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UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

234 New Customhouse
Denver 2, Colorado

December 19, 1955

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Field Team, Region III

Subject: Report of Examination, Docket DMEA 3097 (Uranium), Kirby C. Caryell, Both claims, Emery County, Utah

Enclosed are the original and three copies of the report pertaining to the subject application.

It has been recommended that the application be denied without prejudice. We concur in this recommendation, and we believe the applicant should be advised that preliminary drilling should be done at his expense to prove the existence of the extension of the channels.

E. N. Harshman

E. N. Harshman
Acting Executive Officer, DMEA
Field Team, Region III

Enclosures

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 12, UTAH

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DEC 19 1955

DMEA
Date Rec'd.
DEC 1 1955

BUREAU OF MINES
Denver, Colo.
RECEIVED
DEC 22 1955

December 16, 1955

Memorandum

To: W. M. Traver, Executive Officer, DMEA Field Team, Region III

From: Stephen R. Wilson

Subject: Docket No. DMEA-3897 (Uranium), Kirby C. Coryell, Emery County, Utah

Attached are the original and 10 copies of an engineering report covering examination of property controlled by Kirby C. Coryell, Grand Junction, Colorado. Examination of the property was made by M. H. Moses with Howard Albee of the Geological Survey. A separate section, Summary, Conclusions and Recommendations, is also attached. One copy of the brochure accompanies the information.

The applicant has requested a loan of $181,000 to explore part of the property by 54,500 feet of diamond drilling. It is proposed that two fences of drill holes be placed across projected extensions of the Delta and Rocky Mountain channels which are exposed 1-1/4 to 2 miles north of the Coryell property. A two-stage program of exploration is proposed.

Rocks outcropping in the area of the claims consist of the Kayenta formation, Navajo sandstone, and Carmel sandstone, of Jurassic age. The target formation is the Chinle, believed to lie 500 to 1,100 feet below the surface. Uranium ores occur in the Monitor Butte sandstone member of the Chinle formation at the Delta mine and other nearby properties. No uranium mineralization has been found on the Coryell claims.

The examining engineer considers the work proposed by the applicant to be wildcat prospecting. The probability of ore discovery appears remote, and recommendation is made that the request for Government assistance be denied. I concur in this recommendation.

The proposed exploratory program has been discussed with members of the Atomic Energy Commission.

Stephen R. Wilson
Stephen R. Wilson

Enclosures

cc: J. B. Clemmer

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(date)

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DEC 19 1955

[illegible], CONCLUSIONS AND RECOMMENDATIONS

By Howard V. Allen and H. H. Hess

Kirby C. Cargill, Grand Junction, Colorado, has applied for Government assistance in exploring uranium claims under docket No. [illegible]. The property involved consists of 270 unpatented lode mining claims situated in an unsurveyed area of Emery County, Utah. The claims were acquired by [illegible] permanent September 13 and 14, 1954, to aggregate the applicant's request for a loan of $[illegible] to conduct diamond drilling exploratory work in two stages. Total maximum proposed drilling totaling of 15,000 feet of measured holes and 6,100 feet of cored holes.

Sedimentary rocks in the area of the applicant's claims consist of the Mancos, Chinle and Wingate sandstone formations of Triassic age and the Kayenta, Navajo and Carmel formations of Jurassic age. The area covers part of the southeast end of the San Rafael Swell. The anticlinal axis of the Swell plunges approximately 3 degrees to the southeast through the central part of the group of claims.

The ore-bearing zone in the vicinity of the claims is near the base of the Chinle formation. This formation, in the area, is divided into three members which are, from bottom to top, the Monitor Butte, Moss Back and Church Rock. The Moss Back and Monitor Butte members are the most likely ore-bearing members.

The applicant has based the proposed exploratory work on projection of two productive channels, the Dalton and Rocky Mountain, which are

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12-28-55
(date)

exposed to the north of the claims. The proposed work consists of drilling two fences of holes to intersect the two channels. The applicant believes the holes will average approximately 500 feet in depth. It is probable that the depth will be as great as 1,100 feet.

The Mining geologist and engineer recommend that the request for Government assistance be denied. The proposed project is considered wildcat prospecting because of the distance of projection of channels exposed on properties 1-1/4 to 2 miles to the north and the excessive depth to members of the Chinle formation, productive on properties in the general area of the applicant's claims.

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DEC 19 1955

[illegible]

[illegible]

Engineering Report

By [illegible]
Mining Engineer
Bureau of Mines

Reviewed by
DMEA OPERATING COMMITTEE

12-28-55
(Date)

KIRBY C. CARYLL
HENRY COUNTY, TENN

CONTENTS

	Page
Engineering report	
Introduction	1
Location, topography and physical features	2
History and production	2
Ownership and contract	3
General geology	3
Kimmeln ore reserves	4
Present status	4
Project programs	5
Estimated costs of project programs	8
Proposed financing	10
Conclusions and recommendations	10

ILLUSTRATIONS

Fig. 1 Location map, Kirby C. Caryll, Sixth claims, Henry County, Tenn

Fig. 2 Claim map showing proposed drill hole locations and access roads

INTRODUCTION

An application dated July 8, 1955, for Government aid in an exploratory project under docket No. [illegible], was submitted by Kirby C. Carysil. Property under consideration includes 375 claims in Emery County, Utah. The proposed program consists of 61 drill holes, estimated to average 300 feet in depth, for a total of 24,900 feet of drilling. The estimated cost is $[illegible]. The location pattern of the drill holes is designed to discloses the projected extension of the Dalton and Rocky Mountain stream channels and to explore the Chinle formation in these channels for uranium ores.

A field examination of the property was made September 13 and 14, 1955, by Howard F. Allen, Geological Survey, and M. N. Shupe, Bureau of Mines, to determine the feasibility of the proposed exploratory work and to appraise the estimated costs and the engineering aspects of the job. The field examiners were accompanied to the property by Kirby C. Carysil, the applicant.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The property is situated on the southwest flank of the San Rafael Swell in Emery County, Utah. The specific location is T. 20 S., R. 8 and 9 E., S.L.B. and M., 62 airline miles southwest of Green River, Utah. The claims lie in an area of moderate relief with elevations ranging from 4,000 to 5,000 feet above sea level.

The climate is continental. Summers are hot and dry, and winters are cold, ordinarily with a small amount of snow. Vegetation is scanty and consists of junipers and desert plants.

The property may be reached by traveling 23 miles southerly from Emery, Utah, on paved Utah Highway 10, and thence southeasterly about 20 miles on a rough dirt road to the claims.

HISTORY AND PROSPECTING

This is a new mining property, without previous background or history. Location of the both claims was entered November 8, 1964, and completed June 4, 1965. No work of any kind has been done on the claims.

OWNERSHIP AND HOLDING

The property consists of 2[illegible] unpatented lode mining claims, located and recorded in the name of Kirby C. and Donald E. Coryell (brothers). Because of financial assistance and services given to Kirby C. Coryell by his father and two other brothers, they have shown interests in the claims. Jack O. Jones has a 5 percent interest. Following is a complete list of owners of the both claims:

Kirby C. Coryell	[illegible] Bunting Avenue	Grand Junction, Colo.
Donald E. Coryell	[illegible] Circle Apts.	Wenatchee, Washington
George E. Coryell, Jr.	Yakima Heights	Yakima Island, Washington
Eugene C. Coryell	[illegible] Ave. Roosevelt	Walla Walla, Washington
George C. Coryell	[illegible] East 26th Street	Seattle [illegible], Washington
Jack O. Jones	[illegible] Wall Avenue	Grand Junction, Colo.

The Beth lode mining claims are recorded in the office of the County Recorder, Castle Dale, Emery County, Utah, as follows:

Claim	Book	Page
Beth No. 1 to No. 16	J-72	124 to 139
Beth No. 17	J-75	97
Beth No. 18 to No. 33	J-73	182 to 196
Beth No. 34 to No. 36	J-73	98 to 100
Beth No. 37 to No. 46	J-73	168 to 175
Beth No. 47 to No. 49	J-73	181 to 183
Beth No. 50 to No. 62	J-73	179 to 186
Beth No. 63 to No. 69	J-73	104 to 110
Beth No. 70 to No. 83	J-73	190 to 201
Beth No. 89 to No. 89	J-74	111 to 117
Beth No. 90 to No. 140	J-73	202 to 242
Beth No. 141 to No. 150	J-75	118 to 127
Beth No. 151 to No. 153	J-73	283 to 285
Beth No. 154 to No. 171	J-75	128 to 135
Beth No. 172 to No. 189	J-73	249 to 252
Beth No. 190	J-73	136
Beth No. 191 to No. 202	J-73	254 to 265
Beth No. 211 to No. 217	J-75	137 to 143
Beth No. 218	J-85	294
Beth No. 254 to No. 261	J-75	144 to 151
Beth No. 277	J-73	152
Beth No. 278 to No. 286	J-73	296 to 304
Beth No. 287 to No. 290	J-85	305 to 308
Beth No. 292 to No. 294	J-73	205 to 214
Beth No. 295 to No. 296	J-73	132 to 134
Beth No. 297 to No. 299	J-73	215 to 218
Beth No. 300 to No. 310	J-85	182 to 184
Beth No. 311 to No. 337	J-73	227 to 248
Beth No. 338	J-73	185
Beth No. 339 to No. 342	J-73	244 to 247
Beth No. 343 to No. 348	J-84	159 to 164
Beth No. 349 to No. 354	J-85	185 to 189
Beth No. 355 to No. 356	J-85	289 to 290
Beth No. 357 to No. 370	J-84	165 to 173
Beth No. 377 to No. 373	J-84	181 to 183
Beth No. 391 to No. 406	J-84	174 to 183
Beth No. 413 to No. 415	J-84	184 to 191
Beth No. 469 to No. 471	J-84	192 to 195

Claim	Book	Page
Both No. 473	J-63	164
Both No. 473 to No. 486	J-63	301 to 311
Both No. 486 to No. 488	J-64	137 to 138
Both No. 488 to No. 493	J-63	314 to 319
Both No. 493 to No. 517	J-64	305 to 316
Both No. 518 to No. 540	J-65	307 to 329
Both No. 544	J-64	317
Both No. 145 to No. 156	J-65	102 to 103
Both No. 149 to No. 159	J-65	105 to 106
Both No. 521 to No. 571	J-65	327 to 377
Both No. 572 to No. 585	J-65	378 to 390
Both No. 574 to No. 602	J-66	400 to 428
Both No. 584 to No. 607	J-65	411 to 434
Both No. 589 to No. 753	J-66	415 to 579
Both No. 754 to No. 802	J-64	314 to 362

GENERAL GEOLOGY

Rocks outcropping within the area of the claims are the Dakota formation, Navajo sandstone, and Chinle formation of Jurassic age, occurring successively from northeast to southwest. The locations of the proposed exploratory drill holes (Fig. 2) lie near the base of the Navajo sandstone and near the top of the Dakota formation. In the Rocky River canyon, northeast of the property, Wingate sandstone of Jurassic age, and Chinle and Moenkopi formations of Triassic age, are exposed. Shinarump conglomerate, ordinarily present between the Moenkopi and Chinle formations, is missing in this area. Seep occur in the Shinarump sandstone of the Chinle formation at the Delta mine and other nearby properties.

Two stream channels, the Delta mine and Rocky Mountain, are exposed in the cliffs north of the property and apparently project into the area

of the Myth claims. Several faults and diabase dikes, striking in a northwesterly direction, appear on the claims.

There has been no uranium mineralization found on the property to date.

KNOWN ORE RESERVES

There are no known uranium ore reserves on the Myth claims.

PRESENT MINING

The western part of the property is served by a primitive access road. There are no mine workings, drill holes, or buildings of any kind on the claims.

Salina, Utah, approximately 68 miles northeast of the property, is the nearest railhead, being situated on the Denver and Rio Grande Railroad. The ammonia-buying station at Marysvale, Utah, is 20 miles from Salina.

Mine labor is available from Salina or from the coal-mining towns of Emery County.

Mining equipment and supplies can be obtained from the same sources as the mine labor.

Emery, Utah, is the nearest source of available water.

PROPOSED PROGRAMS

The applicant proposes to explore the property by drilling two rows of vertical holes, one row across the projection of the Smith mine

channel and the other row across the projection of the Rocky Mountain channel, the work to be done in two phases.

Phase I

It is proposed to drill a maximum of 41 holes (fig. 8) in the two rows, to an average depth of 500 feet, for a total of 20,500 feet, the holes to be numbered drilled to the top of the Mesa Rock sandstone and core drilled about 100 feet through the Mesa Rock and Monitor Butte members to the Moenkopi formation. The holes are to be drilled 1,000 feet apart to start, filling in to 500 feet wherever there are indications that a channel is present between holes.

The locations of the longer row of holes to the west lie along a diabase dike. Initial holes of this row should be drilled alternately on either side of the dike where possible.

Approximately 20,500 feet of numbered and 4,100 feet of core drilling shall be completed under phase I.

Phase II

A maximum of 10 holes each will be drilled to delineate ore mineralization discovered in the two rows of holes in phase I. These holes will also be core drilled through the Mesa Rock and Monitor Butte members.

Approximately 10,000 feet of numbered and 2,000 feet of core drilling shall be completed under phase II.

General Provisions

The operator shall provide for examination, logging, splitting, and storage for Government inspection and disposal of drill-hole

cuttings and cores, determination of drilling depths, hole probing, surveying and mapping of drill-hole locations, sampling, and all other duties necessary to the satisfactory technical progress of the proposed program.

The Government shall not contribute to the cost of any hole drilled smaller than AX size, nor to the cost of any hole which cannot be probed with radiometric logging equipment.

The operator's monthly report shall contain certified drill and geologic logs, and certified copies of chemical analyses.

Supervision, the extent and method of sampling and logging holes, the manner of splitting and storing drill-hole cuttings and cores, the laboratory making the chemical analyses, the location of drill sites, and the drilling method used are to be subject to Government approval.

ESTIMATED COSTS OF PROJECT EXPLORATION

Independent Contractor

Phase I

Drilling	
Diamond - 22,000 feet at $[illegible] per foot	$ [illegible]
Core - 6,100 feet at $[illegible] per foot	[illegible]
Access roads (7-1/2 miles)	
Bulldozing - 400 hours at $[illegible] per hour	[illegible]
Drilling and blasting - 1,[illegible] cubic yards at $[illegible] per cubic yard	[illegible]
Total independent contractor, phase I	$[illegible]

Phase II

Drilling	
Measure - 15,000 feet at $8 per foot	$60,000.00
Core - 2,500 feet at $5 per foot	10,000.00
Access roads (4 miles)	
Bulldozing - 240 hours at $12 per hour	2,880.00
Drilling and blasting - 600 cubic yards at $8 per cubic yard	2,400.00
Total independent contracts, phase II	$[illegible]

Other Items of Cost

Phase I

Supervision - 4 months at $[illegible] per month	$ 2,[illegible].00
Technical - 4 months at $[illegible] per month	1,[illegible].00
Jeep truck	
Operating cost (gasoline, oil, grease, repairs, etc.)- 4 months at $[illegible] per month	[illegible].00
Depreciation - 4 months at $[illegible] per month	[illegible].00
Core splitter	18.00
Accounting - 4 months at $[illegible] per month	100.00
Assays - [illegible] at $1.[illegible] each	112.00
Total	$4,[illegible].00

Phase II

Supervision - 2 months at $[illegible] per month	$1,[illegible].00
Technical - 2 months at $[illegible] per month	700.00
Jeep truck	
Operating cost (gasoline, oil, grease, repairs, etc.)- 2 months at $[illegible] per month	[illegible].00
Depreciation - 2 months at $[illegible] per month	100.00
Core splitter	18.00
Accounting - 2 months at $[illegible] per month	[illegible].00
Assays - [illegible] at $1.[illegible] each	[illegible].00
Total	$[illegible],[illegible].00

Estimated Cost Summary

Phase I	$[illegible],[illegible].00
Phase II	[illegible],[illegible].00
Estimated total cost of project	$[illegible],[illegible].00
Government participation at 75 percent	$[illegible],[illegible].75

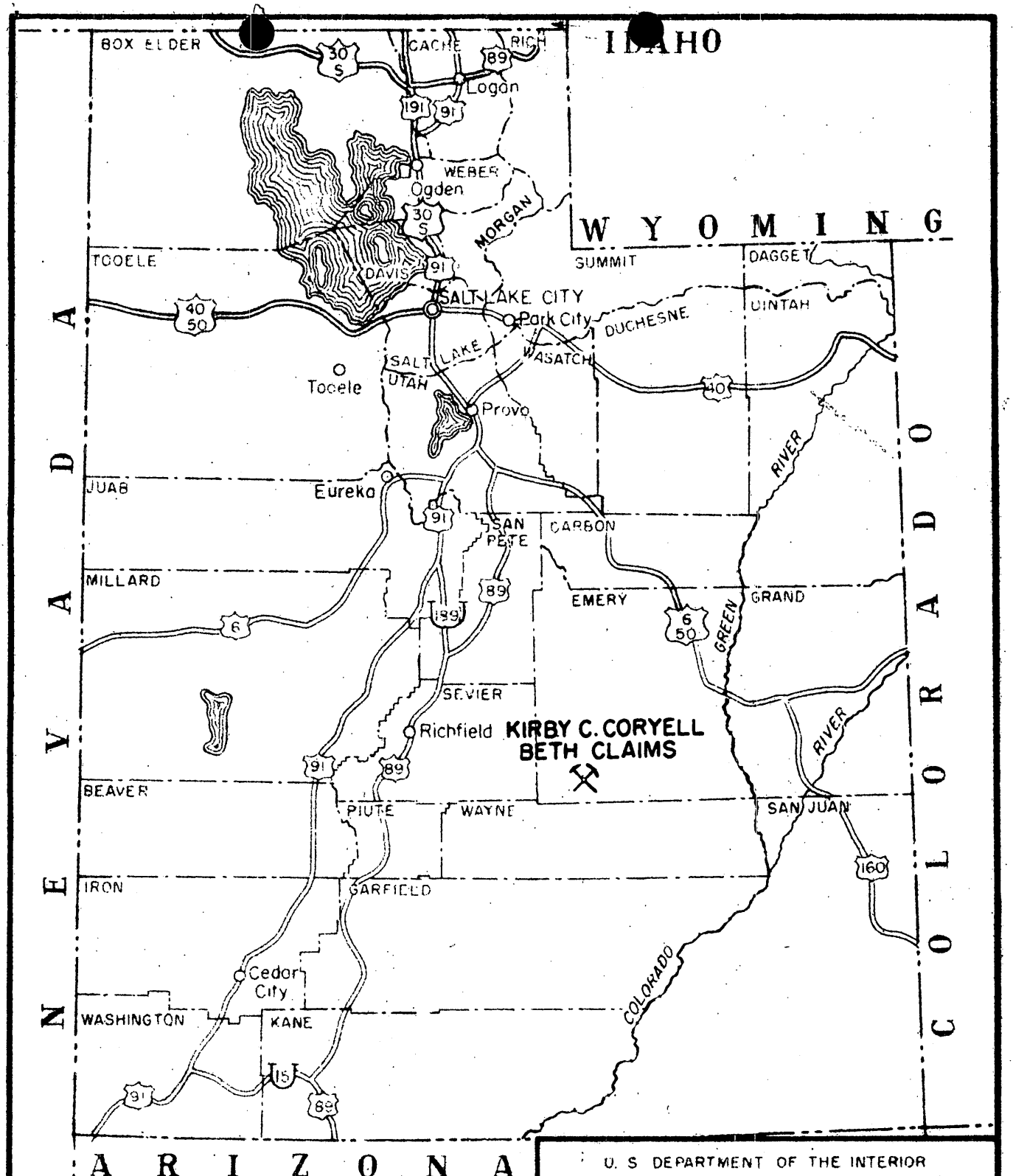
PROPOSED FINANCING

The applicant reports that he plans to invest $[illegible].25 in the proposed exploratory project, which is 25 percent of the estimated cost of $[illegible],[illegible].00, in accordance with the regulations on Government participation, as stated in Section 7, MMRA Order No. 1 Amended.

CONCLUSIONS AND RECOMMENDATIONS

The property, consisting of 270 lode mining claims, is equivalent in size to 18 sections, or one-half township. These extensive holdings cover an area back from the rim of the Muddy River canyon, starting near the top of the Kaibab formation and rising up through the Moenkopi sandstone into the lower Chinle formation. Important uranium ore deposits in the vicinity of the property occur in the Moss Back and Monitor Butte members of the Chinle formation. The Moss Back sandstone is exposed along the cliffs of the Muddy River canyon, and is assumed to extend under the Gerpehl property. As far as is known, no uranium mineralization has been found on top of the cliffs. The reasons for exploration of this property are based entirely on geologic theories and speculation. Proposed exploration is considered of valiant nature.

The applicant projected two stream channels for a distance of 1-1/4 to 2 miles into his property, in the hope that if they are directional by the proposed drilling program, they will contain commercial ore deposits. The favorable horizons in the vicinity of the proposed drilling are estimated to average 800 feet in depth. The probability of ore discovery by the proposed exploratory program appears to be remote, and the cost is high. Therefore, it is recommended that the application for development aid be denied.



U. S DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Fig. 1 DMEA Docket No. 3897

Location Map

KIRBY C. CORYELL, BETH CLAIMS

EMERY COUNTY, UTAH

ENGINEER: *M. H. HOWES*	DATE: NOV. 1, 1955
TRACED: NOV., 1955; A.P.T.S.	1900-359-E
CHECKED:	

TRANSMITTED
DEC 19 1955

MINERAL DEPOSITS
DMEA
RECEIVED
DEC 8 1955
U. S.
GEOLOGICAL SURVEY
DENVER, COLORADO

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
P. O. BOX 360
GRAND JUNCTION, COLORADO

RECEIVED
DEC 22 1955

December 5, 1955

DMEA
Date Rec'd
DEC 8 1955
BUREAU OF MINES
Denver, Colorado

Memorandum

To: E. N. Harshman, DMEA Field Team, Region III

From: J. William Hasler

Subject: DMEA docket 3897, Kirby C. Coryell, Beth claims, San Rafael Mining District, Emery County, Utah

Enclosed is a geologic report on the Beth claims, San Rafael Mining District, Emery County, Utah. Kirby C. Coryell, 922 Bunting Avenue, applied for Government assistance in exploring uranium on the Beth group of claims in the San Rafael Mining District, Emery County, Utah. The application was referred to the field and was examined September 13 and 14, 1955, by M. H. Howes, U. S. Bureau of Mines, and E. F. Albee, U. S. Geological Survey, accompanied by the applicant, Mr. Kirby C. Coryell.

The applicant proposes two fences of holes designated to test the extension of the Hidden Splendor channel and the Rocky Mountain channel. The fence of holes designed to test the Hidden Splendor channel is approximately 1½ miles southwest of the Hidden Splendor property and the one designed to intersect the Rocky Mountain channel is approximately two miles southwest of the Rocky Mountain mine. The rocks in the area range from lower middle Triassic to middle Jurassic. The host rocks are at or near the base of the Chinle formations and drilling depths would range from 900 to 1,100 feet.

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(date)

Current geologic data obtained by the Geological Survey in the area indicates that the Hidden Splendor channel does not extend southwest into the applicant's area with any degree of continuity. The Rocky Mountain channel at the outcrop appears to trend northwesterly rather than southwesterly.

The drilling program, as proposed by the applicant, appears to be of a prospective nature in view of the fact the work is proposed as a result of meager geologic data. It is felt that in order to explore ground at these depths, mineralized trends on ore bodies of large enough size and grade should be indicated before a DMEA program could be approved.

It is recommended that the application be denied without prejudice. The applicant should be advised to do enough preliminary drilling to prove the extension of the proposed channels.

The Atomic Energy Commission was consulted relative to the appraisal of the subject area and I concur with the conclusions and recommendations of the examining team.

The required number of maps and brochure are enclosed.

J. William Hasler

J. William Hasler,
Geologist.

JWH/mlr

Enclosure

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UNITED STATES DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION
REPORT OF EXAMINING TEAM
REGION III

DMEA 3897, Kirby C. Coryell, Beth claims, Emery County, Utah
San Rafael Mining District, Emery County, Utah

Uranium

Geologic report

by

Howard F. Albee
U. S. Geological Survey

~~M. H. Howes~~
~~U. S. Bureau of Mines~~

December 1955

Reviewed by
DMEA OPERATING COMMITTEE

12-28-55
(date)

DMEA 3897

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INTRODUCTION

Application (DMEA docket 3897) has been made by Kirby C. Coryell of 922 Bunting Avenue, Grand Junction, Colorado, for Government assistance in exploring for uranium in the San Rafael Mining District, Emery County, Utah. The applicant proposes to explore the Beth group of claims which consist of 578 unpatented mining claims in an unsurveyed part of Emery County, Utah.

The applicant proposes to drill two fences with holes spaced on 500-foot centers. The estimated maximum footage is 54,900 feet and the minimum is 19,800 feet of core and non-core drilling. The estimated average depth of drilling is 1,100 feet. Each fence of holes is situated so as to intersect the postulated extension of a sandstone channel in the Chinle formation.

The subject claims were examined September 13 and 14, 1955, by M. H. Howes, U. S. Bureau of Mines, and Howard F. Albee, U. S. Geological Survey, in company with the applicant, Kirby C. Coryell.

Because of the drilling depths and prospecting nature of the project, it is recommended that the application be denied without prejudice.

LOCATION AND ACCESSIBILITY

The Beth group of claims located in an unsurveyed area about one mile southwest of the Muddy River in the San Rafael Mining District, Emery County, Utah, are accessible the year around, except for short periods of heavy rain, by about 25 miles of unimproved dirt road that bears easterly from a point 12 miles south of the town of Emery on Utah State Highway 10.

GEOLOGY AND ORE DEPOSITS

The sedimentary rocks in the area of the subject claims range in age from Lower and Middle (?) Triassic to Middle Jurassic. They are, in ascending order, the Moenkopi formation of Lower and Middle (?) Triassic age, the Chinle formation of Upper Triassic age, the Wingate sandstone of Upper Triassic age, the Kayenta formation of Jurassic (?) age, the Navajo sandstone of Jurassic and Jurassic (?) age, and the Carmel formation of Middle Jurassic age.

The subject area is at the southwest end of the San Rafael Swell, the anticlinal axis of which is plunging about 3° southwesterly through the center of the group of claims. Several faults within the area cross the axis of the Swell and trend nearly normal to it. Numerous joints throughout the area trend parallel to faults and diabase dikes. A genetic relationship between the diabase filled fractures, the faults, and the joints is thus suggested by their parallel strikes.

Numerous diabase dikes and sills occur to the west and northwest of the claims. Several dikes are within the area of the claims and they strike generally northwest. Little is known of the time of emplacement of these dikes except that they are of post-Morrison age.

The ore-bearing zone on the claims is near the base of the Chinle formation. The Chinle, in this area, is divided into three members which are, from bottom to top, the Monitor Butte, the Moss Back, and the Church Rock. Potential production could be from the Moss Back member or from sandstone lenses in the Monitor Butte member of the Chinle formation.

The Navajo and Carmel formations crop out in most of the claimed area and the Kayenta formation crops out in a small area on the northeast edge of the claims. Holes drilled from a bench in the lower part of the Navajo formation would have to be about 1,100 feet deep to penetrate the ore-bearing sandstone and bottom in the underlying Moenkopi formation.

Thicknesses of the formations in the area, taken from the nearest measured sections on the Muddy River, are:

Formation	Member	Feet	Source of information
Carmel		650	USGS Bul. 806-C
Navajo		650	USGS Bul. 806-C
Kayenta		250	USGS Bul. 806-C
Wingate		450	USGS Bul. 806-C
Chinle	Church Rock	140	J. H. Stewart, USGS
	Moss Back	70	J. H. Stewart, USGS
	Monitor Butte	100	J. H. Stewart, USGS
Moenkopi		850	J. H. Stewart, USGS

Northeast of the subject area two prominent channels occur in the lower Chinle sands. The Hidden Splendor channel trends southwesterly and the southernmost exposure is in the cliff on the south side of the Muddy River.

The Rocky Mountain channel, about two miles northwest of the Hidden Splendor, is exposed only on one cliff face. This area is being mapped by the U. S. Geological Survey. Data from the mapping project indicates the channel to be trending northwest. The applicant, however, assumes a southwesterly channel trend, nearly parallel to the Hidden Splendor channel.

The Hidden Splendor ore body ranges in size between 100,000 and 200,000 tons. The exposure of the channel south of the Muddy River, assumed to be part of the Hidden Splendor channel, has been explored. Anomalous radioactivity is present, but no minable ore body is known. The ore-bearing sandstone is in the Monitor Butte member and lies about 50 feet below the Moss Back. The channel has been followed northeasterly in the Hidden Splendor mine to its pinchout about 1,000 feet from the adit. It is visibly thinning to the southwest and probably pinches out in a few hundred feet in that direction.

The Rocky Mountain channel has been explored by underground methods and has produced between 100 and 200 tons of ore. The known reserves in the Rocky Mountain channels are small and probably will not exceed the production. The ore-bearing sandstone is in a channel in the Moss Back member of the Chinle formation. The channel has been cut through the Monitor Butte member and sands within the channel rest on a Moenkopi surface.

The applicant has proposed a drilling program consisting of two fences (fig. 2), with holes spaced on 500-foot centers, with which he hopes to intersect the Hidden Splendor and Rocky Mountain channels. This would be projecting the Hidden Splendor channel about a mile and a half and the

Rocky Mountain channel about 2 miles. It is doubtful that any single channel can be projected for such a long distance in this area. They can, however, be projected a few hundreds of feet.

PROPOSED DRILLING PROGRAM

The applicant proposes to drill two separate fences of holes in stage I. Each fence is designed to locate the extension of a known channel. A maximum number of 41 holes will be required to complete this work. The spacing along the fences would be on intervals of 1,000 feet, then off-setting on 500-foot intervals to further delineate the channel.

Stage II would allow 10 holes to be drilled in each channel, and would comprise a maximum of 20 holes.

The average drilling depth would be 900 feet as calculated by the applicant. According to thicknesses obtained by the U. S. Geological Survey from sections measured in the general area, the drilling depths would possibly average 1,100 feet.

The total cost of the project, based on the maximum footage for stage I and stage II, is estimated at $199,515.50.

CONCLUSIONS AND RECOMMENDATIONS

Rocks that crop out in the subject area range in age from Lower and Middle (?) Triassic to Middle Jurassic age. They are, from oldest to youngest, the Kayenta, Navajo, and Carmel formations. The Triassic Wingate and Chinle formations crop out from about a mile to as much as two miles northeast of the claims. The host rocks are at or near the base of the Chinle formation and, from measured sections in the area, would be in excess of 1,000 feet below the lowest proposed drilling sites.

The applicant estimates the average depth of drilling would be 900 feet, and the examining team estimates the minimum depths would be about 1,100 feet. The targets are primarily two channels that are projected from the outcrop about 7,000 feet and about 10,000 feet to the northeast. The applicant postulates that, because of the structure, any irregularity or thickening of the basal Chinle sandstones may be a favorable host rock and, therefore, a target.

Either of the estimated depths are excessive when drilling for a target of unknown size or a channel that has been projected for more than a few hundreds of feet. A drilling program of such depths and based upon such distantly projected or postulated targets would be strictly prospecting.

The area may have merit even though no concrete evidence is at hand to prove the existence of ore deposits by such long projections of ore-bearing channels. The examining team recommends that the application be denied without prejudice. If the applicant can show by drilling that the claims contain thick, mineralized sandstone in the Chinle formation and present an integrated exploration program, including a more limited area, the application may be reconsidered.

