELLOIDES
PINNULARIA VIRIDIS
NAVICULA ELGINENSIS v. ROSTRATA
NAVICULA AMPHIBOLA
CYMBELLA EHRENBERGII
PINNULARIA MESOLEPTA v. ANGUSTA
MELOSIRA ITALICA
MELOSIRA sp. cf. M. INTERRUPTA
EUNOTIA sp.
FRAGILARIA VIRESSENS

These diatoms are generally characteristic of shallow, circumneutral water, although MELOSIRA ITALICA can be planktonic and could therefore indicate somewhat deeper water. I have found MELOSIRA sp. cf. M. INTERRUPTA in Holocene peats of central Mexico.

With the exception of PINNULARIA sp. aff. P. CYMBELLOIDES, the other species are common modern forms. A closely related form, P.

STRATIGRAPHIC RANGE				SHIPMENT NUMBER	O&G-77-5Db		
GENERAL LOCALITY	STATE, COUNTRY, OCEAN, ETC.			REGION	(COUNTY, PROVINCE, SEA, ETC.)		
QUADRANGLE OR AREA				DATE RECEIVED	MO	DAY	YR
KINDS OF FOSSILS				STATUS OF WORK			
REFERRED BY				DATE REPORTED	MO	DAY	YR
REPORT PREPARED BY							

Sample Lewis No. 1B (continued)

CYMBELLOIDES, was described from Miocene deposits surrounding Lake Khanka in southeastern Russia (near Vladivostok). Unfortunately these deposits are not dated so the species is not yet much help in age assignment.

Reference

Wolfe, J. A., 1964, Miocene floras from Fingerrock Wash. southwestern Nevada: USGS Prof. Paper 454-M, 36 p. 8

J. Platt Bradbury
J. Platt Bradbury
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