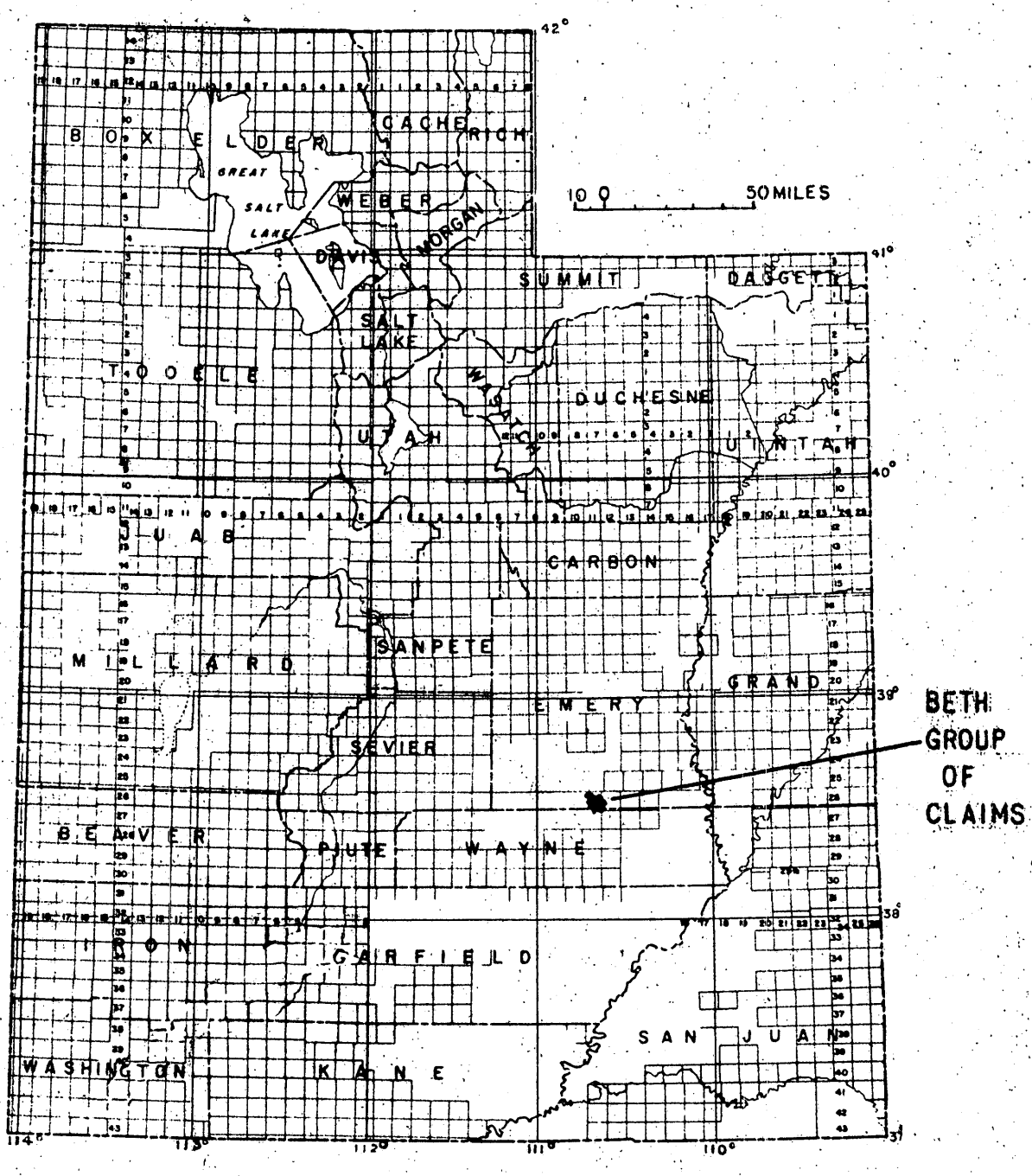

Figure 1. INDEX MAP OF UTAH SHOWING LOCATION OF BETH GROUP OF CLAIMS, KIRBY C. CORYELL PROPERTY, EMERY COUNTY, UTAH

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
DEC 22 1955

December 19, 1955

224 New Customhouse
Denver 2, Colorado

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Acting Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA 3897 (Uranium), Kirby C. Coryell, Beth claims, Emery County, Utah, Comments on Mr. Coryell's letter to DMEA officials in Washington dated November 11, 1955.

Enclosed are two copies each of the following:

1. Memorandum from J. William Hasler dated December 9, 1955

2. Memorandum from R. C. Rubeck to J. William Hasler dated November 30, 1955

3. Memorandum from H. S. Johnson to J. William Hasler.

4. Memorandum from H. B. Dyer to J. William Hasler.

These memoranda have reference to the letter sent to the Defense Minerals Exploration Administration November 11, 1955 by Kirby C. Coryell and may be of some assistance to you in replying to Mr. Coryell's letter.

The field has recommended that this application be denied without prejudice.

E. N. Harshman

E. N. Harshman

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey
Colorado Plateau District
P. O. Box 360
Grand Junction, Colorado

MINERAL DEPOSITS
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U. S.
GEOLOGICAL SURVEY
DENVER, COLORADO

December 9, 1955

Memorandum

RECEIVED
DEC 28 1955

To: Executive Officer, DMEA Field Team, Region III

Through: E. N. Harshman

From: J. William Hasler

Subject: DMEA docket 3897 (Uranium) Kirby C. Coryell, Beth claims, Emery County, Utah.

During the course of the examination of the Beth group of claims and the subsequent preparation of the geologic report by H. F. Albee, ~~the applicant was contacted relative to the type of~~ exploration that would be advisable on his large group of claims. The applicant was very persistent in wanting to know the status of his application; consequently, we advised him that the Defense Minerals Exploration Administration would probably not approve the work as he outlined in his application because of its prospective nature. The applicant and members of the Survey at Grand Junction discussed the applicant's property with him and its various facets relative to the geology involved and the type and kind of exploration necessary. Some two weeks after the discussions with Messrs. Albee, Robeck, and myself, the applicant submitted a letter to the DMEA in Washington, stating, in detail, his theories and postulations justifying a DMEA loan. In this letter he has, more or less, taken issue with some of Mr. Robeck's statements, as well as our view relative to his property. It was felt advisable, therefore, to ask for comments from various Survey geologists familiar with the area. Enclosed are copy of Mr. Coryell's letter and the comments by H. Dyer, Ray Robeck, and H. S. Johnson.

Although we appreciate Mr. Coryell's feelings regarding his property, we are still of the opinion that Mr. Albee's appraisal of the proposed program is sound. This material should accompany the applicant's report.

J. William Hasler
J. William Hasler,
Geologist

JWH/vll

Enclosures

COPY

November 30, 1955

Memorandum

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DEC 2 2 1955

To: J. W. Hasler

From: R. C. Robeck

Subject: K. C. Coryell - letter to DMEA - November 16, 1955

Mr. Coryell's letter is written in such a tone and time that it hardly deserves comment. I believe Mr. Albee was correct in denying the application. If at some future time the applicant furnishes additional information gained from exploration then the case may be re-examined.

Mr. Coryell misquoted me so badly, particularly in regards to Monitor Butte streams, that there is no rebuttal necessary. The fact that he misquoted me indicates his lack of knowledge on the subject.

COPY

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U. S.
GEOLOGICAL SURVEY
DENVER, COLORADO

COPY

Memorandum

November

To: J. W. Hasler

From: H. S. Johnson

Subject: DMEA 3897, Kirby C. Coryell, Beth claims, Emery County, Utah. Comments on Mr. Coryell's letter of November 11, 1955 to DMEA officials in Washington.

Because my present project, "Regional Synthesis", involves the attempt to isolate and understand major and minor ore controls on the Colorado Plateau and to determine ground favorable for significant uranium deposits, I am interested in Coryell's proposal to explore previously untested ground in the southern part of the San Rafael district. Practically all rim exposures of the known ore-bearing units on the Plateau have been well prospected by now, and large new ore deposits will probably be found only by physical exploration in areas where the ore-bearing unit does not outcrop. However, exploration by drilling or drifting can be very expensive (especially where the potentially ore-bearing unit is at considerable depth) and if carried on in a random fashion may not pay off at all. There is certainly no percentage in expending $2,000,000 to find a deposit which will net only $1,000,000 after deduction of mining costs. Therefore, exploration costs must be kept at a minimum by applying all the geologic knowledge possible, and the economic factors of expected deposit size versus cost of exploration must be kept constantly in mind.

I have read Howard Albee's report on Mr. Coryell's proposed program of exploration on the Beth claims, and I concur with Albee's recommendations. I have also read with interest Coryell's letter of November 11, 1955 in which he takes Ray Robeck and other Survey geologists to task for not recognizing the importance of faults, igneous dikes, and tectonic structures in the localization of sandstone type uranium deposits on the Colorado Plateau and especially on the Beth claims. In his ten page single spaced letter, Coryell makes many statements about the geology and controls of Plateau uranium deposits which I consider unwarrentable. Rather than go over the letter sentence by sentence I will content myself with a few general comments.

The first two pages of Coryell's letter indicates to me that he has a clear understanding of the reasons why Survey geologists in Grand Junction are not especially enthusiastic about his proposed exploration of the Beth claims. Briefly some of these reasons are (1) the Delta sandstone lens is not thought to be as continuous as Coryell's interpretation of it, (2) the Moss Back channel at the Rocky Mountain mine is thought to trend NW-SE rather than southwesterly, (3) there is no direct evidence that faults, igneous dikes, or folds have exerted any control on the localization of sandstone type uranium deposits on the Plateau, and (4) the depth to the ore-bearing unit on the Beth claims is such as to prohibit exploration for anything but a large continuous orebody, the presence of which on these claims is entirely speculative so far.

Coryell concedes points (1) and (2) of the foregoing sentence on page 2 of his letter of November 11. The gist of his ten pages of argument then is, as well as I can make out by brief examination, that Robeck and other Survey geologists have completely ignored the relationships between ore deposits and faults, dikes, and folds. This is of course not true. We have given a lot of thought to such structures on the Plateau and would be very happy to be able to recognize and make use of such relationships if we could. If we do not place much importance upon faults, dikes, and folds as determinants of favorable ground, it is because the preponderance of evidence to date suggests to many of us that stratigraphic and lithologic features are considerably more important.

On page 4 of his letter Coryell discussed faults and dikes and their apparent spatial relationship to ore deposits. He says, "This obvious relationship of deep-seated structure to all significant mineralization proves a hydrothermal origin to a mining geologist, as they provide access for deep-seated solutions." I do not believe the evidence backs up Mr. Coryell. That the dikes in the southern San Rafael Swell occupy faults or fractures and come from great depths is obvious. That they are related genetically to the ore solutions and that faults control localization of ore are concepts that are as yet unproven. No dikes cut known ore deposits in the San Rafael district to my knowledge. There are many faults around to be sure and some of them cut orebodies (e.g. at Temple Mountain and Tomsich Mountain). In every instance where I have observed faults cutting orebodies in the San Rafael Swell and the rest of the Plateau the orebodies are displaced by the fault and my interpretation is that the faults are post-ore. (Secondary uranium minerals do occur along faults and fractures but not the primary deposits.) Mine mapping by AEC geologists (Keyes) in the Delta mine in the San Rafael Swell indicates to me that the orebody follows favorable lithologies along the trend of the channel and is not affected by cross-cutting joints and fractures. This has been my observation everywhere on the Plateau. Therefore, I do not feel that the presence of faults or dikes on the Beth claims makes the ground favorable.

On page 5 of his letter Mr. Coryell mentions the presence of diabase dikes in the Grants district and specifically in the Jack Pile mine and implies that they are related to the ore. I have observed the dike at the Jack Pile and am of the opinion that it is post-ore.

On page 6 of his letter Mr. Coryell says that diabase dikes in the southern San Rafael district are all staked. These dikes have been checked for radioactivity by AEC and Survey geologists as early as 1951 and several times since then. They were in every case found to be slightly more radioactive than the barren sedimentary rocks they cut but not anomalously radioactive for basic igneous rocks. The fact that they are covered by claims means nothing. I know of hundreds if not thousands of claims blanketing the Mancos shale near Crescent Junction, Utah.

Their existence of these claims does not improve my opinion of that ground. In fact I would estimate that 90 percent or more of the claims on the Plateau are worthless. As to Coryell's statement that one of the dikes in the San Rafael district contains an appreciable tonnage of ore-grade material, I can only say I have not heard of this and have seen no record of production from such a deposit.

In the last three paragraphs of his letter Mr. Coryell says (1) the geology is all in favor of their being large ore deposits on his claims and (2) a limited drilling program would have a very good chance of finding these orebodies. I disagree with both these ideas. I don't consider the faults and dikes to have any bearing on the favorability of the ground, and I think the drilling program proposed by Mr. Coryell to be too limited to stand a good chance of finding the projected Delta or Rocky Mountain channels, much less explore them. At any rate it seems to me that it is prospecting rather than exploration to put down a few holes in the attempt to intersect a channel or sandstone lens the nearest point of control on which is about 2 miles away. It would be far better to test some of the intervening ground first and try to follow the channel from the known into the unknown.

In summary, I disagree with Coryell's ideas that faults and dikes indicate favorable ground, and I concur with Albee's recommendations. If Coryell should do enough exploration on his own to show the presence of ore or favorable host rocks on his claims, the project could be reconsidered.

C O P Y

MINERAL DEPOSITS
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DEC 12 1955
GEOLOGICAL SURVEY
DENVER, COLORADO

November

Memorandum

To: J. W. Hasler

From: H. B. Dyer

Subject: Letter dated Nov. 16 1955 from Kirby C. Coryell in support of his application for DMEA assistance.

I differ with a number of Mr. Coryells statements, and interpretations. I will list these differences in the order of occurrence in Mr. Coryell's letter.

Number 1 page 3 first paragraph following the questions and answers. Mr. Coryell is incorrect in the statement that "This Delta Channel sand is as thick at outcrop No. 1 as it is at Number 2, the Delta mine." As I remember this sand it is much thinner at its outcrop to the southwest than it is at the Delta mine. Thus, the available evidence indicates that the sand is pinching out in the direction of the applicants property. The sand is known to pinch out towards the Northeast. I can see no reason to assume the Southwest end is any different.

On page 4, Mr. Coryell attempts to establish a relationship between the dikes and ore deposits. This relationship seems extremely tenuous to me since dikes are not known to outcrop within one mile of commercial ore bodies in the Swell. To my knowledge dikes are absent or rare in the Uravan mineral Belt. They are absent in the White Canyon Big Indian Wash and San Rafael river districts. The Moenkopi formation underlying the Delta mine is not visibly altered along the projection of the dike.

Page 6 paragraph 5. I walked the dike in question after the exploration described had been done. I do not have assays yet but the radiometric data indicates that values might be on the order of .01% to .001% U_3O_8.

Page 6 paragraph 6. I would like to see this dike. It has not produced when I last checked the production records.

Page 7. paragraph 1. As a matter of fact the exposed Moss Back channels do not contain mineralization comparable to the Delta deposit.

C O P Y

Return to
Rare and Miscellaneous Metals Division.
F.M. Murphy

For:
R.E. Blackburn.

RECEIVED
NOV 17 1955

Kirby C. Coryell
927 Bunting Avenue
Grand Junction, Colorado
November 16, 1955

Defense Minerals Exploration Administration
Washington 25, D. C.

Gentlemen:

I wanted to discuss the accompanying letter with Mr. Albee and Mr. Hasler before sending it to you. Today I was informed they both were in New Mexico and would not be back until next week. As it seems most desirable that it reach you while my loan application is still in process, I think it best to send it to you now. Mr. Hasler will receive a copy when he returns.

Very truly yours,

Kirby C. Coryell

KCC/mlj
Encl.

RECEIVED

NOV 17 1955

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado
November 11, 1955

Defense Minerals Exploration Administration
Washington 25, D. C.

Re: Docket No. DMEA 3897 (Uranium)
Beth Claims
Emery County, Utah

Gentlemen:

About three weeks ago the opportunity became available to include into my exploration project the 86 claims partially bordering the Beth group on the northeast. This group is outlined in green on the enclosed map. I contacted Mr. Albee, the USGS geologist who made the field examination of my group, to get his opinion of the advisibility and possibility of doing so. Mr. Albee apprised me the recommendation for my application would be "denial without prejudice" and the inclusion of the additional ground was not discussed further, as it obviously would not improve the merits of an exploration program according to the reasons given for denial of my application. These reasons were that the Delta channel (outcrops 1 and 2 on the map) was one of the Monitor Butte sands that habitually pinch out along their trend, and cannot be projected any great distance, and that outcrops 3 and 4 and the Rocky Mountain channel all were Mossback channels that trended northwest. Mr. Albee kindly arranged for me to talk with Mr. Ray Robeck, heading the mapping program in the San Rafael Swell for the USGS, so that Mr. Robeck could present the results of his detailed investigations in the area. I greatly appreciate Mr. Albee's informing me of the field team's recommendation, and the opportunity to discuss the relevant geologic features of the area with him and Mr. Robeck. In addition to substantiating the general interpretations already given me by Mr. Albee, Mr. Robeck stated the following:

The Delta channel (Monitor Butte sand) pinched out several thousand feet to the northeast (revealed by a long drift in the Delta Mine). The course of the channel, however, is substantially as shown on the map. There was no more liklihood of another (or the same) Monitor Butte sand lens being found at any appreciable distance along the projection of the course of this channel (beyond its known extent from pinch out in the Delta Mine to outcrop #1) than there was in any other direction, due to the lenticular nature of these sands and the total lack of pattern of those known to exist. This particular lens, extending the appreciable distance noted, is by far the largest Monitor Butte sand lens known in the swell. In this part of the swell all Monitor Butte streams flowed northeast.

Mossback streams directions was northwest, and the individual [illegible] were formed by streams flowing in this direction. However, the individual courses have no

continuity along the courses of the streams--they are cup-shaped scours extending below the base of the rest of the Mossback with no evidence that any one stream formed two of these scours. They have a completely haphazard pattern without mild scouring between. In plan view, they extend below the general base of the Mossback in about 20% of the area in this vicinity and are deeper and with larger lateral dimensions than elsewhere in the swell. He further stated neither faulting nor folding to have any relationship to mineralization within the swell. All mineralization is very close to a fault, but all barren areas are equally close due to the abundance of faulting. The diabase dikes show no relationship to mineralization; they show only the higher background that would be expected of the igneous material.

Mr. Robeck ascribed the mineralization in the Delta Mine to the contact of the Monitor Butte channel with the Mossback scour northeast of the Delta Mine; that solutions migrating along the base of the Mossback drained down into the Monitor Butte channel and were trapped there. He stated he would not expect other large ore bodies to exist in the southwestern end of the swell except in a Monitor Butte sand with a nearby scour into it by a Mossback channel.

Such were Mr. Robeck's statements of facts and of interpretations stated as facts. Even though the DMEA geologists no doubt tried to segregate Mr. Robeck's information according to fact or interpretation, it is so intermingled, and almost all of it apparently damaging to the merits of my ground, that the chances of loan approval by the field team would be bound to be nil. I believe most of Mr. Robeck's interpretations as stated to me and as he must have stated them to the DMEA geologists seeking his information, to be wholly incorrect. I have not been out to re-examine the area, and will concede that he probably is correct in directions of stream flow during Monitor Butte and Mossback time, and that outcrops 3 and 4 on the map are Mossback scours and are not in part extensions of the Delta channel. However, I would like here to present information indicating him incorrect on other features which most vitally influence feasibility of exploration on my ground.

Several days after talking with Mr. Robeck, I telephoned him and asked a number of questions that troubled me about his interpretations. His answers cleared up a number of matters bothering me, but one series of questions and answers revealed a very important previous statement of his to have the opposite influence on feasibility of exploration than that understood a few days before. While I cannot quote the conversation verbatum, the following questions and answers do not distort the meaning in any way as I understood it at the time.

Q. Does the Monitor Butte take in all the material, which of course is mostly sandstone, between the Shinarump and Mossback?

A. Yes.

Q. Is the Monitor Butte entirely of fluviatile origin?
A. Yes, I would say so.
Q. Are the few sand lenses found in the Monitor Butte due to local features, such as local steepening of gradients?
A. No. They are due to a stream in flood.
Q. Then this particular stream should have deposited sand for the extent of its course, or for very great distances of its course, while in flood?
A. Yes.
Q. What accounts for the lenticular nature of the sands at present? It must be erosion by later streams?
A. Yes, the scouring of later streams.
Q. Then if all these remnant lenses of sands of streams in flood were exposed to view in plan, a pattern should be expected to develop showing others to exist along the trend of a known one?
A. Yes. But far too few of these sands are exposed to view at present to indicate any pattern.
To which I'd like to add now that even with abundant outcrops of Monitor sands, the expected pattern would be revealed only if one of the streams depositing sand happened to parallel a long Chinle exposure with a number of re-entrants. This Delta channel sand is as thick at outcrop number 1 as it is at number 2, the Delta Mine. Its pinch-out to the northeast must be due to the scouring of a Mossback channel, as Mr. Robeck attributes the mineralization to such a feature. It seems unlikely that the sand carried by this powerfully scouring stream in flood could have been scoured out and replaced by mud of later Monitor Butte streams. Mr. Robeck may think this possible based on observation of other Monitor Butte sands, which was not discussed, but he states this particular channel to be much longer as exposed by outcrops and underground workings, and much wider and thicker than any other Monitor Butte sand in the region, and I think he inferred the entire swell. In fact he described other Monitor Butte sands as having little resemblance in form and size with this one. A stream scouring so deeply as this one would hardly be vulnerable to removal by sluggish mud-carrying later streams depositing the same series of sediments without interruption, particularly since this sand record of this stream in flood must have been deposited many feet below its bed before flood, and it must have been covered by many feet of mud during the first few days after flood. The scouring out and removal of sand would have to be done by much later Mossback streams, according to Robeck flowing at right angles across the stream direction of Monitor Butte deposition. Then this reason for fear of non-continuity of the sand of the Delta channel is in itself the environment attributed by Robeck as being responsible for the large ore body in this channel, and in fact he stated none similar would be found unless this same environment were found again. This fear of non-continuity is the only geologic reason given me by anyone as to why the proposed exploration of this channel was not feasible, and according to Robeck's theories it would be every reason to explore along the projection of the channel. Also, there should be no fear that the sand of this channel may be lenticular as deposited, as there probably is little variation in thickness for its exposed length, and even direction of flow was to the

northeast, a stream flowing across a flood plain could not have had a lesser gradient upstream (to the southwest). My theories regarding the mineralization of this channel are quite the opposite of Robeck's, yet the feasibility of exploration of the channel is not adversely affected by the only sensible interpretation of its continuity. Mr. Robeck states the Mossback to scour below its average 40 foot thickness in about 20% of its areal extent in this region. A somewhat lesser percentage would scour sufficiently to destroy a part of this channel and one such scour would destroy only to the extent of the width of that scour. I believe either material at the same horizon may be as good a host as the other in the same structural environment. So far as I know, all the rest of the marketable mineralization in the swell is in the Mossback.

With regard to Mr. Robeck's statements on lack of relevance of structure to mineralization in the swell, I would like to present data showing the opposite belief to be more plausible. Mr. Robeck may be correct in stating that faults in the swell are equally close to all barren areas as they are to all mineralization. However, if one classifies the faults according to liklihood of persistence to great depth, quite the opposite conclusion is obvious. All mineralization of any consequence in the swell known to me is very close spatially (on the scale of a few hundred yards, usually much closer) to such faults so defined by a filling of diabase or width and great strike length of the broken zone. While I'm not particularly familiar with the northern part of the swell, the Temple Mountain and Tomsich Mountain deposits are exceptionally close to major fault zones, and a diabase dike projects into the Delta workings, and these three must account for about 95% of the shipped and blocked out ore of the entire San Rafael Swell. The exposed intersections of these zones with the ore horizon are very few, too. This obvious relationship of deep-seated structure to all significant mineralization quotes a hydrothermal origin to a mining geologist, as they provide access for deep-seated solutions. Indeed, the lack of relationship of mineralization with the abundant small faults is equal proof, as they would provide equal access to the ore horizon for downward percolating waters that had accumulated their metal content in strata above. While the classification of faults according to access to great depths may seem a simplification for convenience to prove a point, it is as sensible and applicable to the problems of ore deposition for the purposes of a structural or mining geologist as a division between conglomerate and shale is for the purposes of a stratigrapher.

From Mr. Albee, I received the impression that my faith in relevance of the structural zones on my property was a matter of opinion which really could not justify DMEA participation in their exploration. Mr. Hasler gave me the impression that drilling in those parts of the claims not thought to contain the Delta channel would have to be designed to explore another channel known to contain mineralization that would justify the expensive exploration these drilling depths require. I would like to bring to your attention facts indicating these views to be short-sighted, although [illegible] forth under an environment dominated by [illegible]

While it is opinion that structure is very important, the belief that it is not important also is opinion, and I'm sure Mr. Albee didn't mean otherwise by his statement. However, there is little doubt that any structural or mining geologist would consider Mr. Robeck's conclusions about structure without foundation, and attach great importance to it in this region. To my knowledge no well-informed geologist depreciates the fundamental relevance of stratigraphic features with this type of mineralization; rather many believe additional features are of equal importance in many instances, and that it usually takes both to accomplish the very special phenomenon of the very large ore bodies. These would be very abundant if due only to a special stratigraphic environment; the structural and mining geologists are aware of structural features of both regional and detail scale that from an empirical standpoint in many districts are as effective in controlling the mineralization as the stratigraphic features. The stratigraphic criteria are empirical too, and thus also of greater reliability than if formed by theory alone. To the structural geologists structure nearly always is the means of access of solutions to the favorable host, and in many instances other structure in the sense of folding or doming of the ore horizon provides a trap for gases or an unknown physical-chemical environment that effects precipitation of the uranium from solution. In other areas we recognize the precipitating agents to be syn-genetic and to have no relationship to structure. It probably generally is believed by most that structural and stratigraphic features have varying degrees of influence on the precise sites and degrees of mineralization in various districts, and according to principles we are beginning to understand. I would like to point out in greater detail than in my application the reasons for believing the fractures partially filled with diabase to be of tremendous importance to the formation of large ore bodies in this district. Some evidence is factual details, some regional structure, and some in the nature of theoretical considerations; however, their aggregate should afford considerable credence to these structures.

1. A close probable relationship between diabasic intrusions and the largest uranium deposits in pre-Cambrian terrain has been recognized for years. New discoveries in similar terrain have strengthened this conviction of association, believed to be structural.
2. Diabasic dikes are abundant in the Grants District, and in fact the material is exposed in the Jack Pile Mine.
3. A diabase dike may be projected a short distance directly into the mineralized zone of the Monument #2 Mine.
4. The diabase dike labeled "B" on the geologic map projects into the Delta Mine. It has been traced on the ground as far as indicated by the red line. The mineralized part of the Delta Mine is cut by joints of similar attitude. Within the ore body, the values are strikingly more consistent for the vertical extent of the sand than for the same distance laterally. This is my impression from an assay map I once saw and from talking with the former superintendent of the operation when exploratory headings were being driven. The site of this ore body constitutes the only exposed intersection of a diabase dike or its projection with a

channel (in the sense of a Monitor Butte Sand or a prominent Mossback scour) in this region.

5. The intersection of a diabase dike and the Mossback has been explored at only one place in the area to my knowledge. That was done by Kyor Oil Company a few miles northwest of the Delta Mine. This dike is essentially parallel to the one projected into the Delta Mine. It was explored partially by drifting and mostly by drilling back to where the intersection passed beneath the Wingate cliff. According to the man supervising this exploration, uranium mineralization was found on both sides of the dike generally getting weaker away from the dike. While sub-commercial, much of it was on the order of 0.[illegible] U_3O_8 for an eight foot thickness. The Mossback does not form a prominent scour here, and the mineralization is many feet above its base. A sample of the altered dike material assayed 0.05 U_3O_8, and a number of others have ranged a few hundredths. It seems most likely that the uraniferous solutions were introduced through the fracture containing the dike.

6. Diabase dikes abound throughout the three or four hundred square miles to the west and northwest of the claims. I know of none that are not staked, even though the depths to the ore horizon vary from 1400 feet to about 2400 feet. The range of composition of diabasic material all would be of the sort that should exhibit relatively low radioactivity for an igneous rock, because of low potassium and lack of accessory minerals of uranium and thorium. It seems likely that many of these were staked because of spotty anomalous radioactivity introduced by solutions. I am reliably informed that one highly altered dike about twenty miles northwest of the claims comprises an appreciable tonnage of 0.20 material.

7. Fractures of this same set outside the swell reportedly contain autunite, however this is merely rumor.

8. The diabasic material of these dikes megascopically is dissimilar to the diabase intrusions of areas of the thick plateau-type basalts. If actually greatly different chemically, as appearances suggest, a close relationship of this much more rare type of diabasic material with uranium mineralization would seem plausible.

9. The dikes are numerous throughout the area to the west and north but are confined almost entirely to one set of fractures. These fractures must be tensional in origin, allowing easy passage of solutions, and they of course must have access to extreme depths as demonstrated by the nature of their filling.

Probably the most generally accepted essential feature required of a potential Chinle host on the plateau, whether it be Shinarump, Monitor Butte, or Mossback, is proximity to the Moenkopi contact. Perhaps next most important is marked variations in thickness of the host in short lateral distances. According to Robeck, in this corner of the swell, the Mossback scours more deeply than anywhere else, in several instances considerably down into the Moenkopi. Great variations in its thickness in short distances also is striking here in contrast to the rest of the swell. It is absent just north of the Delta Mine, is no more than ten feet thick in other places, yet the larger scours probably present a section in excess of 100 feet. Since the rest of the known important mineralization in the swell is in this unit, and here it displays the two most important features to a much greater degree than

than elsewhere, is it not feasible to consider its exploration here even though the one known large ore body has been emplaced in another unit? It should be obvious that lack of abundant solutions rich in uranium, whatever their origin, has been more effective in limiting large scale mineralization than lack of a suitable host. Such solutions are known to have existed in this area, and there is no reason to think the deep Mossback scours may not contain mineralization comparable to the Delta deposit. True, drilling was done in such scours northeast of the Delta line, apparently without encouragement, but there is no structural reason to believe these scours might be mineralized.

It is understood that DMEA requires a specific target to participate in exploration; that such a target generally constitutes the drilling of a channel known or thought by good evidence to contain mineralization commensurate with the costs of exploration. In this type of exploration, an appreciable percentage of the holes miss the channel and the rest probe the channel to try to find the chemical, structural, or unknown environment that localized mineralization. Is it not equally or even more feasible to drill wide-spaced holes along structure almost surely responsible for the localization of mineralization when 20% of those holes also will encounter stratigraphic favorability? In areas such as this, where the structural features thought to be so important may be discerned at the surface, and where the areal percentage of scouring of the ore horizon may be predicted with some confidence it would seem that a much greater percentage of the holes would encounter optimum environment than by the other method, which is in fact, the specific target for any type of exploration. Also, if Mr. Robeck is correct in his opinion of non-persistence of the Mossback scours, then the usual method would not be applicable at all in this area.

It is realized that one would have to have considerable faith in the importance of these structures in this district in order to recommend the type of exploration I suggest. I believe very few mining or structural geologists with considerable field experience on and off the plateau would depreciate the probable importance I have given them. Since it is their field of specialization, shouldn't their views be given more weight than that of those specializing in stratigraphy? The application of structural geology to ore deposits is no less complex than the intricacies of the science of stratigraphy, and to place greater confidence in the abilities of structural and mining geologists in matters of stratigraphic nature is no less absurd than to rely on the views of stratigraphers rather than structural geologists in deciding the relevance of structural conditions to these ore deposits. Their structural beliefs are founded on evidence no more tenuous to them, than the stratigraphic criteria built up by the stratigraphers are to him, and the structural geologists convictions have been strengthened by successful application of their ideas too.

In talking with Mr. Albee, he said he thought the depths of the proposed drilling would average about 1,000 feet. In my application, I estimated it to be 850 to 900 feet, which I thought erred on the high side, to try to assure an adequate footage allowance. Detailed study of the photogeologic and topographic maps since talking with Mr. Albee convinced me my estimates were high rather than low. Investigations of other sources have provided conclusive proof that the drilling depths would average about 800 feet, and that in drilling of the fence of holes for the Delta channel, depths would not be greater than 750 feet. I'd like to present this evidence here:

Chinle Formation: Mr. Marvin Kay, general manager of Climax Uranium, showed me sections of their drilling in this area. From the bottom of the Wingate to the Moenkopi is 250 feet in the area of outcrop 3 on the map.

Wingate: Charles Hunt on page 58 of his report on the Henry Mountains presents a detailed section of the Wingate and Kayenta in the region of outcrops 1 and 2. His Wingate is 300 feet. The manager of uranium exploration for N. P. Hunt company showed me a log of one of their holes drilled about two miles to the east. The interval from the base of the Kayenta to the Moenkopi was 585 feet. This is in close agreement with Climax and Charles Hunt.

Kayenta: Charles Hunt's Kayenta in this area is 322 feet, in contrast to the 125 feet I estimated. However, 192 feet of his Kayenta I took to be Navajo, so what I estimated to be 125 he measured as 130. I stated the proposed drilling to be on a basal Navajo bench. To him, this drilling would be collared in the middle and upper parts of the Kayenta. The geologic map shows the two who made these maps to have been somewhat similarly confused.

Calling the thick-bedded light gray sandstones Navajo rather than Kayenta, of which the average hole would traverse about 100 feet, the drilling depths would be:

Navajo	100
Kayenta	130
Wingate	300
Chinle	250
	780 feet

The two engineers who own the claims bordered in green measured the interval from the Navajo bench to the Moenkopi where exposed at the re-entrant south of the Rocky Mountain Mine by taking a vertical angle from several miles away. I do not remember their exact figure, except that it was a little over 700 feet, which is in close agreement with the other reliable data.

Mr. Albee's data was taken from sections measured some miles away and would suggest the depths to be appreciably in excess of the 1,000 feet he estimated. Their obvious exaggeration of the

My impressions of the geologic features that DMEA may use in evaluation of ground, and the economic aspects of cost of exploration and probable target size, have been gained from a speech Mr. Mittendorf made before Colorado Plateau uranium operators last May 7. While it is realized policy may have changed since that time, I would like to quote that part of his talk stating policy regarding the above matters, as given in a local magazine, as I believe this ground merits DMEA participation unless policy has changed radically.

"To be sure, ore which is visible and can be sampled is a very valuable guide, (as to whether there are indications suggesting the possible presence of a deposit) but other geologic factors come into play which may or may not justify Government participation in further exploration. In your business, especially in view of the trend toward deeper exploration, other guides must be employed.

These include geologic factors such as structural conditions, favorable host rocks and environment—projected trends of known channels, geophysical anomalies, etc., which, by inference, could justify DMEA's participation in the cost of the exploration project provided there is reason to believe that the size of the potential target is commensurate with the cost of the exploration work.

Quite naturally, neither DMEA nor private industry cares to spend $100,000 looking for a $10,000 target, but DMEA would match your dollar with three of its own if it appeared that, say, a quarter-million- dollar project might disclose a major deposit."

Surely the drilling of a fence of holes to locate the extension of the Delta channel should meet these requirements. Ten holes should provide an adequate fence, and of course it may be found with less. Its course for four or five thousand feet is known, and is fairly straight. Even if there were only a 50 % chance that it would be located by ten holes, shouldn't it be worth that risk since in this area it would seem to have great chance of containing a very large ore body by both of the two theories? When found, shouldn't it merit additional exploration?

Of course I also believe the areas of dikes and the three projections of dikes down through the claims bordered in green to merit exploration. While the importance of structure is a major factor in evaluating the feasibility of this exploration, Mr. Mittendorf was speaking of plateau type mineralization and gave structural conditions primary importance as one of the features used by DMEA in evaluating ground. Structure is as important here as anywhere on the plateau, and more obviously important than in almost any other area. Assuming Mr. Robeck's Mossback channeling interpretations correct, holes need not be spaced closer than at several thousand foot intervals along these zones as they somewhat parallel the long dimensions of the scours. A dozen holes, all in favorable structure, should intersect several scours. A few more holes in the areas with both types of favorability should reveal large ore bodies if they exist, and certainly available evidence that they should have been emplaced in such an

[illegible]t in an area known to contain large amounts of urani-[illegible]utions should be enough to warrant the expense of this [illegible]ploration. Is there not a specific target when all [illegible]d holes will explore one of the two features believed [illegible]ble for large scale mineralization in this area, and two [illegible] three of them will explore both features, and almost all [illegible]ditional holes can be placed in the optimum environment of both these features?

I would greatly appreciate a re-evaluation of the merits of my ground, and the claims to the east bordered in green, if their inclusion is possible, and a review of the suitability of DESA participation in their exploration. I do not condemn Mr. Bobeck, but I wish he had thought more deeply regarding the persistence of the Delta channel before expressing as fact the complete futility of exploration for it along its trend, when according to all data accumulated by him and his own theories of mineralization such exploration is in fact the plum he says he has been looking for in this region. I realize his other interpretations of structural features and mineralization would be shared by many stratigraphers, and I hope he realizes that no structural or mining geologist would agree with him.

Very truly yours,

Kirby C. Coryell

KCC/mlj

RECEIVED
JUL 11 1956

DMEA Loan Application

Beth Claims, San Rafael Swell

Emery County, Utah

Kirby G. Coryell
922 Bunting Avenue
Grand Junction,
Colorado

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

RECEIVED
JUL 11 1955

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. 3897
Metal or Mineral Uranium
Date Received 7-11-55
Estimated Cost $199,515.50
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Kirby C. Coryell 922 Bunting Ave. Grand Junction, Colorado

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized. See page 1

(*c*) If a corporation, add to above statement, titles, names and addresses of officers. not applicable

(*d*) If a partnership, add to the above statement the names and addresses of all partners. not applicable

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract We wish to explore parts of 578 unpatented lode mining claims in an unsurveyed part of Emery County, Utah. The claims are named Beth numbers one to 802, with numerous gaps. See page 2

(*b*) State any mine name by which the property is known. Known only as the Beth claims.

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise owner

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. Not applicable

(*e*) If you own the land, describe any liens or encumbrances on it There are no liens or encumbrances other than one agreement; a copy accompanies this application. Pg2-4

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice. See page 5

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. See page 30

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. See page 30

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. See pages 30 to 42 inclusive

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points. See page 43

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power. See pages 43-44

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore ---------- Uranium ----------

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as co[illegible] veins, ore-bearing beds, etc. See pages 44 to 46 inclusive

(*c*) The work will start within ---- 60 ---- days and be completed within ---- 12 ---- months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations. See page 47

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.).

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants. See page 50

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel. See page 50

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be. See page 50

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project. None

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project. None

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes. See page 50

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above. None

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes

(*b*) How do you propose to furnish your share of the costs?

[X] Money [ ] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper.

See page 51

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated ---- July 9 ----, 195[illegible]

Kirby C. Coryell
(Applicant)

By ---- Kirby C. Coryell ----

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

RECEIVED
MAY 1 1956

1. (a) Name of applicant. State here your full legal name, in the form in which you will wish to contract, and your mailing address: Kirby C. Coryell, 922 Bunting Avenue, Grand Junction, Colorado.

1. (b) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized:

The claims are staked and recorded in the names of my brother, Donald D. Coryell, and myself. In addition, financial assistance and services were given me by my father and two other brothers, all of whom have minor interest in the claims. Another party, Jack O. Jones, has been notified that he has a five per cent interest in the claims. We have not formally organized a corporation or partnership, but can at any time if desired by Defense Minerals Exploration Administration for the purposes of this loan.

I have power-of-attorney from Donald D. Coryell to transact any business in relation to these claims, including their outright sale. The names and addresses of all parties in addition to myself having any interest in these claims follow:

George K. Coryell Jr.	Vashon Heights, Vashon Island, Wn.
Kenyon C. Coryell	415 So. Roosevelt, Walla Walla, Washington
George C. Coryell	2028 E. 104th St., Seattle 55, Washington
Donald D. Coryell	Park Circle Apts., Wenatchee, Washington
Jack O. Jones	1332 Hall Avenue, Grand Junction, Colorado

1. (c) Not applicable.

1. (d) Not applicable.

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3 (a) Applicant's property rights:

We wish to explore parts of 578 unpatented lode mining claims in an unsurveyed part of Emery County, Utah. The claims are named Beth numbers 1 to 802, with numerous gaps. All of the 578 Beth claims are considered subject to the terms of any exploration contract resulting from this application. The applicant, and any and all persons with any interest in these claims, has no share in ownership and no relationship of any sort in or with any mining claims or the mineral rights to any ground within ten miles of these claims.

3 (b) State any mine name by which the property is known:

Known only as the Beth claims.

3 (c) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise:

Owner.

3 (d) Not applicable.

3 (e) If you own the land, describe any liens or encumbrances on it:

Following is quoted a copy of an agreement made and signed in the field while engaged in staking part of these claims. The agreement was made with a geologist, Stanley J. Thayne, heading a staking party employed by Apache Uranium, apparently under the direction of Stanford R. Mahoney. The draw at point "A" on the topographic map is the only site for a road down onto the Navajo bench, and it probably would be nearly impossible to build two roads down this draw.

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (e) cont'd.

Thayne and I agreed that each would stake half the draw, and the agreement was drawn up to assure that should one party build a road down the draw, the other party would have full use of it, but could be required to reimburse the builder for part of the cost of construction and pay a share of any maintenance costs.

April 10, 1955

"This agreement entered into on the 10th day of April, 1955 is written in reference to an access road to mining claims located in Segers' Hole southwest side San Rafael, Utah. This agreement has been worked out between Mr. Kirby C. Coryell and Stanley J. Thayne, who represents Stanford R. Mahoney. Both parties agree that future use of the only feasible place for the construction of a road may be used by either party. This right is transferable to any future owner of either group of claims.

More specifically the claims involved are Marlo 9,10, 4, 5, 6 represented by Mr. Stanley J. Thayne and the Beth 682, 681, 680, 679, represented by Mr. Kirby C. Coryell.

Any future road built may be used by either party or future owners. The maintenance and construction cost to be agreed upon by those parties concerned.
(Continued on page 4)

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (e) cont'd.

The whole intent of this agreement is that future owners of either group may have complete access to their claims insomuch as both were staked at the same time and it was desired to avoid any possibility that only one of the parties would have access to the only feasible entrance to Segers' Hole."

/s/

Stanley J. Thayne
Kirby C. Coryell

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice:

Unpatented Lode Mining Claims recorded in office of County Recorder, Castle Dale, Emery County, Utah.

The claims average 1,475 feet long and 590 feet wide. The distance and bearing of the discovery monument of each claim from a vertical angle bench mark, whose elevation and latitude and longitude is referred to on the notice, is stated on each location notice. Each discovery monument is on the claim's centerline, and they average well over 100 feet from an end line. No corner is known to have been missed, although it was necessary to witness a number, and, by the system employed in staking, it is not likely that any were overlooked. Various temporary employees with no interest in these claims assisted in the staking of almost all the claims upon which exploration is proposed in this application; the exceptions are not at the borders but within the group. Every measure known to me was taken to assure the validity of the claims and to render them invulnerable to jumping.

(Claims listed on following pages)

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
1	12-22-54	12-27-54	J73	134
2	"	"	J73	135
3	"	"	J73	136
4	12-25-54	"	J73	137
5	"	"	J73	138
6	"	"	J73	139
7	"	"	J73	140
8	"	"	J73	141
9	"	"	J73	142
10	12-15-54	"	J73	143
11	"	"	J73	144
12	"	"	J73	145
13	"	"	J73	146
14	"	"	J73	147
15	"	"	J73	148
16	"	"	J73	149
17	12-28-54	1-25-55	J75	97
18	12-15-54	12-27-54	J73	150
19	"	"	J73	151
20	"	"	J73	152
21	12-10-54	"	J73	153
22	"	"	J73	154
23	12-10-54	12-27-54	J73	155
24	12-28-54	1-25-55	J75	98

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
25	12-28-54	1-25-55	J75	99
26	"	"	75	100
27	12-25-54	12-27-54	73	156
28	12-22-54	"	73	157
29	12-25-54	"	73	158
30	"	"	73	159
31	"	"	73	160
32	"	"	73	161
33	12-15-54	"	73	162
34	"	"	73	163
35	"	"	73	164
36	"	"	73	165
37	"	"	73	166
38	"	"	73	167
39	"	"	73	168
40	"	"	73	169
41	"	"	73	170
42	"	"	73	171
43	"	"	73	172
44	"	"	73	173
45	"	"	73	174
46	12-10-54	"	73	175
47	12-28-54	1-25-55	75	101
48	"	"	75	102

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
49	12-28-54	1-25-55	J75	103
50	12-22-54	12-27-54	73	176
51	"	"	73	177
52	"	"	73	178
53	"	"	73	179
54	12-8-54	"	73	180
55	"	"	73	181
56	"	"	73	182
57	"	"	73	183
58	"	"	73	184
59	"	"	73	185
60	"	"	73	186
61	"	"	73	187
62	"	"	73	188
63	12-29-54	1-25-55	75	104
64	"	"	75	105
65	"	"	75	106
66	"	"	75	107
67	"	"	75	108
68	"	"	75	109
69	"	"	75	110
70	12-22-54	12-27-54	73	189
71	"	"	73	190
72	"	"	73	191

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
73	12-8-54	12-27-54	J73	192
74	"	"	73	193
75	"	"	73	194
76	"	"	73	195
77	"	"	73	196
78	"	"	73	197
79	"	"	73	198
80	"	"	73	199
81	"	"	73	200
82	"	"	73	201
83	12-29-54	1-25-55	75	111
84	"	"	75	112
85	"	"	75	113
86	"	"	75	114
87	"	"	75	115
88	"	"	75	116
89	"	"	75	117
90	12-16-54	12-27-54	73	202
91	"	"	73	203
92	"	"	73	204
93	"	"	73	205
94	"	"	73	206
95	"	"	73	207
96	"	"	73	208

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3 (f) con'd.

Beth Number	Date Staked	Date Recorded	Book	Page
97	12-16-54	12-27-54	J73	209
98	"	"	73	210
99	12-15-54	"	73	211
100	"	"	73	212
101	12-26-54	"	73	213
102	"	"	73	214
103	"	"	73	215
104	12-16-54	"	73	216
105	"	"	73	217
106	"	"	73	218
107	"	"	73	219
108	"	"	73	220
109	"	"	73	221
110	"	"	73	222
111	"	"	73	223
112	"	"	73	224
113	"	"	73	225
114	12-15-54	"	73	226
115	12-26-54	"	73	227
116	12-16-54	"	73	228
117	"	"	73	229
118	"	"	73	230
119	"	"	73	231
120	"	"	73	232

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
121	12-17-54	12-27-54	J73	233
122	"	"	73	234
123	"	"	73	235
124	"	"	73	236
125	12-26-54	"	73	237
126	12-25-54	"	73	238
127	12-22-54	"	73	239
128	"	"	73	240
129	"	"	73	241
130	12-25-54	"	73	242
131	"	"	73	243
132	"	"	73	244
133	"	"	73	245
134	"	"	73	246
135	"	"	73	247
136	"	"	73	248
137	"	"	73	249
138	"	"	73	250
139	"	"	73	251
140	"	"	73	252
141	12-28-54	1-25-55	75	118
142	"	"	75	119
143	"	"	75	120
144	"	"	75	121

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
145	12-20-54	1-25-55	J75	122
146	"	"	75	123
147	"	"	75	124
148	"	"	75	125
149	"	"	75	126
150	"	"	75	127
151	12-22-54	12-27-54	73	253
152	"	"	73	254
153	"	"	73	255
154	12-18-54	"	73	256
155	"	"	73	257
156	"	"	73	258
157	"	"	73	259
158	"	"	73	260
159	12-25-54	"	73	261
160	12-18-54	"	73	262
161	"	"	73	263
162	"	"	73	264
163	"	"	73	265
164	12-28-54	1-25-55	75	128
165	"	"	75	129
166	"	"	75	130
167	"	"	75	131
168	"	"	75	132

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
169	12-28-54	1-25-55	J75	133
170	"	"	75	134
171	"	"	75	135
172	12-22-54	12-27-54	73	266
173	"	"	73	267
174	12-22-54	"	73	268
175	12-18-54	"	73	269
176	"	"	73	270
177	"	"	73	271
178	"	"	73	272
179	"	"	73	273
180	"	"	73	274
181	"	"	73	275
182	"	"	73	276
183	"	"	73	277
184	"	"	73	278
185	"	"	73	279
186	"	"	73	280
187	"	"	73	281
188	"	"	73	282
189	"	"	73	283
190	12-28-54	1-25-55	75	136
191	12-18-54	12-27-54	73	284
192	"	"	73	285

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
193	12-18-54	12-27-54	J73	286
194	"	"	73	287
195	"	"	73	288
196	"	"	73	289
197	"	"	73	290
198	"	"	73	291
199	"	"	73	292
200	"	"	73	293
201	"	"	73	294
202	"	"	73	295
211	1-17-55	1-25-55	75	137
212	"	"	75	138
213	"	"	75	139
214	1-9-55	"	75	140
215	"	"	75	141
216	"	"	75	142
217	"	"	75	143
226	4-13-55	4-18-55	85	294
254	1-9-55	1-25-55	75	144
255	"	"	75	145
256	"	"	75	146
257	"	"	75	147
258	"	"	75	148
259	"	"	75	149

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
260	1-18-55	1-25-55	J75	150
261	"	"	75	151
277	"	"	75	152
278	12-24-54	1-27-54	73	296
279	"	"	73	297
280	"	"	73	298
281	"	"	73	299
282	"	"	73	300
283	"	"	73	301
284	"	"	73	302
285	"	"	73	303
286	"	"	73	304
287	4-5-55	4-18-55	85	295
288	"	"	85	296
289	"	"	85	297
290	"	"	85	298
295	12-24-54	12-27-54	73	305
296	"	"	73	306
297	"	"	73	307
298	"	"	73	308
299	"	"	73	309
300	"	"	73	310
301	"	"	73	311
302	"	"	73	312

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
303	12-24-54	12-27-54	J73	313
304	"	"	73	314
305	1-18-55	1-25-55	75	153
306	"	"	75	154
307	12-23-54	12-27-54	73	315
308	"	"	73	316
309	6-4-55	6-9-55	95	183
310	6-4-55	"	95	184
311	12-24-54	12-27-54	73	317
312	"	"	73	318
313	12-23-54	"	73	319
314	"	"	73	320
315	"	"	73	321
316	"	"	73	322
317	"	"	73	323
318	"	"	73	324
319	"	"	73	325
320	"	"	73	326
321	"	"	73	327
322	"	"	73	328
323	"	"	73	329
324	"	"	73	330
325	"	"	73	331
326	"	"	73	332

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
327	12-23-54	12-27-54	J73	333
328	"	"	73	334
329	"	"	73	335
330	"	"	73	33633
331	"	"	73	337
332	"	"	73	338
333	"	"	73	339
334	12-22-54	"	73	340
335	"	"	73	341
336	"	"	73	342
337	"	"	73	343
338	12-29-54	1-25-55	75	155
339	12-23-54	12-27-54	73	344
340	"	"	73	345
341	"	"	73	346
342	"	"	73	347
343	5-22-55	6-1-55	94	159
344	"	"	94	160
345	"	"	94	161
346	"	"	94	162
347	"	"	94	163
348	"	"	94	164
349	6-4-55	6-9-55	95	185
350	"	"	95	186

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
351	6-2-55	6-9-55	J95	187
352	"	"	95	188
353	6-4-55	"	95	189
354	"	"	95	190
355	4-10-55	4-18-55	85	299
356	"	"	85	300
368	5-26-55	6-1-55	94	165
369	"	"	94	166
370	"	"	94	167
371	"	"	94	168
372	"	"	94	169
373	"	"	94	170
374	"	"	94	171
375	"	"	94	172
376	"	"	94	173
377	6-2-55	6-9-55	95	191
378	"	"	95	192
379	"	"	95	193
391	5-26-55	6-1-55	94	174
392	"	"	94	175
393	"	"	94	176
394	"	"	94	177
395	"	"	94	178
396	"	"	94	179

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
397	5-26-55	6-1-55	J94	180
398	"	"	94	181
399	"	"	94	182
400	5-25-55	"	94	183
412	"	"	94	184
413	"	"	94	185
414	"	"	94	186
415	"	"	94	187
416	"	"	94	188
417	"	"	94	189
418	"	"	94	190
419	"	"	94	191
468	"	"	94	192
469	"	"	94	193
470	"	"	94	194
471	5-24-55	"	94	195
472	6-2-55	6-9-55	95	194
473	4-13-55	4-18-55	85	301
474	"	"	85	302
475	"	"	85	303
476	"	"	85	304
477	"	"	85	305
478	"	"	85	306
479	"	"	85	307

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
480	4-12-55	4-18-55	J85	308
481	"	"	85	309
482	"	"	85	310
483	"	"	85	311
484	"	"	85	312
485	"	"	85	313
486	5-23-55	6-1-55	94	197
487	"	"	94	198
488	"	"	94	199
489	"	"	94	200
490	5-25-55	"	94	201
491	"	"	94	202
492	5-24-55	"	94	203
493	4-13-55	4-18-55	85	314
494	"	"	85	315
495	"	"	85	316
496	"	"	85	317
497	"	"	85	318
498	"	"	85	319
499	"	"	85	320
500	4-12-55	"	85	321
501	"	"	85	322
502	"	"	85	323
503	"	"	85	324

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
504	4-12-55	4-18-55	J85	325
505	"	"	85	326
506	5-23-55	6-1-55	94	205
507	"	"	94	206
508	"	"	94	207
509	"	"	94	208
510	5-24-55	"	94	209
511	"	"	94	210
512	"	"	94	211
513	"	"	94	212
514	"	"	94	213
515	"	"	94	214
516	"	"	94	215
517	"	"	94	216
518	4-12-55	4-18-55	85	327
519	"	"	85	328
520	"	"	85	329
521	"	"	85	330
522	"	"	85	331
523	"	"	85	332
524	"	"	85	333
525	"	"	85	334
526	"	"	85	335
527	"	"	85	336

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
528	4-10-55	4-18-55	J85	337
529	"	"	85	338
530	"	"	85	339
531	"	"	85	340
532	"	"	85	341
533	4-12-55	"	85	342
534	"	"	85	343
535	"	"	85	344
536	"	"	85	345
537	"	"	85	346
538	"	"	85	347
539	"	"	85	348
540	"	"	85	349
541	"	"	85	350
542	"	"	85	351
543	4-10-55	"	85	352
544	5-22-55	6-1-55	94	217
545	4-10-55	4-18-55	85	353
546	"	"	85	354
547	"	"	85	355
548	"	"	85	356
549	5-24-55	6-9-55	95	195
550	"	"	95	196
551	4-10-55	4-18-55	85	357

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
552	4-12-55	4-18-55	J85	358
553	4-12-55	"	85	359
554	"	"	85	360
555	"	"	85	361
556	"	"	85	362
557	4-10-55	"	85	363
558	"	"	85	364
559	"	"	85	365
560	"	"	85	366
561	"	"	85	367
562	"	"	85	368
563	"	"	85	369
564	"	"	85	370
565	"	"	85	371
566	"	"	85	372
567	"	"	85	373
568	4-5-55	"	85	374
569	"	"	85	375
570	4-10-55	"	85	376
571	"	"	85	377
572	"	"	85	378
573	"	"	85	379
574	"	"	85	380
575	"	"	85	381

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
576	4-10-55	4-18-55	J85	382
578	4-13-55	"	"	383
579	"	"	"	384
580	"	"	"	385
581	"	"	"	386
582	"	"	"	387
583	"	"	"	388
584	"	"	"	389
585	"	"	"	390
586	"	"	"	391
587	"	"	"	392
588	4-6-55	"	"	393
589	"	"	"	394
590	"	"	"	395
591	4-5-55	"	"	396
592	"	"	"	397
593	"	"	"	398
594	"	"	"	399
595	"	"	"	400
674	4-6-55	"	"	402
675	"	"	"	403
676	4-6-55	"	"	404
677	"	"	"	405
678	"	"	"	406

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
679	4-8-55	4-18-55	J85	407
680	4-7-55	"	"	408
681	"	"	"	409
682	"	"	"	410
684	4-5-55	"	"	411
685	"	"	"	412
686	"	"	"	413
687	"	"	"	414
689	"	"	"	415
690	"	"	"	416
691	"	"	"	417
692	4-6-55	"	"	418
693	"	"	"	419
694	"	"	"	420
695	"	"	"	421
696	4-7-55	"	"	422
697	"	"	"	423
698	"	"	"	424
699	"	"	"	425
700	4-5-55	"	"	426
701	"	"	"	427
702	"	"	"	428
703	"	"	"	429
704	"	"	"	430

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
705	4-6-55	4-18-55	J85	431
706	4-5-55	"	"	432
707	"	"	"	433
708	4-6-55	"	"	434
709	"	"	"	435
710	"	"	"	436
711	4-7-55	"	"	437
712	"	"	"	438
713	"	"	"	439
714	"	"	"	440
715	"	"	"	441
716	4-6-55	"	"	442
717	"	"	"	443
718	"	"	"	444
719	"	"	"	445
720	"	"	"	446
721	"	"	"	447
722	4-7-55	"	"	448
723	"	"	"	449
724	"	"	"	450
725	"	"	"	451
726	"	"	"	452
727	4-8-55	"	"	453
728	"	"	"	454

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
729	4-8-55	4-18-55	J85	455
730	"	"	"	456
731	"	"	"	457
732	4-13-55	"	"	458
733	4-8-55	"	"	459
734	"	"	"	460
735	"	"	"	461
736	"	"	"	462
737	"	"	"	463
738	4-7-55	"	"	464
739	"	"	"	465
740	"	"	"	466
741	"	"	"	467
742	"	"	"	468
743	4-8-55	"	"	469
744	"	"	"	470
745	"	"	"	471
746	"	"	"	472
747	"	"	"	473
748	4-10-55	"	"	474
749	4-11-55	"	"	475
750	"	"	"	476
751	"	"	"	477
752	"	"	"	478

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
753	4-11-55	4-18-55	385	479
754	"	"	"	480
755	"	"	"	481
756	"	"	"	482
757	"	"	"	483
758	"	"	"	484
759	"	"	"	485
760	"	"	"	486
761	"	"	"	487
762	4-10-55	"	"	488
763	4-11-55	"	"	489
764	"	"	"	490
765	"	"	"	491
766	"	"	"	492
767	"	"	"	493
768	"	"	"	494
769	"	"	"	495
770	"	"	"	496
771	"	"	"	497
772	"	"	"	498
773	"	"	"	499
774	"	"	"	500
775	"	"	"	501
776	"	"	"	502
777	"	"	"	503

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
778	4-11-55	4-18-55	J85	504
779	"	"	85	505
780	"	"	85	506
781	"	"	85	507
782	"	"	85	508
783	"	"	85	509
784	5-23-55	6-1-55	94	218
785	"	"	94	219
786	"	"	94	220
787	"	"	94	221
788	"	"	94	222
789	"	"	94	223
790	"	"	94	224
791	"	"	94	225
792	"	"	94	226
793	"	"	94	227
794	"	"	94	228
795	"	"	94	229
796	"	"	94	230
797	"	"	94	231
798	"	"	94	232
799	"	"	94	233
800	"	"	94	234
801	"	"	94	235
802		"	94	236

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

4. Physical description.

a. No mining or exploration operations have been or now are being conducted on these claims.

b. There has been no production and there are no known ore reserves, as the property never has been explored by drilling, excavating or other physical methods.

c. Geologic features:

The claims contain intersections of favorable structure and the projections of two channels known to be mineralized elsewhere. One channel contains the Delta or Hidden Splendor deposit and the other the Rocky Mountain deposit. The known outcrops of these channels will be described.

KNOWN CHANNELS PROJECTING INTO THE CLAIMS

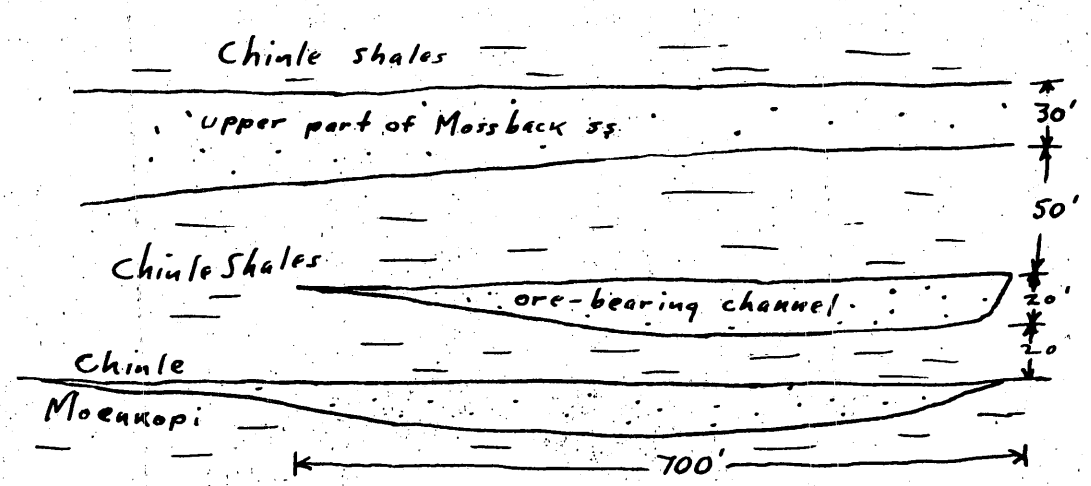
The Channel Containing the Delta (Hidden Splendor) Deposit

The course of the Delta channel is described by four outcrops along a distance of 11,000 feet. Each exposure is colored red on the maps. A single straight line touches a part of each of these channel exposures, demonstrating the course of the channel to be remarkably straight for its known extent. Sections of the two most southwesterly exposures show them surely to be the same channel.

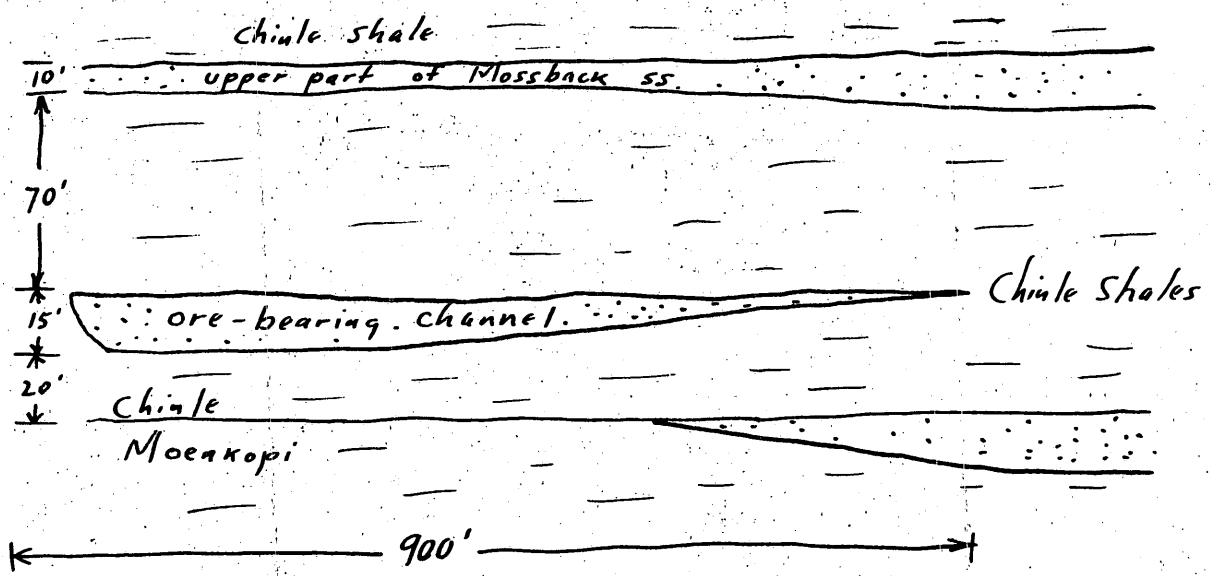
Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

4.(c) cont'd.

The section below is of the outcrop containing the Delta deposit, labeled number two on the maps, looking east. Its relationships to other units can be seen best from the road of the same elevation across the canyon. The thicknesses of the units in this and the following sections are approximate.



The section below is of the other southwesterly outcrop, labeled number 1, looking southwest.



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922 Bunting Avenue
Grand Junction, Colorado

4. (c) cont'd.

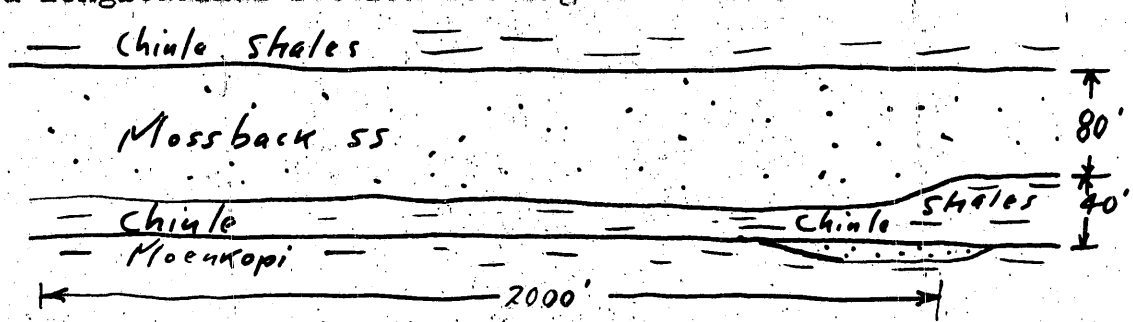
There are three features tending to prove these two exposures to be the same channel:

1. They are the only two sand lenses in the region occupying the same stratigraphic position and also separated from upper Mossback sands by Chinle shales.

2. The southern end of the more northerly exposure is the thickest, thinning to the north, showing it to be the inboard side of a meander, and thus the course would be toward the other lens.

3. The stream forming the channel at the top of the Moenkopi, stratigraphically about twenty feet below the ore sand and with no evidence locally of interruption of deposition between Moenkopi and Chinle time, obviously flowed in the same general direction. The course and outcrops of this Moenkopi, or possibly Shinarump, channel is shown by crosses.

Exposures three and four of the ore-bearing channel are different in appearance from the other two, as here the Mossback sands are of usual thickness, and have coalesced with the channel. Number three is a longitudinal section looking southeast.



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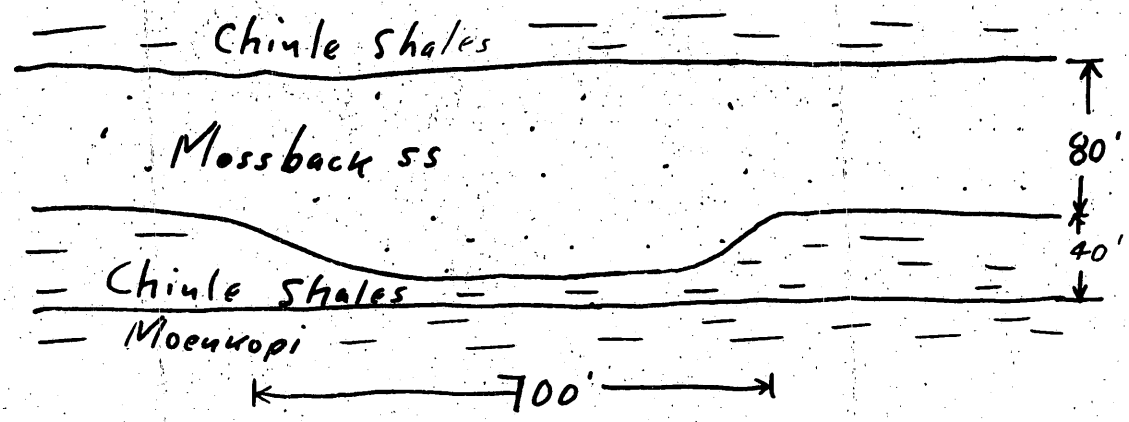
922 Bunting Ave.
Grand Junction, Colo.

4. (c) cont'd.

The most northeasterly exposure, number four, is as follows looking south:



Features tending to prove these four sand exposures to result from one stream scouring at one time follow:

1. All four exposures would look alike in section were the upper part of the Mossback of average thickness throughout the area.

2. They are the only sands of the same stratigraphic position in the vicinity.

3. This direction of stream flow is identical with that of the drainage at the end of Moenkopi time, and locally there is no evidence of a hiatus between Moenkopi and Chinle deposition.

It would seem that the average thickness of Mossback sands in this area was not deposited by one stream flowing at one time, but rather that the sands were accumulated by laterally coalescing streams through a considerable period of time, during which lateral coalescence was not complete at all horizons. The more gradual variations in Mossback

4. (c) cont'd.

thickness, then, would appear to result from incomplete lateral coalescence of the streams, and abrupt thickening would seem to be due to scouring of individual streams during earliest Mossback time. It is believed that the four basal scours were formed by one stream at the same time, and that their difference in appearance in section is due to incompleteness of lateral coalescence of later streams. Should the two northeasterly outcrops not have been formed by the same stream responsible for the ore-bearing channel in the Delta Mine, then the average course of the ore-bearing channel must be more westerly rather than southerly, as there is no other evidence of it to the northeast. Should that be true, the fence of holes designed to intersect the Rocky Mountain channel should locate this channel too.

Ahomalous radioactivity reportedly is present at the most southwesterly outcrop of the channel. The lack of significant mineralization of this outcrop could be attributed to two features in addition to non-deposition. The dip of the channel would allow meteoric waters to percolate along its course, and its outcrop forms a bench, presenting a sizeable area to receive the water. Also, the Muddy River once was charging the channel a few hundred feet up dip from its present outcrop.

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

4. (c) cont'd.

Exposure number three and possibly number four have been explored by drilling, and apparently little encouragement was found. There are two features possibly of fundamental relevance to localization of mineralization that would tend to classify this area as less favorable than the channel where exposed to the southwest and within the Beth claims. Fracturing of northwest strike is not prominent in this area whereas it is to the southwest; its probable importance will be discussed later. Also, the vertical coalescence of the scours with upper Mossback sands may constitute a less favorable environment than that presented where the channel is an entity surrounded by Chinle shales. The upper sands of the Mossback thin progressively to the southwest throughout the 11,000 feet they are exposed, so it is quite possible the ore-bearing channel may be enclosed by mudstones where it traverses the Beth claims.

The Channel Containing the Rocky Mountain Deposit

The outcrop of this Mossback channel is considerably wider than the average of the other, and it scours more deeply, completely through the lower Chinle shales and well into the Moenkopi Formation. It is understood that ore bodies have been found by exploration of the outcrop. The one exposure indicates it to trend in a south-southwesterly direction. It is possible that this channel and the one containing the Delta deposit may join within the Beth claims.

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

4. (c) cont'd.

STRUCTURAL FEATURES OF THE PROPERTY

The claims contain numerous zones of faulting and strong, closely-spaced jointing, generally striking between north and west. Several of the faults contain diabase dikes. To the northwest, most faults of this set are filled with diabase, indicating a tensional origin and demonstrating their access to the sima at least. Data not completely theoretical that indicate ruptures of this set to be important are:

1. The fracture labeled "B" on the geologic map projects into the Delta or Hidden Splendor mineralized zone. It is filled with diabase throughout most of its exposed extent, and can be traced on aerial photos as far as indicated by the red line. To the northwest, uranium ore has been shipped from the Mossback sands adjacent to it despite a local lack of favorable sedimentary features.

2. Faults of this same set outside the swell reportedly contain autunite.

3. The mineralized areas within the Delta Mine are cut by zones of joints of northwest strike.

The foregoing implies the northwest striking ruptures to have been a means of access of uranium bearing solutions from depths. It seems likely that these fractures were formed during a period of regional deformation, evidenced by their great aerial extent and persistence to depth.

Kirby C. Coryell
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Grand Junction, Colo.

4. (c) cont'd.

Should that be true, the diabase probably was emplaced prior to the time of uranium mineralization, and the dikes may have influenced lateral migration of uranium solutions and environmental conditions conducive to deposition of uranium, such as by forming traps for natural gases or the uranium solutions. Thus, these fractures or their dike fillings may have controlled localization of uranium mineralization whatever its genesis may have been.

Within the San Rafael Swell uranium mineralization, and even favorable alteration of the Mossback sandstones, is obviously broadly, and in most instances closely, related spatially to zones of faulting. The northwesterly striking set seems particularly important in this area at the southwestern tip of the swell. Aerial photos show ruptures of this and other sets to be more prominent within the claims than where these channels are known to be mineralized at their outcrops. Other structural favorability of a more theoretical sort is afforded by the trend of the main axis of the swell near the projections of the channels. The dikes cross this axis at right angles, and together they may present excellent traps for the gaseous agents that may have effected precipitation of uranium from solution, as well as possible traps for the uranium solutions themselves if within deep scours or under hydrostatic pressure. Also, the fault labeled "C" may have enough vertical displacement so that the Mossback sands on either side abut

4. (c) cont'd.

impervious mudstones, providing another possible trap. Gaseous precipitating agents probably are responsible for the Delta ore body, as 99 per cent of the ore contains no trace of carbonaceous matter, and barren asphaltic material is abundant, although the very little woody trash present generally is well mineralized. Additional evidence of general nature is afforded by the Black Hills, where all of the better deposits are on small flexures with demonstrable structural closure, and the Grants area of New Mexico, where the two largest ore bodies are within the closed areas of small structural domes. Natural gas is contained in some of the sediments of these areas, and near the San Rafael Swell also. With reference to the plateau proper, it has been noted by others that all the large Triassic ore bodies known are on the flanks of positive areas or flexures whose cores expose older formations. Perhaps more pertinent, the only two zones of extensive mineralization known in the San Rafael Swell, the Delta Mine and the Temple Mountain area, are in the few per cent of Mossback exposures closest to the main axis of the swell.

The dikes are stressed as possible structural favorability from several standpoints in addition to acting as traps for precipitating agents or solutions as set forth in the preceding paragraph. Observable favorability is presented by the uranium ore found adjacent to one of them about two miles to the north without the environment of a scouring channel, and the uranium mineralization found in fractures of this set outside the swell.

Kirby C. Coryell
922 Bunting Ave.

4. (c) cont'd.

Favorability of a more regional nature is afforded by the fact that the largest known hydrothermal uranium deposits in the world are in the vicinity of diabasic intrusions. The plateau cannot be considered an exception, as the excavations of the Jackpile Mine in New Mexico, perhaps containing as large a uranium ore body as the next five or ten largest known on the plateau combined, have exposed diabasic material. The diabase is not suggested to be the source of the uranium bearing solutions, but rather its presence demonstrates nearby ruptures with access to great depths, which may be required to allow the introduction of large amounts of solutions rich in the heaviest elements. It is thought that fractures on the Beth claims filled with diabase, and other faults and joints of the same set, may have provided access for deep-seated uranium-bearing solutions to reach the Mossback sandstones.

DRILLING DEPTHS

The property is underlain by the Kayenta, Navajo, and basal part of the Carmel Formations. The ore horizon is the lower part of the Mossback member of the Chinle Formation. The estimated thicknesses of intervening formations follow:

basal Carmel	100 feet
Navajo	650 feet
Kayenta	125 feet
Wingate	300 feet
Chinle	225 feet

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4. (c) cont'd.

The sites of the proposed drilling are on a basal Navajo shelf. As the holes should be bottomed in the Moenkopi Formation, generally separated from basal Mossback by about 50 feet of Chinle shales, they would average between 850 and 900 feet in depth.

REASONS FOR WISHING TO EXPLORE

I wish to explore this ground because I believe it probably contains at least several sizeable to very large ore bodies, and I would like to guide the exploration to find them. Large ore bodies should be discovered by the proposed exploration if any of the several most generally accepted theories of structural favorability for mineralization in the Triassic hosts are effective in this area. If they are not effective, the probability that large ore bodies exist is greatly reduced; however, the possibility that other ore bodies are contained in the channels comparable to those known at the outcrops still is as great as with other channels, as it generally is recognized that most mineralized channels contain a number of ore bodies of comparable size.

It is feared that should someone else explore the claims, that their exploration may favor the Delta channel to the practical exclusion of the Rocky Mountain channel.

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

4. (c) cont'd.

The latter appears to me to merit as much or more exploration than the former, with the realization that the course of the former is much better known and that it contains a much larger known ore body, for several reasons:

1. The Rocky Mountain channel scours much more deeply and probably is considerably wider, and in the same structural environment it should contain much larger ore bodies.

2. It should intersect more numerous and more positive zones of faults and dikes thought to constitute favorable structure.

3. Its trend should be very close, if not coinciding in great part, with the main anticlinal axis of the swell.

4. A fence of holes drilled along favorable structure to locate the channel may intersect unknown channels or ore bodies not in the Rocky Mountain channel. The proposed fence is thought to be in a structural zone so favorable that minor scouring generally present at the base of the Mossback, and possibly any part of the vertical extent of the Mossback, may contain important mineralization.

Kirby C. Coryell
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4. (c) cont'd.

5. A much lesser extent of this channel is exposed or has been explored than the Delta channel, so a comparison of the size of known ore bodies in each is not fair at this time.

6. A greater part of its course probably can be drilled from the basal Navajo shelf, although this is uncertain.

7. There are several regions on the plateau that contain a number of the very large ore bodies. In each one of these areas one channel is not known to be a host of several of the large ore bodies; it seems more likely that a repetition of structural features has resulted in the emplacement of very large ore bodies in whatever channel host was present, and the structural favorability was so great that the stratigraphic features present normally controlling localization of small ore bodies had little influence on the size and shape or grade of most of the very large ones. Structure is believed to be equally important here, and the projections of both these channels, but particularly the Rocky Mountain channel, intersect several structural zones more apparent than any that may have caused mineralization at the outcrops of either of these channels.

Kirby C. Coryell
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Grand Junction, Colo.

4. (d) State the facts with respect to the accessibility of the project:

It is 28 miles by road from point "A" to Utah Highway 10, a paved highway kept open throughout the year. The first mile of the road from point "A" would require a few hours bulldozer work to prepare it for the hauling of heavy equipment. From where this road joins the highway, it is 12 miles north to the coal mining town of Emery, and 40 miles west to Salina, Utah, a station on the Denver and Rio Grande Railroad. From Salina it is, by railroad, about 45 miles to the buying station at Marysvale, and about 150 miles to Vitro's uranium mill at Salt Lake City.

Should it ever be desirable to drill from the Carmel Formation, road construction to drilling sites would be very inexpensive. The western part of the claims can be traversed by four-wheel drive vehicles at present and much of it by two wheel drive vehicles, and roads easily can be built up the dip slope from Salt Wash (Salvation Creek) to the bench mark of elevation 6,516, allowing access to the southeastern part of the claims.

4. (e) State the availability of manpower, materials, supplies, equipment, water, and power.

The towns of Emery and Salina, whose locations were described in the preceding paragraph, as well as several towns within 30 miles north of Emery, would

Kirby C. Coryell
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4. (e) cont'd.

supply adequate manpower. Coal mining has been the primary industry, other than agriculture, for many years, so trained personnel and mining supplies and equipment should be available. Emery is the closest source of water, although inexhaustible supplies for mining or drilling use could be pumped from wells in the alluvium of the Muddy River or Salt Wash beds. A transmission line for electric power would have to be constructed from Highway 10, twenty-eight miles away, or produced on the property, if electric power was desired for mining operations.

5. (a) The exploration project. State the mineral or minerals for which you wish to explore;

Uranium.

PROPOSED EXPLORATION PROGRAM

5. (b) The two fences of drill holes are shown on both the topographic and geologic maps. Should the fence designed to locate the Delta channel fail to do so, the other fence would intersect it unless the channel turned radically to the south. The shorter more easterly fence would be drilled in a zone of strong jointing of the same attitude as that prominent in the Delta Mine. The holes of the longer fence would be drilled near a diabase dike, alternating the initial holes on either side where possible.

Kirby C. Coryell
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5. (b) cont'd.

This fence probably would require more holes to locate its primary target, the Rocky Mountain channel, but it is thought to present structural favorability so great that minor scours of the basal Mossback sandstones may contain significant ore bodies.

It is proposed that Phase I of the exploration program comprise the drilling of these two fences to locate the channels, which would total a maximum of 41 holes and a minimum of 2 holes. The fence holes would be drilled a thousand feet apart at first, filling in to 500 feet wherever there were indications a channel might have passed between holes.

Phase II would allow 10 holes to be drilled in each channel if the channel's course is such that that many holes can be used to good advantage by drilling from the basal Navajo shelf. Access to drilling sites may be prepared inexpensively anywhere on this shelf, excepting the peaks of bare rock, as far west as just past the more westerly dike. No deep drilling from the Carmel Formation would be contemplated unless it was agreed that previous exploration showed it to be highly desirable. If undertaken, phase II would comprise a maximum of 20 holes and a probable minimum of 10 holes.

Kirby C. Coryell
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5. (b) cont'd.

If exploration has proved the proximity of diabase dikes to have great influence on the deposition of uranium, the remaining holes of the westerly fence that would appear to have a chance of disclosing a new channel should be drilled. It is suggested that part of the footage allotted to this fence be used to offset any mineralization or highly favorable features found while completing the fence. Stated more completely, it is likely that phases I and II will be completed without using the maximum drilling footage proposed in this application; it is suggested in that event that should both parties to any contract resulting from this application be in agreement that the remaining footage can be used to good advantage in further exploration of any channels or structural zones, that the remaining footage be so used.

The maximum holes of both phases would be 61, and the probable minimum 22. The average depth of holes should be approximately 900 feet, and it is thought advisable to core from near the top of the Mossback to the Moenkopi Formation, which should be about 100 feet of coring. The footage then should approximate:

	Maximum	Minimum
non-core	48,800 ft.	17,600 ft.
core	6,100 ft.	2,200 ft.

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

5. (c) The work will start within 60 days and be completed within 12 months from the date of an exploration project contract.

5. (d) State the operating experience and background of the applicant, etc.:

The applicant is a geologist. His college education is two years of mining engineering, a Bachelor of Science degree in geology, and over three years graduate work in geology, all taken at the University of Washington, Seattle, Washington. His field experience is four field seasons in general geology, regional mapping, and detailed mapping of ore deposits; and over four years of uranium geology, the first two working for the Atomic Energy Commission with the Spokane and Salt Lake City Exploration Branches. One year was spent working for private enterprise within the plateau and one year consulting outside the plateau and in its eastern part, and exploring in the western part privately. The applicant will supervise the operations.

Mr. Jack O. Jones, holding a minor interest in the Beth claims, received a degree in mining engineering from Ohio State University in 1936. He has twenty years of professional experience, including five years in the uranium industry. Mr. Jones was employed by the Atomic Energy Commission for two years as deputy chief of the Grand Junction Exploration Branch, supervising their drilling operations on the Colorado Plateau. Mr. Jones will advise the operations.

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

6. Estimate of Costs:

(a) Independent Contracts

(1) drilling:

Maximum Footage

non-core	48,800 ft.	@$3.00/ft.=	$146,400.00
core	6,100 ft.	@$5.00/ft.=	$ 30,500.00
			$176,900.00

Minimum Footage

non-core	17,600 ft.	@$3.00/ft.=	$ 52,800.00
core	2,200 ft.	@$5.00/ft.=	$ 11,000.00
			$ 63,800.00

(2) Road building and preparation of drilling sites:

Phase I: (a) Seven miles of road

60 hrs. dozing/mi. @$12.00/hr.=$ 720.00 per mi.

Seven miles= $5,040.00 $5,040.00

(b) About 700 yards of road to be built down Carmel-Navajo cliff, switchbacking down a draw, elevation drop about 100 yds. About 300 yds. would require removal of about 1,200 cubic yards of rock by blasting.

1200 cu.yds. @$3.00/yd.=	$3,600.00	
70 hrs. dozing @$12.00/hr.=	840.00	
cost of road down draw=	$4,440.00	$4,440.00

Total cost of road, phase I $9,480.00

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

6. (a) cont'd.

Phase II: Difficult to evaluate as the location of the roads are not known at present. Four miles of road is estimated averaging rougher terrain than Phase I. The work per mile is estimated to be 60 hours of dozing and 200 cubic yards of rock excavation.

60 hrs. dozing/mi. @$12.00/hr.=	$ 720.00	
200 cu.yds. rock/mi.@$ 3.00/yd.=	$ 600.00	
	$1,320.00	per mi

Total cost of road, phase II=4 x $1,320.00=$5,280.00

Road costs phase I=	$ 9,480.00	
Road costs phase II=	$ 5,280.00	
Total road & drill site preparation costs	$14,760.00	$ 14,760.00
Cost of drilling maximum footage		$176,900.00
Total cost of Independent Contracts		$191,660.00

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

6. (b) Labor, supervision, and consultants:

Applicant's salary: $600/mo. for possible 6 mo.	$3,600.00
Assistant's salary: $350/mo. for possible 6 mo.	$2,100.00
	$5,700.00

(c) Operating materials and supplies - None

(d) Operating Equipment:

1955 Jeep truck owned by me for my field use; suggest rental and operational expenses be placed at $150/mo. for possible 6 months	$ 900.00
1948 Chrysler owned by me for assistant's field use: suggest rental and operational expenses be placed at $100/mo. for possible 6 mo.	600.00
	$1,500.00
core splitter:purchase price	34.50
	$1,534.50

(e) Rehabilitation and Repairs - None

(f) New buildings, Improvements, Installations - None

(g) Miscellaneous:

accounting: Suggest an allowance of $200.00	$ 200.00
legal fees: For contracts to be drawn up with contractors	200.00
Liability insurance: $46.00 for 6 mo. period	46.00
Assaying of core samples: $3.50 per assay, allowance of 50 samples	175.00
	$ 621.00

(h) Contingencies - None

SUMMARY OF COSTS

6. (a)	$191,660.00
(b)	5,700.00
(d)	1,534.50
(g)	621.00
	$199,515.50

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

7. (a) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation?:

Yes.

(b) How do you propose to furnish your share of the costs?:

A sufficient share in the claims will be sold to finance the applicant's participation in the proposed exploration. Interest shown in the claims by several corporations and individuals has demonstrated this can be accomplished without losing the controlling interest.

Kirby C. Coryell

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

700

FILE COPY
Surname:
Murphy
Hurd
Jones
Kiilsgaard
Gillespie

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

JAN 11 1956

Mr. Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

Re: Docket No. DMEA-3697 (Uranium)
Beth Claims
Emery County, Utah

Dear Mr. Coryell:

Reference is made to your application for Government aid in an exploration project on the above-named property.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information, indicates to us that the probability of disclosing significant ore reserves on your property is not sufficiently promising to justify Government participation in an exploration program. We regret to advise you that, under these circumstances, your application for exploration assistance is denied. However, this denial is made without prejudice. If future limited drilling on your property reveals evidence which could materially alter this opinion, be assured we will be pleased to consider a new application.

We wish to thank you for your interest in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

C. O. Mittendorf

Administrator

FMMurphy/izm 1-10-56
cc to: Adrm's Reading File
Docket
Operating Committee
Code 700
Mr. Murphy
DMEA Field Team, Region III (2)
Messrs, JECrawford, Rm. 3641 THKiilsgaard, Rm. 5224 JOHosted, Rm. 3210, GSA

128

Murphy
Ellis
Joyce

January 10, 1956

Summary of Proposed Project

Object: Denial of application for exploration aid.

Docket No.: DMEA-3897

Commodity: Uranium

Applicant: Kirby C. Coryell, 922 Bunting Ave., Grand Junction, Colorado
Donald D. Coryell, George K. Coryell, Jr., Kenyon C. Coryell, George C. Coryell, and Jack O. Jones also have interests in claims.

Property: 578 claims situated in T. 26 S., R. 8 and 9 E., Emery County, Utah.

Date of Application: July 9, 1955

Referred to Field Team: August 2, 1955

Field Team Report Recd.: December 22, 1955

Amount of Application: $199,515.50

Work Proposed:

	Maximum	Minimum
Number of drill holes	61	22
Footage non-core drilling	48,800 ft.	17,600 ft.
Footage core drilling	6,100 ft.	2,200 ft.
Average depth of holes	900 ft.	

Estimated Costs: (Maximum)

Non-core drilling @ $3.00/ft.	$146,400.00	
Core drilling @ $5.00/ft.	30,500.00	
Roads, access to property and to drill sites	14,760.00	
Total		$191,660.00

Excerpts from Field Team Report:

Rocks outcropping in the area of the claims consist of the Kayenta formation, Navajo sandstone, and Carmel sandstone of Jurassic age. The target formation is the Chinle, believed to lie 900 to 1,100 feet below the surface. Uranium ores occur in the Monitor Butte sandstone member of the ~~member of the~~ Chinle formation at the Delta mine and other nearby properties. No uranium mineralization has been found on the Coryell claims.

A mineralized channel is known to exist at the Delta mine, $1\frac{1}{2}$ miles northeast of the subject claims. Also, another ore-bearing channel is indicated to occur in the Rocky Mountain mine, about 2 miles northwest of the Delta mine. The drilling proposed in the application is based on the projection of these channels into the Coryell claims.

The examining geologist and engineer recommend that the request for Government assistance be denied. The proposed project is considered wildcat prospecting because of the distance of projection of the known channels and the excessive depth to members of the Chinle formation.

The Field Team concurs in this recommendation, and believes the Applicant should be advised that preliminary drilling should be done at his expense to prove the existence of the extension of the channels.

Commodity Members' Comments:

U.S.B.M., James Paone, January 3, 1956:

Concurs in Field Team's recommendation to deny the application without prejudice.

U.S.G.S., W. P. Williams, January 6, 1956:

Concurs in Field Team's recommendation for reasons contained in the Report of Examination.

Rare and Miscellaneous Metals Division, F. M. Murphy, January 10, 1956:

This Division concurs in the Field Team's recommendation to deny the subject application without prejudice. The depth of the holes required to explore for the possible extension of the known channels would make the project extremely costly, moreover, it might be considered prospecting rather than exploration work.

Ernest Wm. Ellis

Ernest Wm. Ellis, Chief
Rare and Miscellaneous
Metals Division

1-6-56 [illegible]

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

January 6, 1956

Re: DMEA 3897
Kirby C. Coryell
Beth Claims
Emery County, Utah
Uranium

Memorandum

To: E. W. Ellis, Defense Minerals Exploration Administration

From: W. P. Williams, U. S. Geological Survey

Subject: Review of Field Team Report

The applicant proposes to spend a total of $198,621 for a drilling project at the southwest end of the San Rafael Swell.

The report of field examination points out: 1) drill hole depths would be in the neighborhood of 1,000 feet; 2) two favorable ore-host formation members and channel structures must be projected onto the property distances of 1½ and 2 miles - which is not a valid procedure; 3) the potential ore zone is deeply buried everywhere on the property, so nothing is known of the structure or characteristics of the ore zone; 4) there is no evidence of mineralization on the property; 5) no drilling or other exploration work has been done on or near the property to demonstrate the possible favorable nature of the property.

There is no evidence whatever, on this date, indicating that an exploration project on the property would result in a significant ore discovery. I agree with the findings of the examining team, and I recommend that the application be denied.

W P Williams

W. P. Williams

RECEIVED
JAN 9 1956

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

January 6, 1956

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Kirby C. Coryell
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W. P. Williams

RECEIVED
JAN 6 1956

W. P. Williams:btr
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cc: Director's Reading File (4212) GSA
Branch Reading, 4212 GSA
DMEA (3)
Docket File
J. E. Crawford, Rm. 3641 Interior
J. O. Hosted, Rm. 3210 GSA
Chron File.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

January 6, 1956

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Virby C. Coryell
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Emery County, Utah
Uranium

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

January 6, 1956

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Uranium

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W. P. Williams

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G 1/6/56

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Chron File.

1-5-56
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

January 3, 1956

Memorandum

To: Ernest William Ellis, DMEA Member
Uranium Commodity Committee, Room 4445

From: James Paone, Bureau of Mines Alternate Member
Uranium Commodity Committee

Subject: Application for Assistance and Report of Examination, DMEA Docket 3897, Kirby C. Coryell, Beth claims, Emery County, Utah

I have reviewed the attached application dated July 9 and the report of examination dated December 19, both received in this office December 28. I have also discussed the application and report of the Beth claims, DMEA Docket 3897, with Joseph O. Hosted, Washington representative of the Atomic Energy Commission.

The applicant requested Federal assistance to explore for uranium on the Beth group of claims, Emery County, Utah, by 54,900 feet of diamond drilling at an estimated cost of $191,660.

A field examination of the property was made September 13 and 14 by the DMEA Field Team. The Field Team concluded in their report that the proposed exploration program was wildcat prospecting and consequently they recommend denial of the application for Government assistance.

Inasmuch as the probability of discovery of ore-grade material appears remote, we recommend that the request for Federal assistance be denied without prejudice.

The report of examination is being forwarded to the Chief, Division of Minerals, in accordance with the routing slip attached thereto.

James Paone
James Paone

RECEIVED
JAN 5 1956

Attachment

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

January 3, 1956

Memorandum

To: Ernest William Ellis, DMEA Member
Uranium Commodity Committee, Room 4445

From: James Paone, Bureau of Mines Alternate Member
Uranium Commodity Committee

Subject: Application for Assistance and Report of Examination, DMEA Docket 3897, Kirby C. Coryell, Beth claims, Emery County, Utah

I have reviewed the attached application dated July 9 and the report of examination dated December 19, both received in this office December 28. I have also discussed the application and report of the Beth claims, DMEA Docket 3897, with Joseph O. Hosted, Washington representative of the Atomic Energy Commission.

The applicant requested Federal assistance to explore for uranium on the Beth group of claims, Emery County, Utah, by 54,900 feet of diamond drilling at an estimated cost of $191,660.

A field examination of the property was made September 13 and 14 by the DMEA Field Team. The Field Team concluded in their report that the proposed exploration program was wildcat prospecting and consequently they recommend denial of the application for Government assistance.

Inasmuch as the probability of discovery of ore-grade material appears remote, we recommend that the request for Federal assistance be denied without prejudice.

The report of examination is being forwarded to the Chief, Division of Minerals, in accordance with the routing slip attached thereto.

James Paone

Attachment

JAN 7 1956

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

January 3, 1956

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Uranium Commodity Committee, Room 4445

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I have reviewed the attached application dated July 9 and the report of examination dated December 19, both received in this office December 28. I have also discussed the application and report of the Beth claims, DMEA Docket 3897, with Joseph O. Hosted, Washington representative of the Atomic Energy Commission.

The applicant requested Federal assistance to explore for uranium on the Beth group of claims, Emery County, Utah, by 54,900 feet of diamond drilling at an estimated cost of $191,660.

A field examination of the property was made September 13 and 14 by the DMEA Field Team. The Field Team concluded in their report that the proposed exploration program was wildcat prospecting and consequently they recommend denial of the application for Government assistance.

Inasmuch as the probability of discovery of ore-grade material appears remote, we recommend that the request for Federal assistance be denied without prejudice.

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James Paone

Attachment

12-30-55 cfgm

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

December 30, 1955

Re: DMEA 3897
Kirby C. Coryell
Beth claims
Emery County, Utah - Uranium

Memorandum

To: E. W. Ellis, Defense Minerals Exploration Administration

From: W. P. Williams, U. S. Geological Survey

Subject: Review of Field Team Report.

On July 27, 1955, in a Review of Application I attempted to point out that the applicant's proposed exploration project would be a prospecting venture. I recommended that the application be denied without prejudice.

A DMEA examining team visited the property and in their report also recommended denial without prejudice.

In some manner the applicant gained the impression that his proposed project might not meet with DMEA approval. His reaction was to send to DMEA a 10-page, closely-written dissertation in an attempt to justify his geologic theories and the proposed exploration.

None of the many querulous arguments of the applicant cause me to alter my original opinion of the subject property. Memoranda by H. S. Johnson and H. B. Dyer, U. S. Geological Survey refute the applicant's contentions concerning geologic ore controls on the subject property.

I again recommend that the application be denied without prejudice. If the applicant can show, by preliminary work of his own, that a favorable host rock exists in a favorable geologic structure then the application could be reconsidered.

W P Williams

W. P. Williams

RECEIVED
DEC 30 1955

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

December 30, 1955

Re: DMEA 3897
Kirby C. Coryell
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W.P. Williams-btr
G 12/30/55

W. P. Williams

cc: Director's reading, 4212 GSA
Branch reading, 4212 GSA
DMEA (3)
Docket file
J. E. Crawford, Rm. 3641 Interior
J. O. Hosted, Rm. 3210 GSA

RECEIVED
DEC 30 1955

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

December 30, 1955

Re: DMEA 3097
Kirby C. Coryell
Bath claims
Emery County, Utah - Uranium

Memorandum

To: E. W. Ellis, Defense Minerals Exploration Administration

From: W. P. Williams, U. S. Geological Survey

Subject: Review of Field Team Report.

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W.P. Williams-btr
G 12/30/55

W. P. Williams

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Branch reading, 4212 GSA
DMEA (3)
Docket file
J. E. Crawford, Rm. 3641 Interior
J. O. Hosted, Rm. 3210 GSA

RECEIVED
DEC 30 1955

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

December 30, 1955

Re: DMEA 3897
Kirby C. Coryell
Beth claims
Emery County, Utah - Uranium

Memorandum

To: T. H. Ellis, Defense Minerals Exploration Administration

From: W. P. Williams, U. S. Geological Survey

Subject: Review of Field Team Report.

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W.P. Williams-btr
G 12/30/55

W. P. Williams

cc: Director's reading, 4212 GSA
Branch reading, 4212 GSA
DMEA (3)
Docket file
J. E. Crawford, Rm. 3641 Interior
J. O. Hosted, Rm. 3210 GSA

RECEIVED
DEC 30 1955

12-29-55 zm

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
DEC 22 1955

224 New Customhouse
Denver 2, Colorado

December 19, 1955

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Field Team, Region III

Subject: Report of Examination, Docket DMEA 3897 (Uranium), Kirby C. Coryell, Beth claims, Emery County, Utah

Enclosed are the original and three copies of the report pertaining to the subject application.

It has been recommended that the application be denied without prejudice. We concur in this recommendation, and we believe the applicant should be advised that preliminary drilling should be done at his expense to prove the existence of the extension of the channels.

E. N. Harshman

E. N. Harshman
Acting Executive Officer, DMEA
Field Team, Region III

Enclosures

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(date)

TRANSMITTED
DEC 19 1955

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 12, UTAH

RECEIVED
DEC 22 1955
DMEA
Date Rec'd.

DEC 19 1955

BUREAU OF MINES
Denver, Colorado

December 16, 1955

Memorandum

To: W. M. Traver, Executive Officer, DMEA Field Team, Region III

From: Stephen R. Wilson

Subject: Docket No. DMEA-3897 (Uranium), Kirby C. Coryell, Emery County, Utah

Attached are the original and 10 copies of an engineering report covering examination of property controlled by Kirby C. Coryell, Grand Junction, Colorado. Examination of the property was made by M. N. Howes with Howard Albee of the Geological Survey. A separate section, Summary, Conclusions and Recommendations, is also attached. One copy of the brochure accompanies the information.

The applicant has requested a loan of $191,000 to explore part of the property by 54,900 feet of diamond drilling. It is proposed that two fences of drill holes be placed across projected extensions of the Delta and Rocky Mountain channels which are exposed 1-1/4 to 2 miles north of the Coryell property. A two-stage program of exploration is proposed.

Rocks outcropping in the area of the claims consist of the Kayenta formation, Navajo sandstone, and Carmel sandstone, of Jurassic age. The target formation is the Chinle, believed to lie 900 to 1,100 feet below the surface. Uranium ores occur in the Monitor Butte sandstone member of the Chinle formation at the Delta mine and other nearby properties. No uranium mineralization has been found on the Coryell claims.

The examining engineer considers the work proposed by the applicant to be wildcat prospecting. The probability of ore discovery appears remote, and recommendation is made that the request for Government assistance be denied. I concur in this recommendation.

The proposed exploratory program has been discussed with members of the Atomic Energy Commission.

Stephen R. Wilson
Stephen R. Wilson

Enclosures

cc: J. B. Clemmer

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(date)

TRANSMITTED

DEC 19 1955

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

RECEIVED
DEC 22 1955

By Howard F. Albee and M. H. Howes

Kirby C. Coryell, Grand Junction, Colorado, has applied for Government assistance in exploring uranium claims under docket No. DMEA-3897. The property involved consists of 578 unpatented lode mining claims situated in an unsurveyed area of Emery County, Utah. The claims were examined by DMEA personnel September 13 and 14, 1955, to appraise the applicant's request for a loan of $191,660 to conduct diamond drilling exploratory work in two stages. Total maximum proposed drilling consists of 48,800 feet of noncored holes and 6,100 feet of cored holes.

Sedimentary rocks in the area of the applicant's claims consist of the Moenkopi, Chinle and Wingate sandstone formations of Triassic age and the Kayenta, Navajo and Carmel formations of Jurassic age. The area covers part of the southwest end of the San Rafael Swell. The anticlinal axis of the Swell plunges approximately 3 degrees to the southwest through the central part of the group of claims.

The ore-bearing zone in the vicinity of the claims is near the base of the Chinle formation. This formation, in the area, is divided into three members which are, from bottom to top, the Monitor Butte, Moss Back and Church Rock. The Moss Back and Monitor Butte members are the most likely ore-bearing members.

The applicant has based the proposed exploratory work on projection of two productive channels, the Delta and Rocky Mountain, which are

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(3059)

exposed to the north of the claims. The proposed work consists of drilling two fences of holes to intersect the two channels. The applicant believes the holes will average approximately 900 feet in depth. It is probable that the depth will be as great as 1,100 feet.

The examining geologist and engineer recommend that the request for Government assistance be denied. The proposed project is considered wildcat prospecting because of the distance of projection of channels exposed on properties 1-1/4 to 2 miles to the north and the excessive depth to members of the Chinle formation, productive on properties in the general area of the applicant's claims.

RECEIVED
DEC 23 1955

TRANSMITTED
DEC 19 1955

KIRBY C. CORYELL
EMERY COUNTY, UTAH
DMEA-3897
Uranium

Engineering Report

By M. H. Howes
Mining Engineer
Bureau of Mines

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55

RECEIVED
DEC 22 1955

KIRBY C. CORYELL
EMERY COUNTY, UTAH

CONTENTS

	Page
Engineering report	
Introduction	2
Location, topography and physical features	2
History and production	3
Ownership and extent	3
General geology	5
Minable ore reserves	6
Present status	6
Project proposals	6
Estimated costs of project proposals	8
Proposed financing	10
Conclusions and recommendations	10

ILLUSTRATIONS

Fig. 1 Location map, Kirby C. Coryell, Beth claims, Emery County, Utah

Fig. 2 Claim map showing proposed drill hole locations and access roads

INTRODUCTION

An application dated July 9, 1955, for Government aid in an exploratory project under docket No. DMEA-3897, was submitted by Kirby C. Coryell. Property under consideration includes 578 claims in Emery County, Utah. The proposed program consists of 61 drill holes, estimated to average 900 feet in depth, for a total of 54,900 feet of drilling. The estimated cost is $191,660. The location pattern of the drill holes is designed to disclose the projected extension of the Delta and Rocky Mountain stream channels and to explore the Chinle formation in these channels for uranium ores.

A field examination of the property was made September 13 and 14, 1955, by Howard F. Albee, Geological Survey, and M. H. Howes, Bureau of Mines, to determine the feasibility of the proposed exploratory work and to appraise the estimated costs and the engineering aspects of the job. The field examiners were accompanied to the property by Kirby C. Coryell, the applicant.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The property is situated on the southwest flank of the San Rafael Swell in Emery County, Utah. The specific location is T. 26 S., R. 8 and 9 E., S.L.B. and M., 55 airline miles southwest of Green River, Utah. The claims lie in an area of moderate relief with elevations ranging from 4,600 to 6,600 feet above sea level.

The climate is semiarid. Summers are hot and dry, and winters are cold, ordinarily with a small amount of snow. Vegetation is scarce and consists of junipers and desert plants.

The property may be reached by traveling 12 miles southerly from Emery, Utah, on paved Utah Highway 10, and thence southeasterly about 28 miles on a rough dirt road to the claims.

HISTORY AND PRODUCTION

This is a new mining property, without previous background or history. Location of the Beth claims was started December 8, 1954, and completed June 4, 1955. No work of any kind has been done on the claims.

OWNERSHIP AND EXTENT

The property consists of 578 unpatented lode mining claims, located and recorded in the names of Kirby C. and Donald D. Coryell (brothers). Because of financial assistance and services given to Kirby C. Coryell by his father and two other brothers, they have minor interests in the claims. Jack O. Jones has a 5 percent interest. Following is a complete list of owners of the Beth claims:

Kirby C. Coryell	922 Bunting Avenue	Grand Junction, Colo.
Donald D. Coryell	Park Circle Apts.	Wenatchee, Washington
George K. Coryell, Jr.	Vashon Heights	Vashon Island, Washington
Kenyon C. Coryell	415 So. Roosevelt	Walla Walla, Washington
George C. Coryell	2028 East 104th Street	Seattle 55, Washington
Jack O. Jones	1332 Wall Avenue	Grand Junction, Colo.

The Beth lode mining claims are recorded in the office of the County Recorder, Castle Dale, Emery County, Utah, as follows:

Claim	Book	Pages
Beth No. 1 to No. 16	J-73	134 to 149
Beth No. 17	J-75	97
Beth No. 18 to No. 23	J-73	150 to 155
Beth No. 24 to No. 26	J-75	98 to 100
Beth No. 27 to No. 46	J-73	156 to 175
Beth No. 47 to No. 49	J-75	101 to 103
Beth No. 50 to No. 62	J-73	176 to 188
Beth No. 63 to No. 69	J-75	104 to 110
Beth No. 70 to No. 82	J-73	189 to 201
Beth No. 83 to No. 89	J-75	111 to 117
Beth No. 90 to No. 140	J-73	202 to 252
Beth No. 141 to No. 150	J-75	118 to 127
Beth No. 151 to No. 163	J-73	253 to 265
Beth No. 164 to No. 171	J-75	128 to 135
Beth No. 172 to No. 189	J-73	266 to 283
Beth No. 190	J-75	136
Beth No. 191 to No. 202	J-73	284 to 295
Beth No. 211 to No. 217	J-75	137 to 143
Beth No. 226	J-85	294
Beth No. 254 to No. 261	J-75	144 to 151
Beth No. 277	J-75	152
Beth No. 278 to No. 286	J-73	296 to 304
Beth No. 287 to No. 290	J-85	295 to 298
Beth No. 295 to No. 304	J-73	305 to 314
Beth No. 305 to No. 306	J-75	153 to 154
Beth No. 307 to No. 308	J-73	315 to 316
Beth No. 309 to No. 310	J-95	183 to 184
Beth No. 311 to No. 337	J-73	317 to 343
Beth No. 338	J-75	155
Beth No. 339 to No. 342	J-73	344 to 347
Beth No. 343 to No. 348	J-94	159 to 164
Beth No. 349 to No. 354	J-95	185 to 190
Beth No. 355 to No. 356	J-85	299 to 300
Beth No. 368 to No. 376	J-94	165 to 173
Beth No. 377 to No. 379	J-95	191 to 193
Beth No. 391 to No. 400	J-94	174 to 183
Beth No. 412 to No. 419	J-94	184 to 191
Beth No. 468 to No. 471	J-94	192 to 195

Claim	Book	Pages
Beth No. 472	J-95	194
Beth No. 473 to No. 485	J-85	301 to 313
Beth No. 486 to No. 492	J-94	197 to 203
Beth No. 493 to No. 505	J-85	314 to 326
Beth No. 506 to No. 517	J-94	205 to 216
Beth No. 518 to No. 543	J-85	327 to 352
Beth No. 544	J-94	217
Beth No. 545 to No. 538	J-85	353 to 356
Beth No. 549 to No. 550	J-95	195 to 196
Beth No. 551 to No. 576	J-85	357 to 382
Beth No. 578 to No. 595	J-85	383 to 400
Beth No. 674 to No. 682	J-85	402 to 410
Beth No. 684 to No. 687	J-85	411 to 414
Beth No. 689 to No. 783	J-85	415 to 509
Beth No. 784 to No. 802	J-94	218 to 236

GENERAL GEOLOGY

Rocks outcropping within the area of the claims are the Kayenta formation, Navajo sandstone, and Carmel formation of Jurassic age, occurring successively from northeast to southwest. The locations of the proposed exploratory drill holes (fig. 2) lie near the base of the Navajo sandstone and near the top of the Kayenta formation. In the Muddy River canyon, northeast of the property, Wingate sandstone of Jurassic age, and Chinle and Moenkopi formations of Triassic age, are exposed. Shinarump conglomerate, ordinarily present between the Moenkopi and Chinle formations, is missing in this area. Ores occur in the Monitor Butte sandstone of the Chinle formation at the Delta mine and other nearby properties.

Two stream channels, the Delta mine and Rocky Mountain, are exposed in the cliffs north of the property and apparently project into the area

of the Beth claims. Several faults and diabase dikes, striking in a northwesterly direction, appear on the claims.

There has been no uranium mineralization found on the property to date.

MINABLE ORE RESERVES

There are no known uranium ore reserves on the Beth claims.

PRESENT STATUS

The western part of the property is served by a primitive access road. There are no mine workings, drill holes, or buildings of any kind on the claims.

Salina, Utah, approximately 68 miles northwest of the property, is the nearest railhead, being situated on the Denver and Rio Grande Railroad. The uranium-buying station at Marysvale, Utah, is 50 miles from Salina.

Mine labor is available from Salina or from the coal-mining towns of Emery County.

Mining equipment and supplies can be obtained from the same source as the mine labor.

Emery, Utah, is the nearest source of available water.

PROJECT PROPOSALS

The applicant proposes to explore the property by drilling two rows of vertical holes, one row across the projection of the Delta mine

channel and the other row across the projection of the Rocky Mountain channel, the work to be done in two phases.

Phase I

It is proposed to drill a maximum of 41 holes (fig. 2) in the two rows, to an average depth of 900 feet, for a total of 36,900 feet, the holes to be noncore drilled to the top of the Moss Back sandstone and core drilled about 100 feet through the Moss Back and Monitor Butte members to the Moenkopi formation. The holes are to be drilled 1,000 feet apart to start, filling in to 500 feet wherever there are indications that a channel is present between holes.

The locations of the longer row of holes to the west lie along a diabase dike. Initial holes of this row should be drilled alternately on either side of the dike where possible.

Approximately 32,800 feet of noncore and 4,100 feet of core drilling shall be completed under phase I.

Phase II

A maximum of 10 holes each will be drilled to delineate ore mineralization discovered in the two rows of holes in phase I. These holes will also be core drilled through the Moss Back and Monitor Butte members.

Approximately 16,000 feet of noncore and 2,000 feet of core drilling shall be completed under phase II.

General Provisions

The operator shall provide for examination, logging, splitting, and storage for Government inspection and disposal of drill-hole

cuttings and cores, determination of drilling depths, hole probing, surveying and mapping of drill-hole locations, sampling, and all other duties necessary to the satisfactory technical progress of the proposed program.

The Government shall not contribute to the cost of any hole drilled smaller than AX size, nor to the cost of any hole which cannot be probed with radiometric logging equipment.

The operator's monthly report shall contain certified drill and geologic logs, and certified copies of chemical analyses.

Supervision, the extent and method of sampling and logging holes, the manner of splitting and storing drill-hole cuttings and cores, the laboratory making the chemical analyses, the location of drill sites, and the drilling method used are to be subject to Government approval.

ESTIMATED COSTS OF PROJECT PROPOSALS

Independent Contracts

Phase I

Drilling	
Noncore - 32,800 feet at $3 per foot	$ 98,400.00
Core - 4,100 feet at $5 per foot	20,500.00
Access roads (7-1/2 miles)	
Bulldozing - 490 hours at $12 per hour	5,880.00
Drilling and blasting - 1,200 cubic yards at $3 per cubic yard	3,600.00
Total independent contracts, phase I	$128,380.00

Phase II

Drilling	
Noncore - 16,000 feet at $3 per foot	$48,000.00
Core - 2,000 feet at $5 per foot	10,000.00
Access roads (4 miles)	
Bulldozing - 240 hours at $12 per hour	2,880.00
Drilling and blasting - 800 cubic yards at $3 per cubic yard	2,400.00
Total independent contracts, phase II	$63,280.00

Other Items of Cost

Phase I

Supervision - 4 months at $600 per month	$ 2,400.00
Technical - 4 months at $350 per month	1,400.00
Jeep truck	
Operating cost (gasoline, oil, grease, repairs, etc.)- 4 months at $100 per month	400.00
Depreciation - 4 months at $50 per month	200.00
Core splitter	18.00
Accounting - 4 months at $25 per month	100.00
Assays - 32 at $3.50 each	112.00
Total	$4,630.00

Phase II

Supervision - 2 months at $600 per month	$1,200.00
Technical - 2 months at $350 per month	700.00
Jeep truck	
Operating cost (gasoline, oil, grease, repairs, etc.)- 2 months at $100 per month	200.00
Depreciation - 2 months at $50 per month	100.00
Core splitter	18.00
Accounting - 2 months at $25 per month	50.00
Assays - 18 at $3.50 each	63.00
Total	$2,331.00

Estimated Cost Summary

Phase I	$133,010.00
Phase II	65,611.00
Estimated total cost of project	$198,621.00
Government participation at 75 percent	$148,965.75

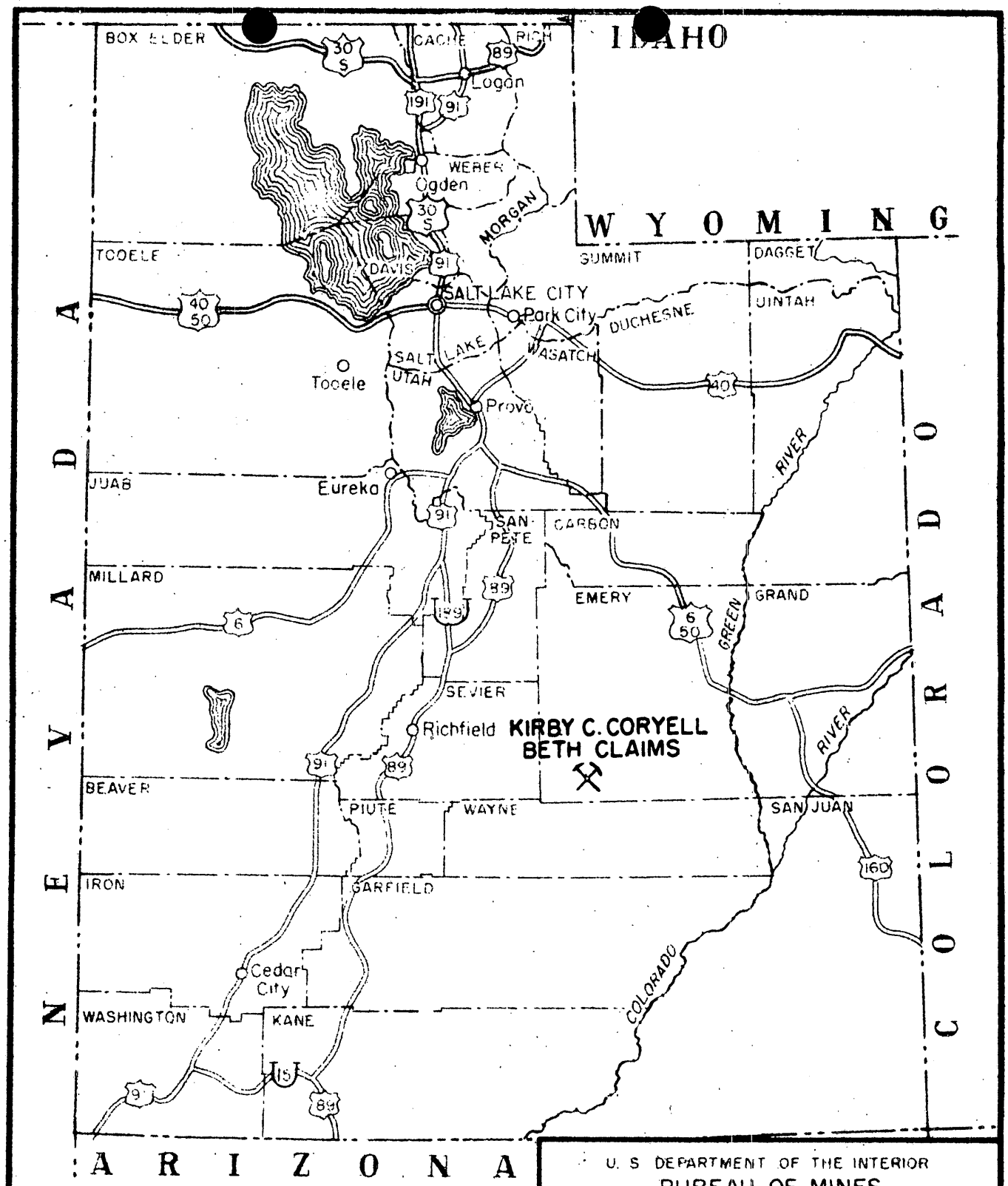
PROPOSED FINANCING

The applicant reports that he plans to invest $49,655.25 in the proposed exploratory project, which is 25 percent of the estimated cost of $198,621.00, in accordance with the regulations on Government participation, as stated in Section 7, DMEA Order No. 1 Amended.

CONCLUSIONS AND RECOMMENDATIONS

The property, consisting of 578 lode mining claims, is equivalent in size to 18 sections, or one-half township. These extensive holdings cover an area back from the rim of the Muddy River canyon, starting near the top of the Kayenta formation and rising up through the Navajo sandstone into the lower Carmel formation. Important uranium ore deposits in the vicinity of the property occur in the Moss Back and Monitor Butte members of the Chinle formation. The Moss Back sandstone is exposed along the cliffs of the Muddy River canyon, and is assumed to extend under the Coryell property. As far as is known, no uranium mineralization has been found on any of the claims. The reasons for exploration of this property are based entirely on geologic theories and assumptions. Proposed exploration is considered of wildcat nature.

The applicant projects two stream channels for a distance of 1-1/4 to 2 miles into his property, in the hope that if they are disclosed by the proposed drilling program, they will contain commercial ore deposits. The favorable horizons in the vicinity of the proposed drilling are estimated to average 900 feet in depth. The probability of ore discovery by the proposed exploratory program appears to be remote, and the cost is high. Therefore, it is recommended that the application for Government aid be denied.



U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Fig. 1 DMEA Docket No. 3897

Location Map

KIRBY C. CORYELL, BETH CLAIMS

EMERY COUNTY, UTAH

ENGINEER: *M. H. HOWES*	DATE: NOV. 1, 1955
TRACED: NOV., 1955; A.P.T.S.	1900-359-E
CHECKED:	

MINERAL DEPOSITS
DMEA
RECEIVED
DEC 8 1955
U. S.
GEOLOGICAL SURVEY
DENVER, COLORADO

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
P. O. BOX 360
GRAND JUNCTION, COLORADO

TRANSMITTED
DEC 19 1955
RECEIVED
DEC 22 1955

December 5, 1955

DMEA
Data Rec'd,
DEC 9 1955
BUREAU OF MINES
Denver, Colorado

Memorandum

To: E. N. Harshman, DMEA Field Team, Region III

From: J. William Easler

Subject: DMEA docket 3897, Kirby C. Coryell, Beth claims, San Rafael Mining District, Emery County, Utah

Enclosed is a geologic report on the Beth claims, San Rafael Mining District, Emery County, Utah. Kirby C. Coryell, 922 Bunting Avenue, applied for Government assistance in exploring uranium on the Beth group of claims in the San Rafael Mining District, Emery County, Utah. The application was referred to the field and was examined September 13 and 14, 1955, by M. H. Howes, U. S. Bureau of Mines, and H. F. Albee, U. S. Geological Survey, accompanied by the applicant, Mr. Kirby C. Coryell.

The applicant proposes two fences of holes designated to test the extension of the Hidden Splendor channel and the Rocky Mountain channel. The fence of holes designed to test the Hidden Splendor channel is approximately 1½ miles southwest of the Hidden Splendor property and the one designed to intersect the Rocky Mountain channel is approximately two miles southwest of the Rocky Mountain mine. The rocks in the area range from lower middle Triassic to middle Jurassic. The host rocks are at or near the base of the Chinle formations and drilling depths would range from 900 to 1,100 feet.

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(date)

Current geologic data obtained by the Geological Survey in the area indicates that the Hidden Splendor channel does not extend southwest into the applicant's area with any degree of continuity. The Rocky Mountain channel at the outcrop appears to trend northwesterly rather than southwesterly.

The drilling program, as proposed by the applicant, appears to be of a prospective nature in view of the fact the work is proposed as a result of meager geologic data. It is felt that in order to explore ground at these depths, mineralized trends on ore bodies of large enough size and grade should be indicated before a DMEA program could be approved.

It is recommended that the application be denied without prejudice. The applicant should be advised to do enough preliminary drilling to prove the extension of the proposed channels.

The Atomic Energy Commission was consulted relative to the appraisal of the subject area and I concur with the conclusions and recommendations of the examining team.

The required number of maps and brochure are enclosed.

J. William Hasler

J. William Hasler,
Geologist.

JWH/mlr

Enclosure

TRANSMITTED
DEC 19 1955
RECEIVED
DEC 23 1955

UNITED STATES DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION
REPORT OF EXAMINING TEAM
REGION III

DMEA 3897, Kirby C. Coryell, Beth claims, Emery County, Utah
San Rafael Mining District, Emery County, Utah

Uranium

Geologic report

by

Howard F. Albee
U. S. Geological Survey

~~M. H. Howes~~
~~U. S. Bureau of Mines~~

December 1955

Reviewed by
DMEA OPERATING COMMITTEE
12-28-55
(date)

DMEA 3897

INTRODUCTION

Application (DMEA docket 3897) has been made by Kirby C. Coryell of 922 Bunting Avenue, Grand Junction, Colorado, for Government assistance in exploring for uranium in the San Rafael Mining District, Emery County, Utah. The applicant proposes to explore the Beth group of claims which consist of 578 unpatented mining claims in an unsurveyed part of Emery County, Utah.

The applicant proposes to drill two fences with holes spaced on 500-foot centers. The estimated maximum footage is 54,900 feet and the minimum is 19,800 feet of core and non-core drilling. The estimated average depth of drilling is 1,100 feet. Each fence of holes is situated so as to intersect the postulated extension of a sandstone channel in the Chinle formation.

The subject claims were examined September 13 and 14, 1955, by M. H. Howes, U. S. Bureau of Mines, and Howard F. Albee, U. S. Geological Survey, in company with the applicant, Kirby C. Coryell.

Because of the drilling depths and prospecting nature of the project, it is recommended that the application be denied without prejudice.

LOCATION AND ACCESSIBILITY

The Beth group of claims located in an unsurveyed area about one mile southwest of the Muddy River in the San Rafael Mining District, Emery County, Utah, are accessible the year around, except for short periods of heavy rain, by about 25 miles of unimproved dirt road that bears easterly from a point 12 miles south of the town of Emery on Utah State Highway 10.

GEOLOGY AND ORE DEPOSITS

The sedimentary rocks in the area of the subject claims range in age from Lower and Middle (?) Triassic to Middle Jurassic. They are, in ascending order, the Moenkopi formation of Lower and Middle (?) Triassic age, the Chinle formation of Upper Triassic age, the Wingate sandstone of Upper Triassic age, the Kayenta formation of Jurassic (?) age, the Navajo sandstone of Jurassic and Jurassic (?) age, and the Carmel formation of Middle Jurassic age.

The subject area is at the southwest end of the San Rafael Swell, the anticlinal axis of which is plunging about 3° southwesterly through the center of the group of claims. Several faults within the area cross the axis of the Swell and trend nearly normal to it. Numerous joints throughout the area trend parallel to faults and diabase dikes. A genetic relationship between the diabase filled fractures, the faults, and the joints is thus suggested by their parallel strikes.

Numerous diabase dikes and sills occur to the west and northwest of the claims. Several dikes are within the area of the claims and they strike generally northwest. Little is known of the time of emplacement of these dikes except that they are of post-Morrison age.

The ore-bearing zone on the claims is near the base of the Chinle formation. The Chinle, in this area, is divided into three members which are, from bottom to top, the Monitor Butte, the Moss Back, and the Church Rock. Potential production could be from the Moss Back member or from sandstone lenses in the Monitor Butte member of the Chinle formation.

The Navajo and Carmel formations crop out in most of the claimed area and the Kayenta formation crops out in a small area on the northeast edge of the claims. Holes drilled from a bench in the lower part of the Navajo formation would have to be about 1,100 feet deep to penetrate the ore-bearing sandstone and bottom in the underlying Moenkopi formation.

Thicknesses of the formations in the area, taken from the nearest measured sections on the Muddy River, are:

Formation	Member	Feet	Source of information
Carmel		650	USGS Bul. 806-C
Navajo		650	USGS Bul. 806-C
Kayenta		250	USGS Bul. 806-C
Wingate		450	USGS Bul. 806-C
Chinle	Church Rock	140	J. H. Stewart, USGS
	Moss Back	70	J. H. Stewart, USGS
	Monitor Butte	100	J. H. Stewart, USGS
Moenkopi		850	J. H. Stewart, USGS

Northeast of the subject area two prominent channels occur in the lower Chinle sands. The Hidden Splendor channel trends southwesterly and the southernmost exposure is in the cliff on the south side of the Muddy River.

The Rocky Mountain channel, about two miles northwest of the Hidden Splendor, is exposed only on one cliff face. This area is being mapped by the U. S. Geological Survey. Data from the mapping project indicates the channel to be trending northwest. The applicant, however, assumes a southwesterly channel trend, nearly parallel to the Hidden Splendor channel.

The Hidden Splendor ore body ranges in size between 100,000 and 200,000 tons. The exposure of the channel south of the Muddy River, assumed to be part of the Hidden Splendor channel, has been explored. Anomalous radioactivity is present, but no minable ore body is known. The ore-bearing sandstone is in the Monitor Butte member and lies about 50 feet below the Moss Back. The channel has been followed northeasterly in the Hidden Splendor mine to its pinchout about 1,000 feet from the adit. It is visibly thinning to the southwest and probably pinches out in a few hundred feet in that direction.

The Rocky Mountain channel has been explored by underground methods and has produced between 100 and 200 tons of ore. The known reserves in the Rocky Mountain channels are small and probably will not exceed the production. The ore-bearing sandstone is in a channel in the Moss Back member of the Chinle formation. The channel has been cut through the Monitor Butte member and sands within the channel rest on a Moenkopi surface.

The applicant has proposed a drilling program consisting of two fences (fig. 2), with holes spaced on 500-foot centers, with which he hopes to intersect the Hidden Splendor and Rocky Mountain channels. This would be projecting the Hidden Splendor channel about a mile and a half and the

Rocky Mountain channel about 2 miles. It is doubtful that any single channel can be projected for such a long distance in this area. They can, however, be projected a few hundreds of feet.

PROPOSED DRILLING PROGRAM

The applicant proposes to drill two separate fences of holes in stage I. Each fence is designed to locate the extension of a known channel. A maximum number of 41 holes will be required to complete this work. The spacing along the fences would be on intervals of 1,000 feet, then offsetting on 500-foot intervals to further delineate the channel.

Stage II would allow 10 holes to be drilled in each channel, and would comprise a maximum of 20 holes.

The average drilling depth would be 900 feet as calculated by the applicant. According to thicknesses obtained by the U. S. Geological Survey from sections measured in the general area, the drilling depths would possibly average 1,100 feet.

The total cost of the project, based on the maximum footage for stage I and stage II, is estimated at $199,515.50.

CONCLUSIONS AND RECOMMENDATIONS

Rocks that crop out in the subject area range in age from Lower and Middle (?) Triassic to Middle Jurassic age. They are, from oldest to youngest, the Kayenta, Navajo, and Carmel formations. The Triassic Wingate and Chinle formations crop out from about a mile to as much as two miles northeast of the claims. The host rocks are at or near the base of the Chinle formation and, from measured sections in the area, would be in excess of 1,000 feet below the lowest proposed drilling sites.

The applicant estimates the average depth of drilling would be 900 feet, and the examining team estimates the minimum depths would be about 1,100 feet. The targets are primarily two channels that are projected from the outcrop about 7,000 feet and about 10,000 feet to the northeast. The applicant postulates that, because of the structure, any irregularity or thickening of the basal Chinle sandstones may be a favorable host rock and, therefore, a target.

Either of the estimated depths are excessive when drilling for a target of unknown size or a channel that has been projected for more than a few hundreds of feet. A drilling program of such depths and based upon such distantly projected or postulated targets would be strictly prospecting.

The area may have merit even though no concrete evidence is at hand to prove the existence of ore deposits by such long projections of ore-bearing channels. The examining team recommends that the application be denied without prejudice. If the applicant can show by drilling that the claims contain thick, mineralized sandstone in the Chinle formation and present an integrated exploration program, including a more limited area, the application may be reconsidered.

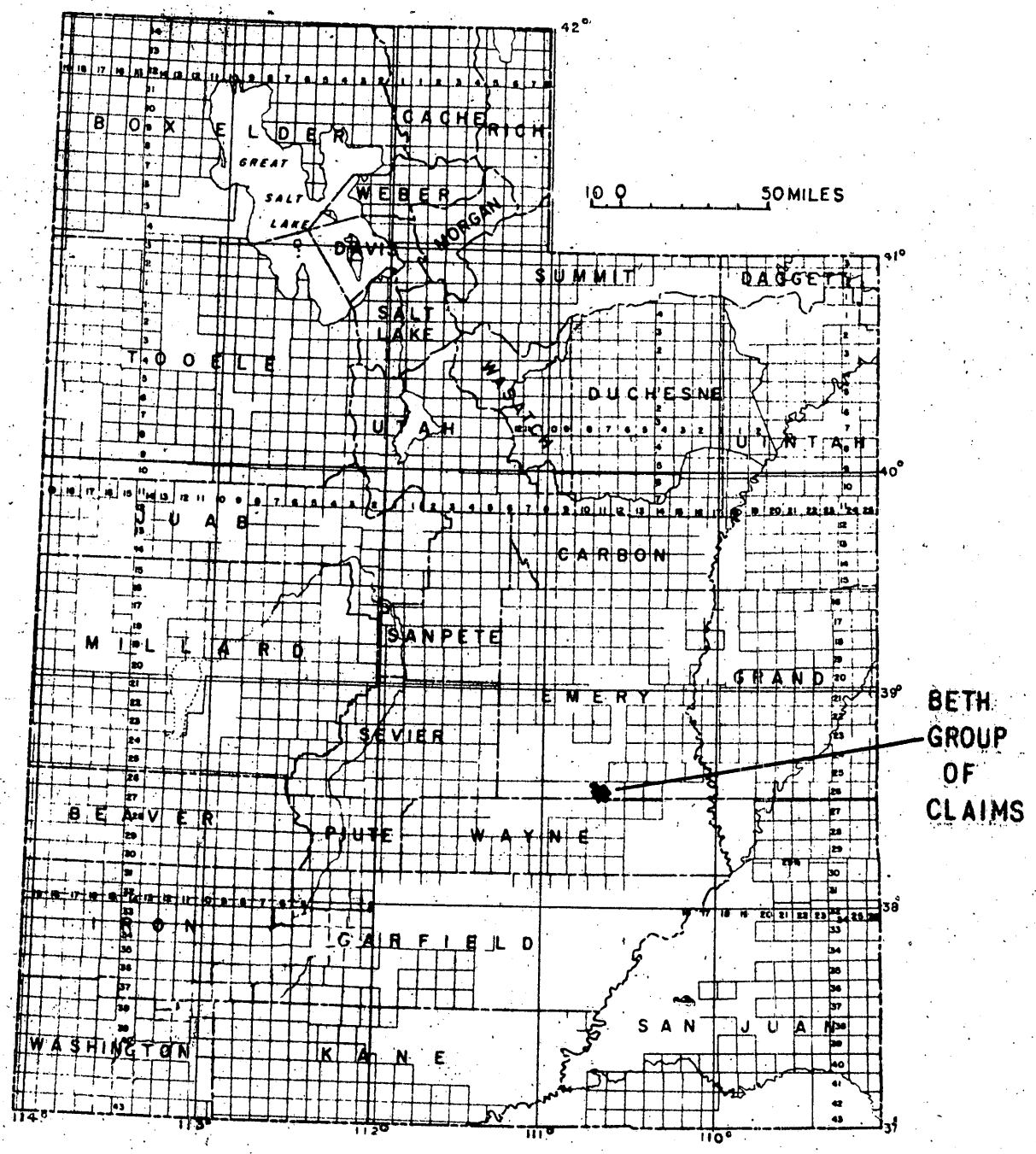


Figure 1. INDEX MAP OF UTAH SHOWING LOCATION OF BETH GROUP OF CLAIMS, KIRBY C. CORYELL PROPERTY, EMERY COUNTY, UTAH

12/23/55 glu

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
DEC 22 1955

December 19, 1955

224 New Customhouse
Denver 2, Colorado

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Acting Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA 3897 (Uranium), Kirby C. Coryell, Beth claims, Emery County, Utah, Comments on Mr. Coryell's letter to DMEA officials in Washington dated November 11, 1955.

Enclosed are two copies each of the following:

1. Memorandum from J. William Hasler dated December 9, 1955

2. Memorandum from R. C. Robeck to J. William Hasler dated November 30, 1955

3. Memorandum from H. S. Johnson to J. William Hasler.

4. Memorandum from H. B. Dyer to J. William Hasler.

These memoranda have reference to the letter sent to the Defense Minerals Exploration Administration November 11, 1955 by Kirby C. Coryell and may be of some assistance to you in replying to Mr. Coryell's letter.

The field has recommended that this application be denied without prejudice.

E. N. Harshman

E. N. Harshman

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey
Colorado Plateau District
P. O. Box 360
Grand Junction, Colorado

MINERAL DEPOSITS
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DEC 12 1955
U. S.
GEOLOGICAL SURVEY
DENVER, COLORADO

December 9, 1955

Memorandum

RECEIVED
DEC 28 1955

To: Executive Officer, DMEA Field Team, Region III

Through: E. N. Harshman

From: J. William Hasler

Subject: DMEA docket 3897 (Uranium) Kirby C. Coryell, Beth claims, Emery County, Utah.

During the course of the examination of the Beth group of claims and the subsequent preparation of the geologic report by H. F. Albee, ~~the applicant was contacted relative to the type of~~ exploration that would be advisable on his large group of claims. The applicant was very persistent in wanting to know the status of his application; consequently, we advised him that the Defense Minerals Exploration Administration would probably not approve the work as he outlined in his application because of its prospective nature. The applicant and members of the Survey at Grand Junction discussed the applicant's property with him and its various facets relative to the geology involved and the type and kind of exploration necessary. Some two weeks after the discussions with Messrs. Albee, Robeck, and myself, the applicant submitted a letter to the DMEA in Washington, stating, in detail, his theories and postulations justifying a DMEA loan. In this letter he has, more or less, taken issue with some of Mr. Robeck's statements, as well as our view relative to his property. It was felt advisable, therefore, to ask for comments from various Survey geologists familiar with the area. Enclosed are copy of Mr. Coryell's letter and the comments by H. Dyer, Ray Robeck, and H. S. Johnson.

Although we appreciate Mr. Coryell's feelings regarding his property, we are still of the opinion that Mr. Albee's appraisal of the proposed program is sound. This material should accompany the applicant's report.

J. William Hasler
J. William Hasler,
Geologist

JWH/vll

Enclosures

COPY

November 30, 1955

MINERAL DEPOSITS
DMEA
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DEC 12 1955
U. S.
GEOLOGICAL SURVEY
DENVER, COLORADO

Memorandum

RECEIVED
DEC 22 1955

To: J. W. Hasler

From: R. C. Robeck

Subject: K. C. Coryell - letter to DMEA - November 16, 1955

Mr. Coryell's letter is written in such a tone and time that it hardly deserves comment. I believe Mr. Albee was correct in denying the application. If at some future time the applicant furnishes additional information gained from exploration then the case may be re-examined.

Mr. Coryell misquoted me so badly, particularly in regards to Monitor Butte streams, that there is no rebuttal necessary. The fact that he misquoted me indicates his lack of knowledge on the subject.

COPY

C O P Y

MINERAL DEPOSITS
DATA
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DEC 29 1955
U.S. GEOLOGICAL SURVEY
DENVER, COLORADO

November

Memorandum

To: J. W. Hasler

From: H. B. Dyer

Subject: Letter dated Nov. 16 1955 from Kirby C. Coryell in support of his application for DMEA assistance.

I differ with a number of Mr. Coryell's statements, and interpretations. I will list these differences in the order of occurrence in Mr. Coryell's letter.

Number 1 page 3 first paragraph following the questions and answers. Mr. Coryell is incorrect in the statement that "This Delta Channel sand is as thick at outcrop No. 1 as it is at Number 2, the Delta mine." As I remember this sand it is much thinner at its outcrop to the southwest than it is at the Delta mine. Thus, the available evidence indicates that the sand is pinching out in the direction of the applicants property. The sand is known to pinch out towards the Northeast. I can see no reason to assume the Southwest end is any different.

On page 4, Mr. Coryell attempts to establish a relationship between the dikes and ore deposits. This relationship seems extremely tenuous to me since dikes are not known to outcrop within one mile of commercial ore bodies in the Swell. To my knowledge dikes are absent or rare in the Uravan mineral Belt. They are absent in the White Canyon Big Indian Wash and San Rafael river districts. The Moenkopi formation underlying the Delta mine is not visibly altered along the projection of the dike.

Page 6 paragraph 5. I walked the dike in question after the exploration described had been done. I do not have assays yet but the radiometric data indicates that values might be on the order of .01% to .001% U_3O_8.

Page 6 paragraph 6. I would like to see this dike. It has not produced when I last checked the production records.

Page 7. paragraph 1. As a matter of fact the exposed Moss Back channels do not contain mineralization comparable to the Delta deposit.

C O P Y

MINERAL DEPOSITS
DMEA
RECEIVED
DEC 12 1955
GEOLOGICAL SURVEY
GRAND JUNCTION, COLORADO

C O P Y

November

Memorandum

To: J. W. Hasler

From: H. S. Johnson

Subject: DMEA 3897, Kirby C. Coryell, Beth claims, Emery County, Utah. Comments on Mr. Coryell's letter of November 11, 1955 to DMEA officials in Washington.

Because my present project, "Regional Synthesis", involves the attempt to isolate and understand major and minor ore controls on the Colorado Plateau and to determine ground favorable for significant uranium deposits, I am interested in Coryell's proposal to explore previously untested ground in the southern part of the San Rafael district. Practically all rim exposures of the known ore-bearing units on the Plateau have been well prospected by now, and large new ore deposits will probably be found only by physical exploration in areas where the ore-bearing unit does not outcrop. However, exploration by drilling or drifting can be very expensive (especially where the potentially ore-bearing unit is at considerable depth) and if carried on in a random fashion may not pay off at all. There is certainly no percentage in expending $2,000,000 to find a deposit which will net only $1,000,000 after deduction of mining costs. Therefore, exploration costs must be kept at a minimum by applying all the geologic knowledge possible, and the economic factors of expected deposit size versus cost of exploration must be kept constantly in mind.

I have read Howard Albee's report on Mr. Coryell's proposed program of exploration on the Beth claims, and I concur with Albee's recommendations. I have also read with interest Coryell's letter of November 11, 1955 in which he takes Ray Robeck and other Survey geologists to task for not recognizing the importance of faults, igneous dikes, and tectonic structures in the localization of sandstone type uranium deposits on the Colorado Plateau and especially on the Beth claims. In his ten page single spaced letter, Coryell makes many statements about the geology and controls of Plateau uranium deposits which I consider unwarrentable. Rather than go over the letter sentence by sentence I will content myself with a few general comments.

The first two pages of Coryell's letter indicates to me that he has a clear understanding of the reasons why Survey geologists in Grand Junction are not especially enthusiastic about his proposed exploration of the Beth claims. Briefly some of these reasons are (1) the Delta sandstone lens is not thought to be as continuous as Coryell's interpretation of it, (2) the Moss Back channel at the Rocky Mountain mine is thought to trend NW-SE rather than southwesterly, (3) there is no direct evidence that faults, igneous dikes, or folds have exerted any control on the localization of sandstone type uranium deposits on the Plateau, and (4) the depth to the ore-bearing unit on the Beth claims is such as to prohibit exploration for anything but a large continuous orebody, the presence of which on these claims is entirely speculative so far.

Coryell concedes points (1) and (2) of the foregoing sentence on page 2 of his letter of November 11. The gist of his ten pages of argument then is, as well as I can make out by brief examination, that Robeck and other Survey geologists have completely ignored the relationships between ore deposits and faults, dikes, and folds. This is of course not true. We have given a lot of thought to such structures on the Plateau and would be very happy to be able to recognize and make use of such relationships if we could. If we do not place much importance upon faults, dikes, and folds as determinants of favorable ground, it is because the preponderance of evidence to date suggests to many of us that stratigraphic and lithologic features are considerably more important.

On page 4 of his letter Coryell discussed faults and dikes and their apparent spatial relationship to ore deposits. He says, "This obvious relationship of deep-seated structure to all significant mineralization proves a hydrothermal origin to a mining geologist, as they provide access for deep-seated solutions." I do not believe the evidence backs up Mr. Coryell. That the dikes in the southern San Rafael Swell occupy faults or fractures and come from great depths is obvious. That they are related genetically to the ore solutions and that faults control localization of ore are concepts that are as yet unproven. No dikes cut known ore deposits in the San Rafael district to my knowledge. There are many faults around to be sure and some of them cut orebodies (e.g. at Temple Mountain and Tomsich Mountain). In every instance where I have observed faults cutting orebodies in the San Rafael Swell and the rest of the Plateau the orebodies are displaced by the fault and my interpretation is that the faults are post-ore. (Secondary uranium minerals do occur along faults and fractures but not the primary deposits.) Mine mapping by AEC geologists (Keyes) in the Delta mine in the San Rafael Swell indicates to me that the orebody follows favorable lithologies along the trend of the channel and is not affected by cross-cutting joints and fractures. This has been my observation everywhere on the Plateau. Therefore, I do not feel that the presence of faults or dikes on the Beth claims makes the ground favorable.

On page 5 of his letter Mr. Coryell mentions the presence of diabase dikes in the Grants district and specifically in the Jack Pile mine and implies that they are related to the ore. I have observed the dike at the Jack Pile and am of the opinion that it is post-ore.

On page 6 of his letter Mr. Coryell says that diabase dikes in the southern San Rafael district are all staked. These dikes have been checked for radioactivity by AEC and Survey geologists as early as 1951 and several times since then. They were in every case found to be slightly more radioactive than the barren sedimentary rocks they cut but not anomalously radioactive for basic igneous rocks. The fact that they are covered by claims means nothing. I know of hundreds if not thousands of claims blanketing the Mancos shale near Crescent Junction, Utah.

C O P Y

The existence of these claims does not improve my opinion of that ground. In fact I would estimate that 90 percent or more of the claims on the Plateau are worthless. As to Coryell's statement that one of the dikes in the San Rafael district contains an appreciable tonnage of ore-grade material, I can only say I have not heard of this and have seen no record of production from such a deposit.

In the last three paragraphs of his letter Mr. Coryell says (1) the geology is all in favor of their being large ore deposits on his claims and (2) a limited drilling program would have a very good chance of finding these orebodies. I disagree with both these ideas. I don't consider the faults and dikes to have any bearing on the favorability of the ground, and I think the drilling program proposed by Mr. Coryell to be too limited to stand a good chance of finding the projected Delta or Rocky Mountain channels, much less explore them. At any rate it seems to me that it is prospecting rather than exploration to put down a few holes in the attempt to intersect a channel or sandstone lens the nearest point of control on which is about 2 miles away. It would be far better to test some of the intervening ground first and try to follow the channel from the known into the unknown.

In summary, I disagree with Coryell's ideas that faults and dikes indicate favorable ground, and I concur with Albee's recommendations. If Coryell should do enough exploration on his own to show the presence of ore or favorable host rocks on his claims, the project could be reconsidered.

FILE COPY
Surname:
700
Murphy

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

NOV 23 1955

Mr. Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

Re: Docket No. DMEA-3897 (Uranium)
Beth claims
Emery County, Utah

Dear Mr. Coryell:

This is to acknowledge your letter, dated November 16, and the attached geologic report, dated November 11, 1955, in which you present the merits of your proposed project to explore the Beth claims.

Our letter to you of October 19, advised that we expected to receive the Field Team's report and recommendation relating to your application about November 2. However, we have recently been advised that this report will not be forwarded until you have an opportunity to talk with Mr. Hasler.

In the meantime, your above-mentioned report is being reviewed here in Washington.

Sincerely yours,

SIGNED

Ernest Wm. Ellis, Chief
Rare and Miscellaneous
Metals Division

FMMurphy/izm
11-22-55
cc to: Admr.'s Reading File
Operating Committee
Docket
Code 700
Mr. Murphy
DMEA Field Team, Region III (2)
Messrs. JECrawford, Rm. 3641
THKiilsgaard, Rm. 5224
JOHosted, Rm. 3210, GSA

11-17-55 [illegible]

RECEIVED
NOV 17 1955

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado
November 16, 1955

Defense Minerals Exploration Administration
Washington 25, D. C.

Gentlemen:

I wanted to discuss the accompanying letter with Mr. Albee and Mr. Hasler before sending it to you. Today I was informed they both were in New Mexico and would not be back until next week. As it seems most desirable that it reach you while my loan application is still in process, I think it best to send it to you now. Mr. Hasler will receive a copy when he returns.

Very truly yours,

Kirby C. Coryell
Kirby C. Coryell

KCC/mlj
encl.

11-17-55 [illegible]

RECEIVED
NOV 17 1955

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado
November 11, 1955

Defense Minerals Exploration Administration
Washington 25, D. C.

Re: Docket No. DMEA 3897 (Uranium)
Beth Claims
Emery County, Utah

Gentlemen:

About three weeks ago the opportunity became available to include into my exploration project the 86 claims partially bordering the Beth group on the northeast. This group is outlined in green on the enclosed map. I contacted Mr. Albee, the USGS geologist who made the field examination of my group, to get his opinion of the advisibility and possibility of doing so. Mr. Albee apprised me the recommendation for my application would be "denial without prejudice" and the inclusion of the additional ground was not discussed further, as it obviously would not improve the merits of an exploration program according to the reasons given for denial of my application. These reasons were that the Delta channel (outcrops 1 and 2 on the map) was one of the Monitor Butte sands that habitually pinch out along their trend, and cannot be projected any great distance, and that outcrops 3 and 4 and the Rocky Mountain channel all were Mossback channels that trended northwest. Mr. Albee kindly arranged for me to talk with Mr. Ray Robeck, heading the mapping program in the San Rafael Swell for the USGS, so that Mr. Robeck could present the results of his detailed investigations in the area. I greatly appreciate Mr. Albee's informing me of the field team's recommendation, and the opportunity to discuss the relevant geologic features of the area with him and Mr. Robeck. In addition to substantiating the general interpretations already given me by Mr. Albee, Mr. Robeck stated the following:

The Delta channel (Monitor Butte sand) pinched out several thousand feet to the northeast(revealed by a long drift in the Delta Mine). The course of the channel, however, is substantially as shown on the map. There was no more liklihood of another (or the same) Monitor Butte sand lens being found at any appreciable distance along the projection of the course of this channel (beyond its known extent from pinch out in the Delta Mine to outcrop #1) than there was in any other direction, due to the lenticular nature of these sands and the total lack of pattern of those known to exist. This particular lens, extending the appreciable distance noted, is by far the largest Monitor Butte sand lens known in the swell. In this part of the swell all Monitor Butte streams flowed northeast.

Mossback stream direction was northwest, and the individual scours (nos. 3 and 4 and the Rocky Mt. one) were formed by streams flowing in that direction. However, the individual scours have no

continuity along the courses of the streams--they are cup-shaped scours extending below the base of the rest of the Mossback with no evidence that any one stream formed two of these scours. They have a completely haphazard pattern without mild scouring between. In plan view, they extend below the general base of the Mossback in about 20% of the area in this vicinity and are deeper and with larger lateral dimensions than elsewhere in the swell. He further stated neither faulting nor folding to have any relationship to mineralization within the swell. All mineralization is very close to a fault, but all barren areas are equally close due to the abundance of faulting. The diabase dikes show no relationship to mineralization; they show only the higher background that would be expected of the igneous material.

Mr. Robeck ascribed the mineralization in the Delta Mine to the contact of the Monitor Butte channel with the Mossback scour northeast of the Delta Mine; that solutions migrating along the base of the Mossback drained down into the Monitor Butte channel and were trapped there. He stated he would not expect other large ore bodies to exist in the southwestern end of the swell except in a Monitor Butte sand with a nearby scour into it by a Mossback channel.

Such were Mr. Robeck's statements of facts and of interpretations stated as facts. Even though the DMEA geologists no doubt tried to segregate Mr. Robeck's information according to fact or interpretation, it is so intermingled, and almost all of it apparently damaging to the merits of my ground, that the chances of loan approval by the field team would be bound to be nil. I believe most of Mr. Robeck's interpretations as stated to me and as he must have stated them to the DMEA geologists seeking his information, to be wholly incorrect. I have not been out to re-examine the area, and will concede that he probably is correct in directions of stream flow during Monitor Butte and Mossback time, and that outcrops 3 and 4 on the map are Mossback scours and are not in part extensions of the Delta channel. However, I would like here to present information indicating him incorrect on other features which most vitally influence feasibility of exploration on my ground.

Several days after talking with Mr. Robeck, I telephoned him and asked a number of questions that troubled me about his interpretations. His answers cleared up a number of matters bothering me, but one series of questions and answers revealed a very important previous statement of his to have the opposite influence on feasibility of exploration than that understood a few days before. While I cannot quote the conversation verbatum, the following questions and answers do not distort the meaning in any way as I understood it at the time.

Q. Does the Monitor Butte take in all the material, which of course is mostly mudstone, between the Shinarump and Mossback?
A. Yes.

Q. Is the Monitor Butte entirely of fluviatile origin?
A. Yes, I would say so.
Q. Are the few sand lenses found in the Monitor Butte due to local features, such as local steepening of gradients?
A. No. They are due to a stream in flood.
Q. Then this particular stream should have deposited sand for the extent of its course, or for very great distances of its course, while in flood?
A. Yes.
Q. What accounts for the lenticular nature of the sands at present? It must be erosion by later streams?
A. Yes, the scouring of later streams.
Q. Then if all these remnant lenses of sands of streams in flood were exposed to view in plan, a pattern should be expected to develop showing others to exist along the trend of a known one?
A. Yes. But far too few of these sands are exposed to view at present to indicate any pattern.
To which I'd like to add now that even with abundant outcrops of Monitor sands, the expected pattern would be revealed only if one of the streams depositing sand happened to parallel a long Chinle exposure with a number of re-entrants. This Delta channel sand is as thick at outcrop number 1 as it is at number 2, the Delta Mine. Its pinch-out to the northeast must be due to the scouring of a Mossback channel, as Mr. Robeck attributes the mineralization to such a feature. It seems unlikely that the sand carried by this powerfully scouring stream in flood could have been scoured out and replaced by mud of later Monitor Butte streams. Mr. Robeck may think this possible based on observation of other Monitor Butte sands, which was not discussed, but he states this particular channel to be much longer as exposed by outcrops and underground workings, and much wider and thicker than any other Monitor Butte sand in the region, and I think he inferred the entire swell. In fact he described other Monitor Butte sands as having little resemblance in form and size with this one. A stream scouring so deeply as this one would hardly be vulnerable to removal by sluggish mud-carrying later streams depositing the same series of sediments without interruption, particularly since this sand record of this stream in flood must have been deposited many feet below its bed before flood, and it must have been covered by many feet of mud during the first few days after flood.The scouring out and removal of sand would have to be done by much later Mossback streams, according to Robeck flowing at right angles across the stream direction of Monitor Butte deposition. Then this reason for fear of non-continuity of the sand of the Delta channel is in itself the environment attributed by Robeck as being responsible for the large ore body in this channel, and in fact he stated none similar would be found unless this same environment were found again. This fear of non-continuity is the only geologic reason given me by anyone as to why the proposed exploration of this channel was not feasible, and according to Robeck's theories it would be every reason to explore along the projection of the channel. Also, there should be no fear that the sand of this channel may be lenticular as deposited, as there probably is little variation in thickness for its exposed extent, and since direction of flow was to the

northeast, a stream flowing across a flood plain could not have had a lesser gradient upstream (to the southwest). My theories regarding the mineralization of this channel are quite the opposite of Robeck's, yet the feasibility of exploration of the channel is not adversely affected by the only sensible interpretation of its continuity. Mr. Robeck states the Mossback to scour below its average 40 foot thickness in about 20% of its areal extent in this region. A somewhat lesser percentage would scour sufficiently to destroy a part of this channel and one such scour would destroy only to the extent of the width of that scour. I believe either material at the same horizon may be as good a host as the other in the same structural environment. So far as I know, all the rest of the marketable mineralization in the swell is in the Mossback.

With regard to Mr. Robeck's statements on lack of relevance of structure to mineralization in the swell, I would like to present data showing the opposite belief to be more plausible. Mr. Robeck may be correct in stating that faults in the swell are equally close to all barren areas as they are to all mineralization. However, if one classifies the faults according to liklihood of persistence to great depth, quite the opposite conclusion is obvious. All mineralization of any consequence in the swell known to me is very close spatially (on the scale of a few hundred yards, usually much closer) to such faults so defined by a filling of diabase or width and great strike length of the broken zone. While I'm not particularly familiar with the northern part of the swell, the Temple Mountain and Tomsich Mountain deposits are exceptionally close to major fault zones, and a diabase dike projects into the Delta workings, and these three must account for about 95% of the shipped and blocked out ore of the entire San Rafael Swell. The exposed intersections of these zones with the ore horizon are very few too. This obvious relationship of deep-seated structure to all significant mineralization proves a hydrothermal origin to a mining geologist, as they provide access for deep-seated solutions. Indeed, the lack of relationship of mineralization with the abundant small faults is equal proof, as they would provide equal access to the ore horizon for downward percolating waters that had accumulated their metal content in strata above. While the classification of faults according to access to great depths may seem a simplification for convenience to prove a point, it is as sensible and applicable to the problems of ore deposition for the purposes of a structural or mining geologist as a division between conglomerate and shale is for the purposes of a stratigrapher.

From Mr. Albee, I received the impression that my faith in relevance of the structural zones on my property was a matter of opinion which really could not justify DMEA participation in their exploration. Mr. Hasler gave me the impression that drilling in those parts of the claims not thought to contain the Delta channel would have to be designed to explore another channel known to contain mineralization that would justify the expensive exploration these drilling depths require. I would like to bring to your attention facts indicating these views to be short-sighted, although I realize they were put forth under an environment dominated by Robeck's interpretations.

While it is opinion that structure is very important, the belief that it is not important also is opinion, and I'm sure Mr. Albee didn't mean otherwise by his statement. However, there is little doubt that any structural or mining geologist would consider Mr. Robeck's conclusions about structure without foundation, and attach great importance to it in this region. To my knowledge no well-informed geologist depreciates the fundamental relevance of stratigraphic features with this type of mineralization; rather many believe additional features are of equal importance in many instances, and that it usually takes both to accomplish the very special phenomenon of the very large ore bodies. These would be very abundant if due only to a special stratigraphic environment; the structural and mining geologists are aware of structural features of both regional and detail scale that from an empirical standpoint in many districts are as effective in controlling the mineralization as the stratigraphic features. The stratigraphic criteria are empirical too, and thus also of greater reliability than if formed by theory alone. To the structural geologists structure nearly always is the means of access of solutions to the favorable host, and in many instances other structure in the sense of folding or doming of the ore horizon provides a trap for gases or an unknown physical-chemical environment that effects precipitation of the uranium from solution. In other areas we recognize the precipitating agents to be syn-genetic and to have no relationship to structure. It probably generally is believed by most that structural and stratigraphic features have varying degrees of influence on the precise sites and degrees of mineralization in various districts, and according to principles we are beginning to understand. I would like to point out in greater detail than in my application the reasons for believing the fractures partially filled with diabase to be of tremendous importance to the formation of large ore bodies in this district. Some evidence is factual details, some regional structure, and some in the nature of theoretical considerations; however, their aggregate should afford considerable credence to these structures.

1. A close probable relationship between diabasic intrusions and the largest uranium deposits in pre-Cambrian terrain has been recognized for years. New discoveries in similar terrain have strengthened this conviction of association, believed to be structural.
2. Diabasic dikes are abundant in the Grants District, and in fact the material is exposed in the Jack Pile Mine.
3. A diabase dike may be projected a short distance directly into the mineralized zone of the Monument #2 Mine.
4. The diabase dike labeled "B" on the geologic map projects into the Delta Mine. It has been traced on the ground as far as indicated by the red line. The mineralized part of the Delta Mine is cut by joints of similar attitude. Within the ore body, the values are strikingly more consistent for the vertical extent of the sand than for the same distance laterally. This is my impression from an assay map I once saw and from talking with the former supervisor of the operation when exploratory headings were being driven. The site of this ore body constitutes the only exposed intersection of a diabase dike or its projection with a

channel (in the sense of a Monitor Butte Sand or a prominent Mossback scour) in this region.
5. The intersection of a diabase dike and the Mossback has been explored at only one place in the area to my knowledge. That was done by Ryan Oil Company a few miles northwest of the Delta Mine. This dike is essentially parallel to the one projecting into the Delta Mine. It was explored partially by drifting but mostly by drilling back to where the intersection passed beneath the Wingate cliff. According to the man supervising this exploration, uranium mineralization was found on both sides of the dike, generally getting weaker away from the dike. While sub-commercial, much of it was on the order of 0.08 U_3O_8 for an eight foot thickness. The Mossback does not form a prominent scour here, and the mineralization is many feet above its base. A sample of the altered dike material assayed 0.05 U_3O_8, and a number of others have assayed a few hundredths. It seems most likely that the uraniferous solutions were introduced through the fracture containing the dike.
6. Diabase dikes abound throughout the three or four hundred square miles to the west and northwest of the claims. I know of none that are not staked, even though the depths to the ore horizon vary from 1400 feet to about 2400 feet. The range of composition of diabasic material all would be of the sort that should exhibit relatively low radioactivity for an igneous rock, because of low potassium and lack of accessory minerals of uranium and thorium. It seems likely that many of these were staked because of spotty anomalous radioactivity introduced by solutions. I am reliably informed that one highly altered dike about twenty miles northwest of the claims comprises an appreciable tonnage of 0.20 material.
7. Fractures of this same set outside the swell reportedly contain autunite, however this is merely rumor.
8. The diabasic material of these dikes megascopically is dissimilar to the diabase intrusions of areas of the thick plateau-type basalts. If actually greatly different chemically, as appearances suggest, a close relationship of this much more rare type of diabasic material with uranium mineralization would seem plausible.
9. The dikes are numerous throughout the area to the west and north, but are confined almost entirely to one set of fractures. These fractures must be tensional in origin, allowing easy passage of solutions, and they of course must have access to extreme depths as demonstrated by the nature of their filling.

Probably the most generally accepted essential feature required of a potential Chinle host on the plateau, whether it be Shinarump, Monitor Butte, or Mossback, is proximity to the Moenkopi contact. Perhaps next most important is marked variations in thicknesses of the host in short lateral distances. According to Robeck, in this corner of the swell, the Mossback scours more deeply than anywhere else, in several instances considerably down into the Moenkopi. Great variations in its thickness in short distances also is striking here in contrast to the rest of the swell. It is absent just north of the Delta Mine, is no more than ten feet thick in other places, yet the larger scours probably present a section in excess of 100 feet. Since the rest of the known important mineralization in the swell is in this unit, and here it displays the two most important features to a much greater degree than

than elsewhere, is it not feasible to consider its exploration here even though the one known large ore body has been emplaced in another unit? It should be obvious that lack of abundant solutions rich in uranium, whatever their origin, has been more effective in limiting large scale mineralization than lack of a suitable host. Such solutions are known to have existed in this area, and there is no reason to think the deep Mossback scours may not contain mineralization comparable to the Delta deposit. True, drilling was done in such scours northeast of the Delta Mine, apparently without encouragement, but there is no structural reason to believe these scours might be mineralized.

It is understood that DMEA requires a specific target to participate in exploration; that such a target generally constitutes the drilling of a channel known or thought by good evidence to contain mineralization commensurate with the costs of exploration. In this type of exploration, an appreciable percentage of the holes miss the channel and the rest probe the channel to try to find the chemical, structural, or unknown environment that localized mineralization. Is it not equally or even more feasible to drill wide-spaced holes along structure almost surely responsible for the localization of mineralization when 20% of those holes also will encounter stratigraphic favorability? In areas such as this, where the structural features thought to be so important may be discerned at the surface, and where the areal percentage of scouring of the ore horizon may be predicted with some confidence, it would seem that a much greater percentage of the holes would encounter optimum environment than by the other method, which is in fact, the specific target for any type of exploration. Also, if Mr. Robeck is correct in his opinion of non-persistence of the Mossback scours, then the usual method would not be applicable at all in this area.

It is realized that one would have to have considerable faith in the importance of these structures in this district in order to recommend the type of exploration I suggest. I believe very few mining or structural geologists with considerable field experience on and off the plateau would depreciate the probable importance I have given them. Since it is their field of specialization, shouldn't their views be given more weight than that of those specializing in stratigraphy? The application of structural geology to ore deposits is no less complex than the intricacies of the science of stratigraphy, and to place greater confidence in the abilities of structural and mining geologists in matters of stratigraphic nature is no less absurd than to rely on the views of stratigraphers rather than structural geologists in deciding the relevance of structural conditions to these ore deposits. Their structural beliefs are founded on evidence no more tenuous to them, than the stratigraphic criteria built up by the stratigraphers are to him, and the structural geologists convictions have been strengthened by successful application of their ideas too.

In talking with Mr. Albee, he said he thought the depths of the proposed drilling would average about 1,000 feet. In my application, I estimated it to be 850 to 900 feet, which I thought erred on the high side, to try to assure an adequate footage allowance. Detailed study of the photogeologic and topographic maps since talking with Mr. Albee convinced me my estimates were high rather than low. Investigations of other sources have provided conclusive proof that the drilling depths would average about 800 feet, and that in drilling of the fence of holes for the Delta channel, depths would not be greater than 750 feet. I'd like to present this evidence here:

Chinle Formation: Mr. Marvin Kay, general manager of Climax Uranium, showed me sections of their drilling in this area. From the bottom of the Wingate to the Moenkopi is 250 feet in the area of outcrop 3 on the map.

Wingate: Charles Hunt on page 58 of his report on the Henry Mountains presents a detailed section of the Wingate and Kayenta in the region of outcrops 1 and 2. His Wingate is 300 feet. The manager of uranium exploration for N. B. Hunt company showed me a log of one of their holes drilled about two miles to the east. The interval from the base of the Kayenta to the Moenkopi was 585 feet. This is in close agreement with Climax and Charles Hunt.

Kayenta: Charles Hunt's Kayenta in this area is 322 feet, in contrast to the 125 feet I estimated. However, 192 feet of his Kayenta I took to be Navajo, so what I estimated to be 125 he measured as 130. I stated the proposed drilling to be on a basal Navajo bench. To him, this drilling would be collared in the middle and upper parts of the Kayenta. The geologic map shows the two who made these maps to have been somewhat similarly confused.

Calling the thick-bedded light gray sandstones Navajo rather than Kayenta, of which the average hole would traverse about 100 feet, the drilling depths would be:

Navajo	100
Kayenta	130
Wingate	300
Chinle	250
	780 feet

The two engineers who own the claims bordered in green measured the interval from the Navajo bench to the Moenkopi where exposed at the re-entrant south of the Rocky Mountain Mine by taking a vertical angle from several miles away. I do not remember their exact figure, except that it was a little over 700 feet, which is in close agreement with the other reliable data.

Mr. Albee's data was taken from sections measured some miles away and would suggest the depths to be appreciably in excess of the 1,000 feet he estimated. Their obvious exaggeration of the section here apparently caused him to scale them down some, but not nearly enough.

My impressions of the geologic features that DMEA may use in evaluation of ground, and the economic aspects of cost of exploration and probable target size, have been gained from a speech Mr. Mittendorf made before Colorado Plateau uranium operators last May 7. While it is realized policy may have changed since that time, I would like to quote that part of his talk stating policy regarding the above matters, as given in a local magazine, as I believe this ground merits DMEA participation unless policy has changed radically.

"To be sure, ore which is visible and can be sampled is a very valuable guide, (as to whether there are indications suggesting the possible presence of a deposit) but other geologic factors come into play which may or may not justify Government participation in further exploration. In your business, especially in view of the trend toward deeper exploration, other guides must be employed.

These include geologic factors such as structural conditions, favorable host rocks and environment--projected trends of known channels, geophysical anomalies, etc., which, by inference, could justify DMEA's participation in the cost of the exploration project provided there is reason to believe that the size of the potential target is commensurate with the cost of the exploration work.

Quite naturally, neither DMEA nor private industry cares to spend $100,000 looking for a $10,000 target, but DMEA would match your dollar with three of its own if it appeared that, say, a quarter-million- dollar project might disclose a major deposit."

Surely the drilling of a fence of holes to locate the extension of the Delta channel should meet these requirements. Ten holes should provide an adequate fence, and of course it may be found with less. Its course for four or five thousand feet is known, and is fairly straight. Even if there were only a 50 % chance that it would be located by ten holes, shouldn't it be worth that risk since in this area it would seem to have great chance of containing a very large ore body by both of the two theories? When found, shouldn't it merit additional exploration?

Of course I also believe the areas of dikes and the three projections of dikes down through the claims bordered in green to merit exploration. While the importance of structure is a major factor in evaluating the feasibility of this exploration, Mr. Mittendorf was speaking of plateau type mineralization and gave structural conditions primary importance as one of the features used by DMEA in evaluating ground. Structure is as important here as anywhere on the plateau, and more obviously important than in almost any other area. Assuming Mr. Robeck's Mossback channeling interpretations correct, holes need not be spaced closer than at several thousand foot intervals along these zones as they somewhat parallel the long dimensions of the scours. A dozen holes, all in favorable structure, should intersect several scours. A few more holes in the areas with both types of favorability should reveal large ore bodies if they exist, and certainly available evidence that they would have been emplaced in such an

environment in an area known to contain large amounts of uraniferous solutions should be enough to warrant the expense of this limited exploration. Is there not a specific target when all wide-spaced holes will explore one of the two features believed responsible for large scale mineralization in this area, and two or three of them will explore both features, and almost all additional holes can be placed in the optimum environment of both these features?

I would greatly appreciate a re-evaluation of the merits of my ground, and the claims to the east bordered in green, if their inclusion is possible, and a review of the suitability of DMEA participation in their exploration. I do not condemn Mr. Robeck, but I wish he had thought more deeply regarding the persistence of the Delta channel before expressing as fact the complete futility of exploration for it along its trend, when according to all data accumulated by him and his own theories of mineralization such exploration is in fact the plum he says he has been looking for in this region. I realize his other interpretations of structural features and mineralization would be shared by many stratigraphers, and I hope he realizes that no structural or mining geologist would agree with him.

Very truly yours,

Kirby C. Coryell

Kirby C. Coryell

KCC/mlj

10/28/55 gh

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
OCT 27 1955

October 24, 1955

224 New Customhouse
Denver 2, Colorado

Memorandum

To: Chairman of the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region III

Subject: DMEA Docket 3897 (Uranium), Kirby C. Coryell, Beth claims, Emery County, Utah

Mr. Kirby C. Coryell telephoned Hasler and asked him to defer his Report of Examination on the subject property pending receipt of additional information from the applicant.

In view of the applicant's request, our teletype to you dated October 18, 1955 stating the Reports of Examination would be forwarded to you about November 2, 1955 should be disregarded.

W. M. Traver

W. M. Traver

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

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Surname copy

Murphy 700

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

OCT 19 1955

Mr. Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

Re: Docket No. DMEA-3897 (Uranium)
Beth claims
Emery County, Utah

Dear Mr. Coryell:

This is in response to your letter of October 10, regarding the status of the above-docketed application.

The Executive Officer, DMEA Field Team, Region III, has advised us that its report of examination and recommendation in regard to the Beth claims will be forwarded to Washington about November 2, 1955.

Until this information is received and reviewed by our mining engineers and geologists here, we can not state whether all or part of your proposed exploration program will be approved and a contract recommended. We will endeavor to keep this finalization period as brief as possible.

Sincerely yours,

Frank E. Johnson

Acting Administrator

FMMurphy/gla
10-19-55
cc to: Admr.'s Reading File
Docket
Messrs. JECrawford, Rm. 3641
THKiilsgaard, Rm. 5224
JOHosted, Rm. 3210, GSA
Code 700, Mr. Murphy
DMEA Field Team, Region III (2)

R.C.L.

Chairman Operating Committee DMEA 10/18/55

DN 235 BUR MINES 1018 10-18-55 3-17

CHAIRMAN, OPERATING COMMITTEE, DMEA

REURTEL DOCKET 3897, KIRBY CORYELL. APPROVAL INDICATED. REPORTS TO YOU ABOUT NOVEMBER 2.

W M TRAVER

RECEIVED
OCT 19 1955

Denver, Color

Surname copy 700

FMMurphy
Ellis
Yoder
Kilgaard
Selfridge
Ferguson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

OCT 17 1955

Department of the Interior
DMEA

1[illegible]C1(D1) Revolving Fund, Defense Production Act, Interior (Allocated Working Fund to the Office of the Secy.)

T E L E T Y P E

W. M. TRAVER, EXECUTIVE OFFICER
DMEA FIELD TEAM, REGION III
221 NEW CUSTOMHOUSE BUILDING
DENVER 2, COLORADO

RE DOCKET NO. DMEA-3897, URANIUM, KIRBY C. CORTELL, BETH CLAIMS, EMERY COUNTY, UTAH. PLEASE ADVISE STATUS OF APPLICATION.

George C. Selfridge

GEORGE C. SELFRIDGE, (443)
CHAIRMAN, OPERATING COMMITTEE

FMMurphy/gla
cc to: Admr.'s Reading File
Operating Committee
Docket
Code 700
Mr. Murphy
DMEA Field Team, Region III - Confirmation

R.C.S.

10/13/55 gla

RECEIVED
OCT 12 1955

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado
October 10, 1955

United States Department of Interior
Defense Minerals Exploration Administration
Washington 25, D. C.

Gentlemen:

Your field team examined the Beth claims, San Rafael Swell, Docket Number DMEA 3897, about a month ago. They stated they could give me no indication as to whether the loan would be approved or denied; that I would be notified by you when all offices concerned agreed as to disposition of my application.

The action taken on the loan application will have great bearing on my plans, both with the Beth claims and otherwise. Any indication that you can give me as to whether your action probably will be denial or approval of part or all of the proposed exploration will be very much appreciated.

Very truly yours,

Kirby C. Coryell

Kirby C. Coryell

KCC/mlj

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
AUG - 8 1955

224 New Customhouse
Denver 2, Colorado

August 5, 1955

Memorandum

To: W. H. King (w/brochure)
J. W. Hasler

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-3897 (Uranium), Kirby C. Coryell, Beth claims, Emery County, Utah

Enclosed is the subject application in the amount of $199,515.50 which has been referred to this region for a field examination.

Attached for your information are a copy of a letter from the Chairman of the Operating Committee and memoranda from the Uranium Commodity Committee.

W. M. TRAVER,

W. M. Traver

Enclosures

HMC:pw

cc: Subject
Chron
Sec.Op.Comm. (2)
Harshman

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
AUG 8 1955

224 New Customhouse
Denver 2, Colorado

August 5, 1955

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W. M. TRAVER,

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Enclosures

HMC:pw

cc: Subject
Chron
Sec.Op.Comm. (2)
Harshman

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
AUG - 8 1955

224 New Customhouse
Denver 2, Colorado

August 5, 1955

Memorandum

To: W. H. King (w/brochure)
J. W. Hasler

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-3903 (Uranium), R. M. Matson, et al, La Reina, Pajaro Colorado, and Pajaro Azul claims, Rio Arriba County, New Mexico

Enclosed is the subject application in the amount of $13,460.00 which has been referred to this region for a field examination.

Attached for your information are a copy of a letter from the Chairman of the Operating Committee and memoranda from members of the Uranium Commodity Committee.

W. M. TRAVER,

W. M. Traver

Enclosures

HMC:pw

cc: Subject
Chron
Sec.Op.Comm. (2)
Harshman

Surname 700

Murphy
Ellis
Kirkegaard
Gehon
Martin
Johnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

AUG - 2 1955

Mr. Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

Re: Docket No. DMEA-3897 (Uranium)
Beth claims
Emery County, Utah

Dear Mr. Coryell:

The application for assistance in exploring the subject property in Emery County, Utah, under the captioned docket number, has been reviewed by the Rare and Miscellaneous Metals Division of the Defense Minerals Exploration Administration. It has been referred to the Executive Officer of Region III at the following address:

Mr. W. M. Traver
Executive Officer
DMEA Field Team, Region III
224 New Customhouse Building
Denver 2, Colorado

The Regional Office will contact you in regard to your project if additional information is required.

Sincerely yours,

C. O. Mittendorf

Administrator

F M Murphy:am
7-29-55
cc to: Admr. Reading File
Docket
Code 700
Mr. Murphy
DMEA Field Team, Region III(2)

R.C.S.

700

Surname
Murphy
Ellis
Martin
Hoffman

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

AUG - 2 1955

Mr. W. M. Traver
Executive Officer
DMEA Field Team, Region III
22h New Customhouse Building
Denver 2, Colorado

Re: Docket No. DMEA-3697 (Uranium)
Kirby C. Coryell
Bath claims
Emery County, Utah

Dear Mr. Traver:

The captioned application is referred to Region III Field Team for investigation, a field examination if deemed advisable, and recommendation. A copy of the application was forwarded to your office on July 12, 1955.

Enclosed are copies of memoranda from J. E. Crawford, dated July 19, and W. P. Williams dated July 27, 1955, members of the Uranium Commodity Committee.

You will note that Mr. Williams recommends that the subject application be denied without prejudice. We concur with this recommendation. However, it may be possible that some drilling by the Applicant on his property, or drilling by other individuals just east of the Applicant's property, has been performed since Mr. William's arrival here in Washington. In which case, if favorable structures were found to exist near or on the subject claims, then the proposed project might be warranted. With this thought in mind it was decided to refer this application to the Field Team.

Sincerely yours,

W. S. Martin

ACTING Chairman, Operating Committee (2HB)

Enclosures:

APPROVED:

/s/ Robert W. Geehan (2HB)
Member, Bureau of Mines

Thor H. Kiilsgaard (2HB)
Member, Geological Survey

FMMurphy:am
7-29-55
cc to: Admr. Reading File
Operating Committee
Docket
Messrs. J. E. Crawford, Rm. 3641
T. H. Kiilsgaard, Rm. 5222
J. O. Hosted, Rm. 3210, GSA
Code 700
Mr. Murphy

R.C.B.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

July 27, 1955

Memorandum

To: E. W. Ellis, Defense Minerals Exploration Administration

From: W. P. Williams, U. S. Geological Survey

Subject: Review of DMEA application, Docket No. 3197, Kirby C. Coryell, Beth claims, Emery County, Utah.

The applicant, by employment of claim staking individuals, has located and recorded a block of 576 contiguous, unpatented mining claims in the San Rafael Swell region of Emery County, Utah. The northeast boundary of the claims lies about 1-1/2 miles southwest of the Delta Mine which was originally exploited by Vernon Pick.

I had the opportunity to discuss this application with Mr. Coryell in Grand Junction before the application was submitted to DMEA. In spite of his favorable descriptions of geologic conditions on the property Mr. Coryell realizes that some unattractive features are also present in the contemplated exploration project. Mr. Coryell proposes to explore for the extensions of two Shinarump sandstone channels, one the Delta Mine channel -- the other the Rocky Mountain Mine channel located 2 miles northeast of the Delta Mine, by means of a maximum total of 61 core drill holes at a total estimated cost of $191,560.

The application points out the merits of the property by showing that the two known channels if extended will probably pass onto the Beth claims. Other favorable geologic criteria are cited such as the northwest-trending faults and diabase dikes.

The following characteristics of the proposed project appear unfavorable to me both from the standpoint of appropriateness for DMEA participation and for the prospect of making a worthwhile discovery with the money involved:

1. While it is true that the Delta mine channel appears to be heading toward the short fence of holes shown on the map in the application, channels in the lower Chinle and Moenkopi are known to meander and change direction within short distances. I think it is wrong for anyone to assume a

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channel trend from only one exposure of the channel, as the applicant has done with the Rocky Mountain Mine channel. The Delta Mine channel must be projected 1-1/2 miles to the proposed exploration drill holes, and the Rocky Mountain Mine channel must be extended a minimum of 2 miles.

2. Surface rocks on the property consist of the Navajo and Kayenta Formations, which means that drill holes to the top of the Moenkopi would be at least 900 feet deep. Because the ore zones are deeply buried everywhere on the property the initial drill holes would be seeking primarily for channel structures and a suitable ore-host rock rather than for ore.

3. The relationship between fracturing, faulting, and igneous intrusion and uranium ore deposition, which the applicant considers conclusive, is neither completely understood nor demonstrated.

We have no assurance whatever that the two channels will continue and extend into the Beth claims at the places indicated for exploration drilling. The applicant states no drilling has been performed on the property; consequently no evidence of mineralization on the property has been presented. Because the potential ore zones in the lower Chinle are everywhere deeply buried on the property I doubt that much additional information could be obtained by visiting the property. In view of the foregoing I recommend that the application be denied without prejudice but if such is done the applicant should be informed that if he can show, by preliminary drilling on his own account or by drilling of other individuals just east of the applicant's property, that favorable structures and/or mineralization exist either on the property or close to the property line, then a new application would be considered.

WPW

W. P. Williams

WPWilliams:iml
G-7/27/55

cc: Director's reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
J. E. Crawford, 3641
J. O. Hosted, 3210

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

July 19, 1955

Memorandum

To: Ernest William Ellis, DMEA Member
Uranium Commodity Committee, Room 4445

From: John E. Crawford, Bureau of Mines Member
Uranium Commodity Committee

Subject: Application for assistance, DMEA Docket 3897, Beth Claims, San Rafael Swell, Emery County, Utah

I have reviewed the attached application, Beth Claims, DMEA Docket 3897; and I have discussed it with Joseph O. Hosted, Washington representative of the Atomic Energy Commission.

Although no specific work has been done insofar as prospecting is concerned, Mr. Hosted and I believe that the application should be referred to the Field Team, because of the favorable area and the many geologic features mentioned. The Field Team should be requested to consult with Ernest R. Gordon, Atomic Energy Commission, Grand Junction, Colorado.

John E. Crawford

Attachment

7/27/55 gla

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

July 27, 1955

Memorandum

To: E. W. Ellis, Defense Minerals Exploration Administration

From: W. P. Williams, U. S. Geological Survey

Subject: Review of DMEA application, Docket No. 3897, Kirby C. Coryell, Beth claims, Emery County, Utah.

The applicant, by employment of claim staking individuals, has located and recorded a block of 578 contiguous, unpatented mining claims in the San Rafael Swell region of Emery County, Utah. The northeast boundary of the claims lies about 1-1/2 miles southwest of the Delta Mine which was originally exploited by Vernon Pick.

I had the opportunity to discuss this application with Mr. Coryell in Grand Junction before the application was submitted to DMEA. In spite of his favorable descriptions of geologic conditions on the property Mr. Coryell realizes that some unattractive features are also present in the contemplated exploration project. Mr. Coryell proposes to explore for the extensions of two Shinarump sandstone channels, one the Delta Mine channel -- the other the Rocky Mountain Mine channel located 2 miles northeast of the Delta Mine, by means of a maximum total of 61 core drill holes at a total estimated cost of $191,660.

The application points out the merits of the property by showing that the two known channels if extended will probably pass onto the Beth claims. Other favorable geologic criteria are cited such as the northwest-trending faults and diabase dikes.

The following characteristics of the proposed project appear unfavorable to me both from the standpoint of appropriateness for DMEA participation and for the prospect of making a worthwhile discovery with the money involved:

1. While it is true that the Delta mine channel appears to be heading toward the short fence of holes shown on the map in the application, channels in the lower Chinle and Moenkopi are known to meander and change direction within short distances. I think it is wrong for anyone to assume a

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channel trend from only one exposure of the channel, as the applicant has done with the Rocky Mountain Mine channel. The Delta Mine channel must be projected 1-1/2 miles to the proposed exploration drill holes, and the Rocky Mountain Mine channel must be extended a minimum of 2 miles.

2. Surface rocks on the property consist of the Navajo and Kayenta Formations, which means that drill holes to the top of the Moenkopi would be at least 900 feet deep. Because the ore zones are deeply buried everywhere on the property the initial drill holes would be seeking primarily for channel structures and a suitable ore-host rock rather than for ore.

3. The relationship between fracturing, faulting, and igneous intrusion and uranium ore deposition, which the applicant considers conclusive, is neither completely understood nor demonstrated.

We have no assurance whatever that the two channels will continue and extend into the Beth claims at the places indicated for exploration drilling. The applicant states no drilling has been performed on the property; consequently no evidence of mineralization on the property has been presented. Because the potential ore zones in the lower Chinle are everywhere deeply buried on the property I doubt that much additional information could be obtained by visiting the property. In view of the foregoing I recommend that the application be denied without prejudice but if such is done the applicant should be informed that if he can show, by preliminary drilling on his own account or by drilling of other individuals just east of the applicant's property, that favorable structures and/or mineralization exist either on the property or close to the property line, then a new application would be considered.

W P Williams

W. P. Williams

July 12, 1955
Subject: DMEA-3897
Re: Exploration Assistance
Beth Claims

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

Dear Mr. Coryell:

The receipt of your application dated July 9, 1955 for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA-3897 and referred to the Rare and Miscellaneous Metals Division.

Kindly identify all future correspondence relating to your application by this docket number.

Sincerely yours,

Robert E. Adams, Chief
Operations Control and
Statistics Division

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DMEA Loan Application

Beth Claims, San Rafael Swell

Emery County, Utah

Kirby C. Coryell
922 Bunting Avenue
Grand Junction,
Colorado

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

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JUL 11 1955

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. 3897
Metal or Mineral Uranium
Date Received 7-11-55
Estimated Cost $199,515.50
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Kirby C. Coryell 922 Bunting Ave. Grand Junction, Colorado

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized. See page 1

(*c*) If a corporation, add to above statement, titles, names and addresses of officers. not applicable

(*d*) If a partnership, add to the above statement the names and addresses of all partners. not applicable

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract We wish to explore parts of 578 unpatented lode mining claims in an unsurveyed part of Emery County, Utah. The claims are named Beth numbers one to 802, with numerous gaps. See page 2

(*b*) State any mine name by which the property is known. Known only as the Beth claims.

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise owner

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. Not applicable

(*e*) If you own the land, describe any liens or encumbrances on it There are no liens or encumbrances other than one agreement; a copy accompanies this application. Pg2-4

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice. See page 5

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. See page 30

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. See page 30

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. See pages 30 to 42 inclusive

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence [illegible]s. See page 43

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power. See pages 43-44

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore Uranium

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if ne of any present mine workings, and the location of the proposed exploration work as related to such features as co veins, ore-bearing beds, etc. See pages 44 to 46 inclusive

(*c*) The work will start within 60 days and be completed within 12 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations. See page 47

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.). See pages 48 and 49

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants. See page 50

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel. None

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be. See page 50

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project. None

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project. None

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes. See page 50

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above. Non

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes

(*b*) How do you propose to furnish your share of the costs?

[X] Money [ ] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper.

See page 51

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated July 9, 1955

Kirby C. Coryell
(Applicant)

By Kirby C. Coryell

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any de ment or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

1. (a) Name of applicant. State here your full legal name, in the form in which you will wish to contract, and your mailing address: Kirby C. Coryell, 922 Bunting Avenue, Grand Junction, Colorado.

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1. (b) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized:

The claims are staked and recorded in the names of my brother, Donald D. Coryell, and myself. In addition, financial assistance and services were given me by my father and two other brothers, all of whom have minor interest in the claims. Another party, Jack O. Jones, has been notified that he has a five per cent interest in the claims. We have not formally organized a corporation or partnership, but can at any time if desired by Defense Minerals Exploration Administration for the purposes of this loan.

I have power-of-attorney from Donald D. Coryell to transact any business in relation to these claims, including their outright sale. The names and addresses of all parties in addition to myself having any interest in these claims follow:

George K. Coryell Jr.	Vashon Heights, Vashon Island, Wn.
Kenyon C. Coryell	415 So. Roosevelt, Walla Walla, Washington
George C. Coryell	2028 E. 104th St., Seattle 55, Washington
Donald D. Coryell	Park Circle Apts., Wenatchee, Washington
Jack O. Jones	1332 Hall Avenue, Grand Junction, Colorado

1. (c) Not applicable.

1. (d) Not applicable.

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3 (a) Applicant's property rights:

We wish to explore parts of 578 unpatented lode mining claims in an unsurveyed part of Emery County, Utah. The claims are named Beth numbers 1 to 802, with numerous gaps. All of the 578 Beth claims, are considered subject to the terms of any exploration contract resulting from this application. The applicant, and any and all persons with any interest in these claims, has no share in ownership and no relationship of any sort in or with any mining claims or the mineral rights to any ground within ten miles of these claims.

3 (b) State any mine name by which the property is known:

Known only as the Beth claims.

3 (c) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise:

Owner.

3 (d) Not applicable.

3 (e) If you own the land, describe any liens or encumbrances on it:

Following is quoted a copy of an agreement made and signed in the field while engaged in staking part of these claims. The agreement was made with a geologist, Stanley J. Thayne, heading a staking party employed by Apache Uranium, apparently under the direction of Stanford R. Mahoney. The draw at point "A" on the topographic map is the only site for a road down onto the Navajo bench, and it probably would be nearly impossible to build two roads down this draw.

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (e) cont'd.

Thayne and I agreed that each would stake half the draw, and the agreement was drawn up to assure that should one party build a road down the draw, the other party would have full use of it, but could be required to reimburse the builder for part of the cost of construction and pay a share of any maintenance costs.

April 10, 1955

"This agreement entered into on the 10th day of April, 1955 is written in reference to an access road to mining claims located in Segers' Hole southwest side San Rafael, Utah. This agreement has been worked out between Mr. Kirby C. Coryell and Stanley J. Thayne, who represents Stanford R. Mahoney. Both parties agree that future use of the only feasible place for the construction of a road may be used by either party. This right is transferable to any future owner of either group of claims.

More specifically the claims involved are Marlo 9,10, 4, 5, 6 represented by Mr. Stanley J. Thayne and the Beth 682, 681, 680, 679, represented by Mr. Kirby C. Coryell.

Any future road built may be used by either party or future owners. The maintenance and construction cost to be agreed upon by those parties concerned.

(Continued on page 4)

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (e) cont'd.

The whole intent of this agreement is that future owners of either group may have complete access to their claims insomuch as both were staked at the same time and it was desired to avoid any possibility that only one of the parties would have access to the only feasible entrance to Segers' Hole."

/s/

Stanley J. Thayne
Kirby C. Coryell

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice:

Unpatented Lode Mining Claims recorded in office of County Recorder, Castle Dale, Emery County, Utah.

The claims average 1,475 feet long and 590 feet wide. The distance and bearing of the discovery monument of each claim from a vertical angle bench mark, whose elevation and latitude and longitude is referred to on the notice, is stated on each location notice. Each discovery monument is on the claim's centerline, and they average well over 100 feet from an end line. No corner is known to have been missed, although it was necessary to witness a number, and, by the system employed in staking, it is not likely that any were overlooked. Various temporary employees with no interest in these claims assisted in the staking of almost all the claims upon which exploration is proposed in this application; the exceptions are not at the borders but within the group. Every measure known to me was taken to assure the validity of the claims and to render them invulnerable to jumping.

(Claims listed on following pages)

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
1	12-22-54	12-27-54	J73	134
2	"	"	J73	135
3	"	"	J73	136
4	12-25-54	"	J73	137
5	"	"	J73	138
6	"	"	J73	139
7	"	"	J73	140
8	"	"	J73	141
9	"	"	J73	142
10	12-15-54	"	J73	143
11	"	"	J73	144
12	"	"	J73	145
13	"	"	J73	146
14	"	"	J73	147
15	"	"	J73	148
16	"	"	J73	149
17	12-28-54	1-25-55	J75	97
18	12-15-54	12-27-54	J73	150
19	"	"	J73	151
20	"	"	J73	152
21	12-10-54	"	J73	153
22	"	"	J73	154
23	12-10-54	12-27-54	J73	155
24	12-28-54	1-25-55	J75	98

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
25	12-28-54	1-25-55	J75	99
26	"	"	75	100
27	12-25-54	12-27-54	73	156
28	12-22-54	"	73	157
29	12-25-54	"	73	158
30	"	"	73	159
31	"	"	73	160
32	"	"	73	161
33	12-15-54	"	73	162
34	"	"	73	163
35	"	"	73	164
36	"	"	73	165
37	"	"	73	166
38	"	"	73	167
39	"	"	73	168
40	"	"	73	169
41	"	"	73	170
42	"	"	73	171
43	"	"	73	172
44	"	"	73	173
45	"	"	73	174
46	12-10-54	"	73	175
47	12-28-54	1-25-55	75	101
48	"	"	75	102

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
49	12-28-54	1-25-55	J75	103
50	12-22-54	12-27-54	73	176
51	"	"	73	177
52	"	"	73	178
53	"	"	73	179
54	12-8-54	"	73	180
55	"	"	73	181
56	"	"	73	182
57	"	"	73	183
58	"	"	73	184
59	"	"	73	185
60	"	"	73	186
61	"	"	73	187
62	"	"	73	188
63	12-29-54	1-25-55	75	104
64	"	"	75	105
65	"	"	75	106
66	"	"	75	107
67	"	"	75	108
68	"	"	75	109
69	"	"	75	110
70	12-22-54	12-27-54	73	189
71	"	"	73	190
72	"	"	73	191

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
73	12-8-54	12-27-54	J73	192
74	"	"	73	193
75	"	"	73	194
76	"	"	73	195
77	"	"	73	196
78	"	"	73	197
79	"	"	73	198
80	"	"	73	199
81	"	"	73	200
82	"	"	73	201
83	12-29-54	1-25-55	75	111
84	"	"	75	112
85	"	"	75	113
86	"	"	75	114
87	"	"	75	115
88	"	"	75	116
89	"	"	75	117
90	12-16-54	12-27-54	73	202
91	"	"	73	203
92	"	"	73	204
93	"	"	73	205
94	"	"	73	206
95	"	"	73	207
96	"	"	73	208

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3 (f) con'd.

Beth Number	Date Staked	Date Recorded	Book	Page
97	12-16-54	12-27-54	J73	209
98	"	"	73	210
99	12-15-54	"	73	211
100	"	"	73	212
101	12-26-54	"	73	213
102	"	"	73	214
103	"	"	73	215
104	12-16-54	"	73	216
105	"	"	73	217
106	"	"	73	218
107	"	"	73	219
108	"	"	73	220
109	"	"	73	221
110	"	"	73	222
111	"	"	73	223
112	"	"	73	224
113	"	"	73	225
114	12-15-54	"	73	226
115	12-26-54	"	73	227
116	12-16-54	"	73	228
117	"	"	73	229
118	"	"	73	230
119	"	"	73	231
120	"	"	73	232

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
121	12-17-54	12-27-54	J73	233
122	"	"	73	234
123	"	"	73	235
124	"	"	73	236
125	12-26-54	"	73	237
126	12-25-54	"	73	238
127	12-22-54	"	73	239
128	"	"	73	240
129	"	"	73	241
130	12-25-54	"	73	242
131	"	"	73	243
132	"	"	73	244
133	"	"	73	245
134	"	"	73	246
135	"	"	73	247
136	"	"	73	248
137	"	"	73	249
138	"	"	73	250
139	"	"	73	251
140	"	"	73	252
141	12-28-54	1-25-55	75	118
142	"	"	75	119
143	"	"	75	120
144	"	"	75	121

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
145	12-28-54	1-25-55	J75	122
146	"	"	75	123
147	"	"	75	124
148	"	"	75	125
149	"	"	75	126
150	"	"	75	127
151	12-22-54	12-27-54	73	253
152	"	"	73	254
153	"	"	73	255
154	12-18-54	"	73	256
155	"	"	73	257
156	"	"	73	258
157	"	"	73	259
158	"	"	73	260
159	12-25-54	"	73	261
160	12-18-54	"	73	262
161	"	"	73	263
162	"	"	73	264
163	"	"	73	265
164	12-28-54	1-25-55	75	128
165	"	"	75	129
166	"	"	75	130
167	"	"	75	131
168	"	"	75	132

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
169	12-28-54	1-25-55	J75	133
170	"	"	75	134
171	"	"	75	135
172	12-22-54	12-27-54	73	266
173	"	"	73	267
174	12-22-54	"	73	268
175	12-18-54	"	73	269
176	"	"	73	270
177	"	"	73	271
178	"	"	73	272
179	"	"	73	273
180	"	"	73	274
181	"	"	73	275
182	"	"	73	276
183	"	"	73	277
184	"	"	73	278
185	"	"	73	279
186	"	"	73	280
187	"	"	73	281
188	"	"	73	282
189	"	"	73	283
190	12-28-54	1-25-55	75	136
191	12-18-54	12-27-54	73	284
192	"	"	73	285

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
193	12-18-54	12-27-54	J73	286
194	"	"	73	287
195	"	"	73	288
196	"	"	73	289
197	"	"	73	290
198	"	"	73	291
199	"	"	73	292
200	"	"	73	293
201	"	"	73	294
202	"	"	73	295
211	1-17-55	1-25-55	75	137
212	"	"	75	138
213	"	"	75	139
214	1-9-55	"	75	140
215	"	"	75	141
216	"	"	75	142
217	"	"	75	143
226	4-13-55	4-18-55	85	294
254	1-9-55	1-25-55	75	144
255	"	"	75	145
256	"	"	75	146
257	"	"	75	147
258	"	"	75	148
259	"	"	75	149

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
260	1-18-55	1-25-55	J75	150
261	"	"	75	151
277	"	"	75	152
278	12-24-54	1-27-54	73	296
279	"	"	73	297
280	"	"	73	298
281	"	"	73	299
282	"	"	73	300
283	"	"	73	301
284	"	"	73	302
285	"	"	73	303
286	"	"	73	304
287	4-5-55	4-18-55	85	295
288	"	"	85	296
289	"	"	85	297
290	"	"	85	298
295	12-24-54	12-27-54	73	305
296	"	"	73	306
297	"	"	73	307
298	"	"	73	308
299	"	"	73	309
300	"	"	73	310
301	"	"	73	311
302	"	"	73	312

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
303	12-24-54	12-27-54	J73	313
304	"	"	73	314
305	1-18-55	1-25-55	75	153
306	"	"	75	154
307	12-23-54	12-27-54	73	315
308	"	"	73	316
309	6-4-55	6-9-55	95	183
310	6-4-55	"	95	184
311	12-24-54	12-27-54	73	317
312	"	"	73	318
313	12-23-54	"	73	319
314	"	"	73	320
315	"	"	73	321
316	"	"	73	322
317	"	"	73	323
318	"	"	73	324
319	"	"	73	325
320	"	"	73	326
321	"	"	73	327
322	"	"	73	328
323	"	"	73	329
324	"	"	73	330
325	"	"	73	331
326	"	"	73	332

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
327	12-23-54	12-27-54	J73	333
328	"	"	73	334
329	"	"	73	335
330	"	"	73	336
331	"	"	73	337
332	"	"	73	338
333	"	"	73	339
334	12-22-54	"	73	340
335	"	"	73	341
336	"	"	73	342
337	"	"	73	343
338	12-29-54	1-25-55	75	155
339	12-23-54	12-27-54	73	344
340	"	"	73	345
341	"	"	73	346
342	"	"	73	347
343	5-22-55	6-1-55	94	159
344	"	"	94	160
345	"	"	94	161
346	"	"	94	162
347	"	"	94	163
348	"	"	94	164
349	6-4-55	6-9-55	95	185
350	"	"	95	186

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
351	6-2-55	6-9-55	J95	187
352	"	"	95	188
353	6-4-55	"	95	189
354	"	"	95	190
355	4-10-55	4-18-55	85	299
356	"	"	85	300
368	5-26-55	6-1-55	94	165
369	"	"	94	166
370	"	"	94	167
371	"	"	94	168
372	"	"	94	169
373	"	"	94	170
374	"	"	94	171
375	"	"	94	172
376	"	"	94	173
377	6-2-55	6-9-55	95	191
378	"	"	95	192
379	"	"	95	193
391	5-26-55	6-1-55	94	174
392	"	"	94	175
393	"	"	94	176
394	"	"	94	177
395	"	"	94	178
396	"	"	94	179

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
397	5-26-55	6-1-55	J94	180
398	"	"	94	181
399	"	"	94	182
400	5-25-55	"	94	183
412	"	"	94	184
413	"	"	94	185
414	"	"	94	186
415	"	"	94	187
416	"	"	94	188
417	"	? "	94	189
418	"	"	94	190
419	"	"	94	191
468	"	"	94	192
469	"	"	94	193
470	"	"	94	194
471	5-24-55	"	94	195
472	6-2-55	6-9-55	95	194
473	4-13-55	4-18-55	85	301
474	"	"	85	302
475	"	"	85	303
476	"	"	85	304
477	"	"	85	305
478	"	"	85	306
479	"	"	85	307

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
480	4-12-55	4-18-55	J85	308
481	"	"	85	309
482	"	"	85	310
483	"	"	85	311
484	"	"	85	312
485	"	"	85	313
486	5-23-55	6-1-55	94	197
487	"	"	94	198
488	"	"	94	199
489	"	"	94	200
490	5-25-55	"	94	201
491	"	"	94	202
492	5-24-55	"	94	203
493	4-13-55	4-18-55	85	314
494	"	"	85	315
495	"	"	85	316
496	"	"	85	317
497	"	"	85	318
498	"	"	85	319
499	"	"	85	320
500	4-12-55	"	85	321
501	"	"	85	322
502	"	"	85	323
503	"	"	85	324

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
504	4-12-55	4-18-55	J85	325
505	"	"	85	326
506	5-23-55	6-1-55	94	205
507	"	"	94	206
508	"	"	94	207
509	"	"	94	208
510	5-24-55	"	94	209
511	"	"	94	210
512	"	"	94	211
513	"	"	94	212
514	"	"	94	213
515	"	"	94	214
516	"	"	94	215
517	"	"	94	216
518	4-12-55	4-18-55	85	327
519	"	"	85	328
520	"	"	85	329
521	"	"	85	330
522	"	"	85	331
523	"	"	85	332
524	"	"	85	333
525	"	"	85	334
526	"	"	85	335
527	"	"	85	336

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
528	4-10-55	4-18-55	J85	337
529	"	"	85	338
530	"	"	85	339
531	"	"	85	340
532	"	"	85	341
533	4-12-55	"	85	342
534	"	"	85	343
535	"	"	85	344
536	"	"	85	345
537	"	"	85	346
538	"	"	85	347
539	"	"	85	348
540	"	"	85	349
541	"	"	85	350
542	"	"	85	351
543	4-10-55	"	85	352
544	5-22-55	6-1-55	94	217
545	4-10-55	4-18-55	85	353
546	"	"	85	354
547	"	"	85	355
548	"	"	85	356
549	5-24-55	6-9-55	95	195
550	"	"	95	196
551	4-10-55	4-18-55	85	357

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
552	4-12-55	4-18-55	J85	358
553	4-12-55	"	85	359
554	"	"	85	360
555	"	"	85	361
556	"	"	85	362
557	4-10-55	"	85	363
558	"	"	85	364
559	"	"	85	365
560	"	"	85	366
561	"	"	85	367
562	"	"	85	368
563	"	"	85	369
564	"	"	85	370
565	"	"	85	371
566	"	"	85	372
567	"	"	85	373
568	4-5-55	"	85	374
569	"	"	85	375
570	4-10-55	"	85	376
571	"	"	85	377
572	"	"	85	378
573	"	"	85	379
574	"	"	85	380
575	"	"	85	381

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
576	4-10-55	4-18-55	J85	382
578	4-13-55	"	"	383
579	"	"	"	384
580	"	"	"	385
581	"	"	"	386
582	"	"	"	387
583	"	"	"	388
584	"	"	"	389
585	"	"	"	390
586	"	"	"	391
587	"	"	"	392
588	4-6-55	"	"	393
589	"	"	"	394
590	"	"	"	395
591	4-5-55	"	"	396
592	"	"	"	397
593	"	"	"	398
594	"	"	"	399
595	"	"	"	400
674	4-6-55	"	"	402
675	"	"	"	403
676	4-8-55	"	"	404
677	"	"	"	405
678	"	"	"	406

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
679	4-8-55	4-18-55	J85	407
680	4-7-55	"	"	408
681	"	"	"	409
682	"	"	"	410
684	4-5-55	"	"	411
685	"	"	"	412
686	"	"	"	413
687	"	"	"	414
689	"	"	"	415
690	"	"	"	416
691	"	"	"	417
692	4-6-55	"	"	418
693	"	"	"	419
694	"	"	"	420
695	"	"	"	421
696	4-7-55	"	"	422
697	"	"	"	423
698	"	"	"	424
699	"	"	"	425
700	4-5-55	"	"	426
701	"	"	"	427
702	"	"	"	428
703	"	"	"	429
704	"	"	"	430

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
705	4-6-55	4-18-55	J85	431
706	4-5-55	"	"	432
707	"	"	"	433
708	4-6-55	"	"	434
709	"	"	"	435
710	"	"	"	436
711	4-7-55	"	"	437
712	"	"	"	438
713	"	"	"	439
714	"	"	"	440
715	"	"	"	441
716	4-6-55	"	"	442
717	"	"	"	443
718	"	"	"	444
719	"	"	"	445
720	"	"	"	446
721	"	"	"	447
722	4-7-55	"	"	448
723	"	"	"	449
724	"	"	"	450
725	"	"	"	451
726	"	"	"	452
727	4-8-55	"	"	453
728	"	"	"	454

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
729	4-8-55	4-18-55	J85	455
730	"	"	"	456
731	"	"	"	457
732	4-13-55	"	"	458
733	4-8-55	"	"	459
734	"	"	"	460
735	"	"	"	461
736	"	"	"	462
737	"	"	"	463
738	4-7-55	"	"	464
739	"	"	"	465
740	"	"	"	466
741	"	"	"	467
742	"	"	"	468
743	4-8-55	"	"	469
744	"	"	"	470
745	"	"	"	471
746	"	"	"	472
747	"	"	"	473
748	4-10-55	"	"	474
749	4-11-55	"	"	475
750	"	"	"	476
751	"	"	"	477
752	"	"	"	478

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
753	4-11-55	4-18-55	J85	479
754	"	"	"	480
755	"	"	"	481
756	"	"	"	482
757	"	"	"	483
758	"	"	"	484
759	"	"	"	485
760	"	"	"	486
761	"	"	"	487
762	4-10-55	"	"	488
763	4-11-55	"	"	489
764	"	"	"	490
765	"	"	"	491
766	"	"	"	492
767	"	"	"	493
768	"	"	"	494
769	"	"	"	495
770	"	"	"	496
771	"	"	"	497
772	"	"	"	498
773	"	"	"	499
774	"	"	"	500
775	"	"	"	501
776	"	"	"	502
777	"	"	"	503

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

3. (f) cont'd.

Beth Number	Date Staked	Date Recorded	Book	Page
778	4-11-55	4-18-55	J85	504
779	"	"	85	505
780	"	"	85	506
781	"	"	85	507
782	"	"	85	508
783	"	"	85	509
784	5-23-55	6-1-55	94	218
785	"	"	94	219
786	"	"	94	220
787	"	"	94	221
788	"	"	94	222
789	"	"	94	223
790	"	"	94	224
791	"	"	94	225
792	"	"	94	226
793	"	"	94	227
794	"	"	94	228
795	"	"	94	229
796	"	"	94	230
797	"	"	94	231
798	"	"	94	232
799	"	"	94	233
800	"	"	94	234
801	"	"	94	235
802		"	94	236

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

4. Physical description.

a. No mining or exploration operations have been or now are being conducted on these claims.

b. There has been no production and there are no known ore reserves, as the property never has been explored by drilling, excavating or other physical methods.

c. Geologic features:

The claims contain intersections of favorable structure and the projections of two channels known to be mineralized elsewhere. One channel contains the Delta or Hidden Splendor deposit and the other the Rocky Mountain deposit. The known outcrops of these channels will be described.

KNOWN CHANNELS PROJECTING INTO THE CLAIMS

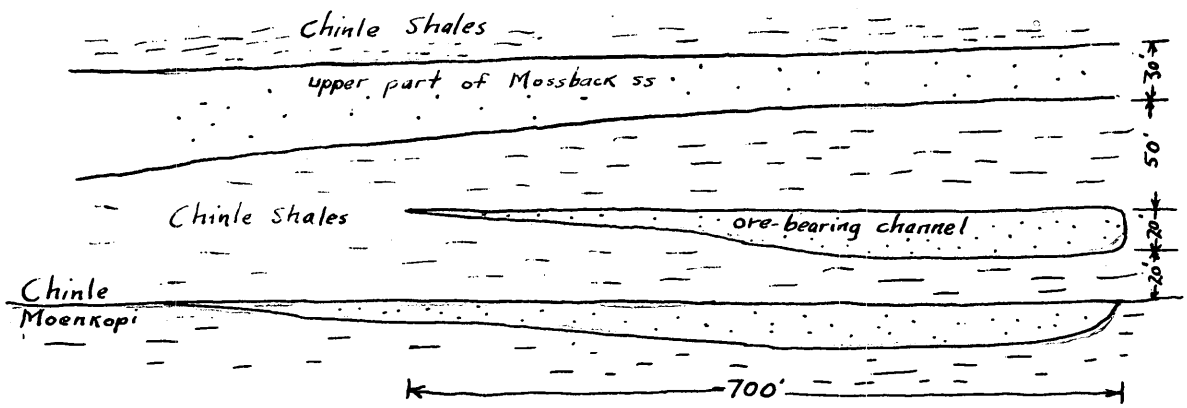
The Channel Containing the Delta (Hidden Splendor) Deposit

The course of the Delta channel is described by four outcrops along a distance of 11,000 feet. Each exposure is colored red on the maps. A single straight line touches a part of each of these channel exposures, demonstrating the course of the channel to be remarkably straight for its known extent. Sections of the two most southwesterly exposures show them surely to be the same channel.

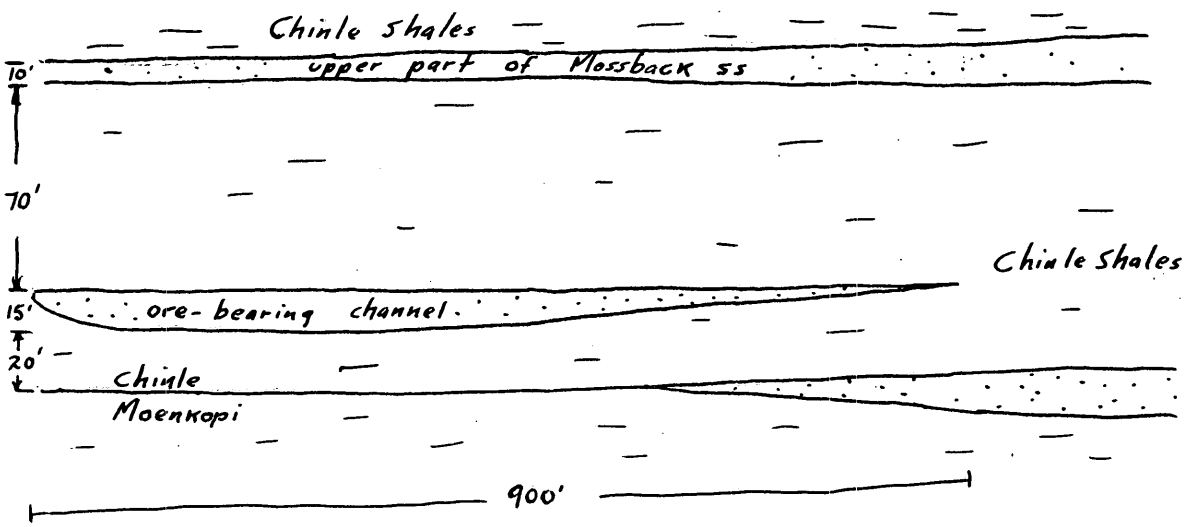
Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

4.(c) cont'd.

The section below is of the outcrop containing the Delta deposit, labeled number two on the maps, looking east. Its relationships to other units can be seen best from the road of the same elevation across the canyon. The thicknesses of the units in this and the following sections are approximate.



The section below is of the other southwesterly outcrop, labeled number 1, looking southwest.



Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colorado

4. (c) cont'd.

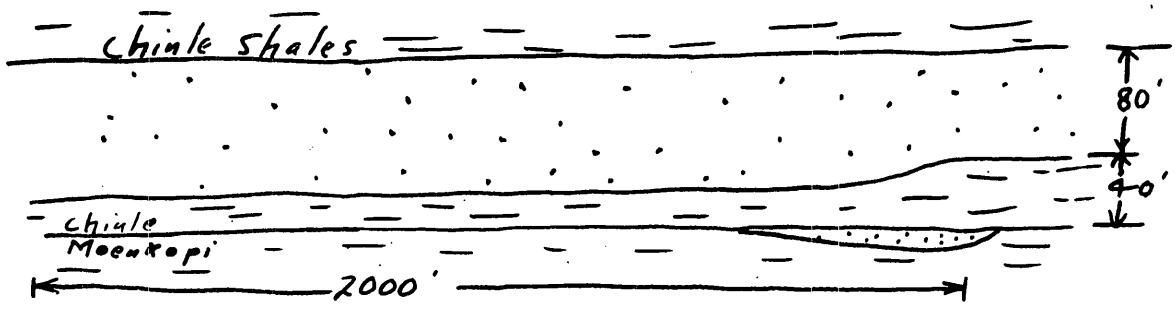
There are three features tending to prove these two exposures to be the same channel:

1. They are the only two sand lenses in the region occupying the same stratigraphic position and also separated from upper Mossback sands by Chinle shales.

2. The southern end of the more northerly exposure is the thickest, thinning to the north, showing it to be the inboard side of a meander, and thus the course would be toward the other lens.

3. The stream forming the channel at the top of the Moenkopi, stratigraphically about twenty feet below the ore sand and with no evidence locally of interruption of deposition between Moenkopi and Chinle time, obviously flowed in the same general direction. The course and outcrops of this Moenkopi, or possibly Shinarump, channel is shown by crosses.

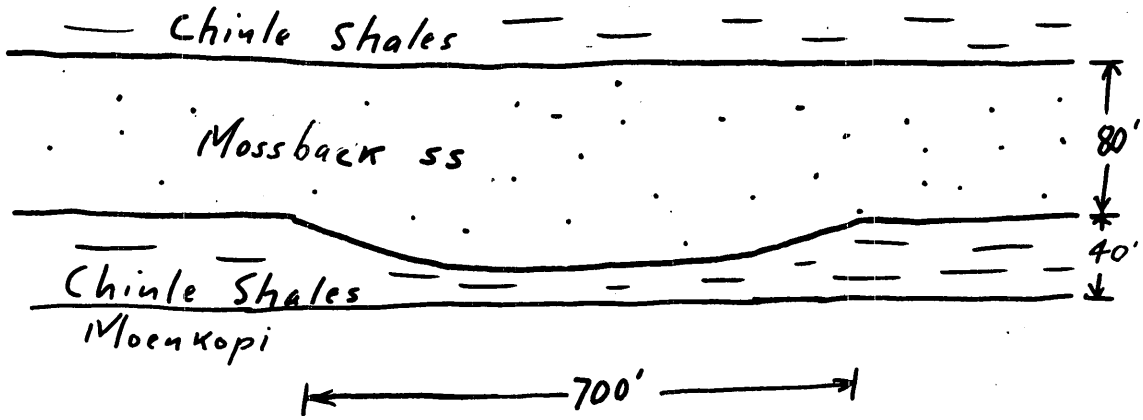
Exposures three and four of the ore-bearing channel are different in appearance from the other two, as here the Mossback sands are of usual thickness, and have coalesced with the channel. Number three is a longitudinal section looking southeast.



Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

4. (c) cont'd.

The most northeasterly exposure, number four, is as follows looking south:



Features tending to prove these four sand exposures to result from one stream scouring at one time follow:

1. All four exposures would look alike in section were the upper part of the Mossback of average thickness throughout the area.

2. They are the only sands of the same stratigraphic position in the vicinity.

3. This direction of stream flow is identical with that of the drainage at the end of Moenkopi time, and locally there is no evidence of a hiatus between Moenkopi and Chinle deposition.

It would seem that the average thickness of Mossback sands in this area was not deposited by one stream flowing at one time, but rather that the sands were accumulated by laterally coalescing streams through a considerable period of time, during which lateral coalescence was not complete at all horizons. The more gradual variations in Mossback

Kirby C. Coryell
922 Bunting Ave. Grand Junction, Colo.

4. (c) cont'd.

thickness, then, would appear to result from incomplete lateral coalescence of the streams, and abrupt thickening would seem to be due to scouring of individual streams during earliest Mossback time. It is believed that the four basal scours were formed by one stream at the same time, and that their difference in appearance in section is due to incompleteness of lateral coalescence of later streams. Should the two northeasterly outcrops not have been formed by the same stream responsible for the ore-bearing channel in the Delta Mine, then the average course of the ore-bearing channel must be more westerly rather than southerly, as there is no other evidence of it to the northeast. Should that be true, the fence of holes designed to intersect the Rocky Mountain channel should locate this channel too.

Anomalous radioactivity reportedly is present at the most southwesterly outcrop of the channel. The lack of significant mineralization of this outcrop could be attributed to two features in addition to non-deposition. The dip of the channel would allow meteoric waters to percolate along its course, and its outcrop forms a bench, presenting a sizeable area to receive the water. Also, the Muddy River once was charging the channel a few hundred feet up dip from its present outcrop.

Kirby C. Coryell
922 Bunting Avenue
Grand Junction, Colo.

4. (c) cont'd.

Exposure number three and possibly number four have been explored by drilling, and apparently little encouragement was found. There are two features possibly of fundamental relevance to localization of mineralization that would tend to classify this area as less favorable than the channel where exposed to the southwest and within the Beth claims. Fracturing of northwest strike is not prominent in this area whereas it is to the southwest; its probable importance will be discussed later. Also, the vertical coalescence of the scours with upper Mossback sands may constitute a less favorable environment than that presented where the channel is an entity surrounded by Chinle shales. The upper sands of the Mossback thin progressively to the southwest throughout the 11,000 feet they are exposed, so it is quite possible the ore-bearing channel may be enclosed by mudstones where it traverses the Beth claims.

The Channel Containing the Rocky Mountain Deposit

The outcrop of this Mossback channel is considerably wider than the average of the other, and it scours more deeply, completely through the lower Chinle shales and well into the Moenkopi Formation. It is understood that ore bodies have been found by exploration of the outcrop. The one exposure indicates it to trend in a south-southwesterly direction. It is possible that this channel and the one containing the Delta deposit may join within the Beth claims.

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

4. (c) cont'd.

STRUCTURAL FEATURES OF THE PROPERTY

The claims contain numerous zones of faulting and strong, closely-spaced jointing, generally striking between north and west. Several of the faults contain diabase dikes. To the northwest, most faults of this set are filled with diabase, indicating a tensional origin and demonstrating their access to the sima at least. Data not completely theoretical that indicate ruptures of this set to be important are:

1. The fracture labeled "B" on the geologic map projects into the Delta or Hidden Splendor mineralized zone. It is filled with diabase throughout most of its exposed extent, and can be traced on aerial photos as far as indicated by the red line. To the northwest, uranium ore has been shipped from the Mossback sands adjacent to it despite a local lack of favorable sedimentary features.

2. Faults of this same set outside the swell reportedly contain autunite.

3. The mineralized areas within the Delta Mine are cut by zones of joints of northwest strike.

The foregoing implies the northwest striking ruptures to have been a means of access of uranium bearing solutions from depths. It seems likely that these fractures were formed during a period of regional deformation, evidenced by their great aerial extent and persistence to depth.

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4. (c) cont'd.

Should that be true, the diabase probably was emplaced prior to the time of uranium mineralization, and the dikes may have influenced lateral migration of uranium solutions and environmental conditions conducive to deposition of uranium, such as by forming traps for natural gases or the uranium solutions. Thus, these fractures or their dike fillings may have controlled localization of uranium mineralization whatever its genesis may have been.

Within the San Rafael Swell uranium mineralization, and even favorable alteration of the Mossback sandstones, is obviously broadly, and in most instances closely, related spatially to zones of faulting. The northwesterly striking set seems particularly important in this area at the southwestern tip of the swell. Aerial photos show ruptures of this and other sets to be more prominent within the claims than where these channels are known to be mineralized at their outcrops. Other structural favorability of a more theoretical sort is afforded by the trend of the main axis of the swell near the projections of the channels. The dikes cross this axis at right angles, and together they may present excellent traps for the gaseous agents that may have effected precipitation of uranium from solution, as well as possible traps for the uranium solutions themselves if within deep scours or under hydrostatic pressure. Also, the fault labeled "C" may have enough vertical displacement so that the Mossback sands on either side abut

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4. (c) cont'd.

impervious mudstones, providing another possible trap. Gaseous precipitating agents probably are responsible for the Delta ore body, as 99 per cent of the ore contains no trace of carbonaceous matter, and barren asphaltic material is abundant, although the very little woody trash present generally is well mineralized. Additional evidence of general nature is afforded by the Black Hills, where all of the better deposits are on small flexures with demonstrable structural closure, and the Grants area of New Mexico, where the two largest ore bodies are within the closed areas of small structural domes. Natural gas is contained in some of the sediments of these areas, and near the San Rafael Swell also. With reference to the plateau proper, it has been noted by others that all the large Triassic ore bodies known are on the flanks of positive areas or flexures, whose cores expose older formations. Perhaps more pertinent, the only two zones of extensive mineralization known in the San Rafael Swell, the Delta Mine and the Temple Mountain area, are in the few per cent of Mossback exposures closest to the main axis of the swell.

The dikes are stressed as possible structural favorability from several standpoints in addition to acting as traps for precipitating agents or solutions as set forth in the preceding paragraph. Observable favorability is presented by the uranium ore found adjacent to one of them about two miles to the north without the environment of a scouring channel, and the uranium mineralization found in fractures of this set outside the swell.

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4. (c) cont'd.

Favorability of a more regional nature is afforded by the fact that the largest known hydrothermal uranium deposits in the world are in the vicinity of diabasic intrusions. The plateau cannot be considered an exception, as the excavations of the Jackpile Mine in New Mexico, perhaps containing as large a uranium ore body as the next five or ten largest known on the plateau combined, have exposed diabasic material. The diabase is not suggested to be the source of the uranium bearing solutions, but rather its presence demonstrates nearby ruptures with access to great depths, which may be required to allow the introduction of large amounts of solutions rich in the heaviest elements. It is thought that fractures on the Beth claims filled with diabase, and other faults and joints of the same set, may have provided access for deep-seated uranium-bearing solutions to reach the Mossback sandstones.

DRILLING DEPTHS

The property is underlain by the Kayenta, Navajo, and basal part of the Carmel Formations. The ore horizon is the lower part of the Mossback member of the Chinle Formation. The estimated thicknesses of intervening formations follow:

basal Carmel	100 feet
Navajo	650 feet
Kayenta	125 feet
Wingate	300 feet
Chinle	225 feet

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4. (c) cont'd.

The sites of the proposed drilling are on a basal Navajo shelf. As the holes should be bottomed in the Moenkopi Formation, generally separated from basal Mossback by about 50 feet of Chinle shales, they would average between 850 and 900 feet in depth.

REASONS FOR WISHING TO EXPLORE

I wish to explore this ground because I believe it probably contains at least several sizeable to very large ore bodies, and I would like to guide the exploration to find them. Large ore bodies should be discovered by the proposed exploration if any of the several most generally accepted theories of structural favorability for mineralization in the Triassic hosts are effective in this area. If they are not effective, the probability that large ore bodies exist is greatly reduced; however, the possibility that other ore bodies are contained in the channels comparable to those known at the outcrops still is as great as with other channels, as it generally is recognized that most mineralized channels contain a number of ore bodies of comparable size.

It is feared that should someone else explore the claims, that their exploration may favor the Delta channel to the practical exclusion of the Rocky Mountain channel.

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4. (c) cont'd.

The latter appears to me to merit as much or more exploration than the former, with the realization that the course of the former is much better known and that it contains a much larger known ore body, for several reasons:

1. The Rocky Mountain channel scours much more deeply and probably is considerably wider, and in the same structural environment it should contain much larger ore bodies.

2. It should intersect more numerous and more positive zones of faults and dikes thought to constitute favorable structure.

3. Its trend should be very close, if not coinciding in great part, with the main anticlinal axis of the swell.

4. A fence of holes drilled along favorable structure to locate the channel may intersect unknown channels or ore bodies not in the Rocky Mountain channel. The proposed fence is thought to be in a structural zone so favorable that minor scouring generally present at the base of the Mossback, and possibly any part of the vertical extent of the Mossback, may contain important mineralization.

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4. (c) cont'd.

5. A much lesser extent of this channel is exposed or has been explored than the Delta channel, so a comparison of the size of known ore bodies in each is not fair at this time.

6. A greater part of its course probably can be drilled from the basal Navajo shelf, although this is uncertain.

7. There are several regions on the plateau that contain a number of the very large ore bodies. In each one of these areas one channel is not known to be a host of several of the large ore bodies; it seems more likely that a repetition of structural features has resulted in the emplacement of very large ore bodies in whatever channel host was present, and the structural favorability was so great that the stratigraphic features present normally controlling localization of small ore bodies had little influence on the size and shape or grade of most of the very large ones. Structure is believed to be equally important here, and the projections of both these channels, but particularly the Rocky Mountain channel, intersect several structural zones more apparent than any that may have caused mineralization at the outcrops of either of these channels.

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4. (d) State the facts with respect to the accessibility of the project:

It is 28 miles by road from point "A" to Utah Highway 10, a paved highway kept open throughout the year. The first mile of the road from point "A" would require a few hours bulldozer work to prepare it for the hauling of heavy equipment. From where this road joins the highway, it is 12 miles north to the coal mining town of Emery, and 40 miles west to Salina, Utah, a station on the Denver and Rio Grande Railroad. From Salina it is, by railroad, about 45 miles to the buying station at Marysvale, and about 150 miles to Vitro's uranium mill at Salt Lake City.

Should it ever be desirable to drill from the Carmel Formation, road construction to drilling sites would be very inexpensive. The western part of the claims can be traversed by four-wheel drive vehicles at present and much of it by two wheel drive vehicles, and roads easily can be built up the dip slope from Salt Wash (Salvation Creek) to the bench mark of elevation 6,516, allowing access to the southeastern part of the claims.

4. (e) State the availability of manpower, materials, supplies, equipment, water, and power.

The towns of Emery and Salina, whose locations were described in the preceding paragraph, as well as several towns within 30 miles north of Emery, would

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4. (e) cont'd.

supply adequate manpower. Coal mining has been the primary industry, other than agriculture, for many years, so trained personnel and mining supplies and equipment should be available. Emery is the closest source of water, although inexhaustible supplies for mining or drilling use could be pumped from wells in the alluvium of the Muddy River or Salt Wash beds. A transmission line for electric power would have to be constructed from Highway 10, twenty-eight miles away, or produced on the property, if electric power was desired for mining operations.

5. (a) The exploration project. State the mineral or minerals for which you wish to explore:

Uranium.

PROPOSED EXPLORATION PROGRAM

5. (b) The two fences of drill holes are shown on both the topographic and geologic maps. Should the fence designed to locate the Delta channel fail to do so, the other fence would intersect it unless the channel turned radically to the south. The shorter more easterly fence would be drilled in a zone of strong jointing of the same attitude as that prominent in the Delta Mine. The holes of the longer fence would be drilled near a diabase dike, alternating the initial holes on either side where possible.

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5. (b) cont'd.

This fence probably would require more holes to locate its primary target, the Rocky Mountain channel, but it is thought to present structural favorability so great that minor scours of the basal Mossback sandstones may contain significant ore bodies.

It is proposed that Phase I of the exploration program comprise the drilling of these two fences to locate the channels, which would total a maximum of 41 holes and a minimum of 2 holes. The fence holes would be drilled a thousand feet apart at first, filling in to 500 feet wherever there were indications a channel might have passed between holes.

Phase II would allow 10 holes to be drilled in each channel if the channel's course is such that that many holes can be used to good advantage by drilling from the basal Navajo shelf. Access to drilling sites may be prepared inexpensively anywhere on this shelf, excepting the peaks of bare rock, as far west as just past the more westerly dike. No deep drilling from the Carmel Formation would be contemplated unless it was agreed that previous exploration showed it to be highly desirable. If undertaken, phase II would comprise a maximum of 20 holes and a probable minimum of 10 holes.

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5. (b) cont'd.

If exploration has proved the proximity of diabase dikes to have great influence on the deposition of uranium, the remaining holes of the westerly fence that would appear to have a chance of disclosing a new channel should be drilled. It is suggested that part of the footage allotted to this fence be used to offset any mineralization or highly favorable features found while completing the fence. Stated more completely, it is likely that phases I and II will be completed without using the maximum drilling footage proposed in this application; it is suggested in that event that should both parties to any contract resulting from this application be in agreement that the remaining footage can be used to good advantage in further exploration of any channels or structural zones, that the remaining footage be so used.

The maximum holes of both phases would be 61, and the probable minimum 22. The average depth of holes should be approximately 900 feet, and it is thought advisable to core from near the top of the Mossback to the Moenkopi Formation, which should be about 100 feet of coring. The footage then should approximate:

	Maximum	Minimum
non-core	48,800 ft.	17,600 ft.
core	6,100 ft.	2,200 ft.

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5. (c) The work will start within 60 days and be completed within 12 months from the date of an exploration project contract.

5. (d) State the operating experience and background of the applicant, etc.:

The applicant is a geologist. His college education is two years of mining engineering, a Bachelor of Science degree in geology, and over three years graduate work in geology, all taken at the University of Washington, Seattle, Washington. His field experience is four field seasons in general geology, regional mapping, and detailed mapping of ore deposits; and over four years of uranium geology, the first two working for the Atomic Energy Commission with the Spokane and Salt Lake City Exploration Branches. One year was spent working for private enterprise within the plateau and one year consulting outside the plateau and in its eastern part, and exploring in the western part privately. The applicant will supervise the operations.

Mr. Jack O. Jones, holding a minor interest in the Beth claims, received a degree in mining engineering from Ohio State University in 1936. He has twenty years of professional experience, including five years in the uranium industry. Mr. Jones was employed by the Atomic Energy Commission for two years as deputy chief of the Grand Junction Exploration Branch, supervising their drilling operations on the Colorado Plateau. Mr. Jones will advise the operations.

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6. Estimate of Costs:

(a) Independent Contracts

(1) drilling:

Maximum Footage

non-core	48,800 ft.	@$3.00/ft.=	$146,400.00
core	6,100 ft.	@$5.00/ft.=	$ 30,500.00
			$176,900.00

Minimum Footage

non-core	17,600 ft.	@$3.00/ft.=	$ 52,800.00
core	2,200 ft.	@$5.00/ft.=	$ 11,000.00
			$ 63,800.00

(2) Road building and preparation of drilling sites:

Phase I: (a) Seven miles of road

60 hrs. dozing/mi. @$12.00/hr.=$ 720.00 per mi.

Seven miles=	$5,040.00	$5,040.00

(b) About 700 yards of road to be built down Carmel-Navajo cliff, switchbacking down a draw, elevation drop about 100 yds. About 300 yds. would require removal of about 1,200 cubic yards of rock by blasting.

1200 cu.yds. @$3.00/yd.=	$3,600.00	
70 hrs. dozing @$12.00/hr.=	840.00	
cost of road down draw=	$4,440.00	$4,440.00

Total cost of road, phase I $9,480.00

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6. (a) cont'd.

Phase II: Difficult to evaluate as the location of the roads are not known at present. Four miles of road is estimated averaging rougher terrain than Phase I. The work per mile is estimated to be 60 hours of dozing and 200 cubic yards of rock excavation.

60 hrs. dozing/mi. @$12.00/hr.=	$ 720.00	
200 cu.yds. rock/mi.@$ 3.00/yd.=	$ 600.00	
	$1,320.00	per mi

Total cost of road, phase II=4 x $1,320.00=$5,280.00

Road costs phase I=	$ 9,480.00	
Road costs phase II=	$ 5,280.00	
Total road & drill site preparation costs	$14,760.00	$ 14,760.00

Cost of drilling maximum footage	$176,900.00
Total cost of Independent Contracts	$191,660.00

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6. (b) Labor, supervision, and consultants:

Applicant's salary: $600/mo. for possible 6 mo.	$3,600.00
Assistant's salary: $350/mo. for possible 6 mo.	$2,100.00
	$5,700.00

(c) Operating materials and supplies - None

(d) Operating Equipment:

1955 Jeep truck owned by me for my field use: suggest rental and operational expenses be placed at $150/mo. for possible 6 months	$ 900.00
1948 Chrysler owned by me for assistant's field use: suggest rental and operational expenses be placed at $100/mo. for possible 6 mo.	600.00
	$1,500.00
core splitter:purchase price	34.50
	$1,534.50

(e) Rehabilitation and Repairs - None

(f) New buildings, Improvements, Installations - None

(g) Miscellaneous:

accounting: Suggest an allowance of $200.00	$ 200.00
legal fees: For contracts to be drawn up with contractors	200.00
Liability insurance: $46.00 for 6 mo. period	46.00
Assaying of core samples: $3.50 per assay, allowance of 50 samples	175.00
	$ 621.00

(h) Contingencies - None

SUMMARY OF COSTS

6. (a)	$191,660.00
(b)	5,700.00
(d)	1,534.50
(g)	621.00
	$199,515.50

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7. (a) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation?:

Yes.

(b) How do you propose to furnish your share of the costs?:

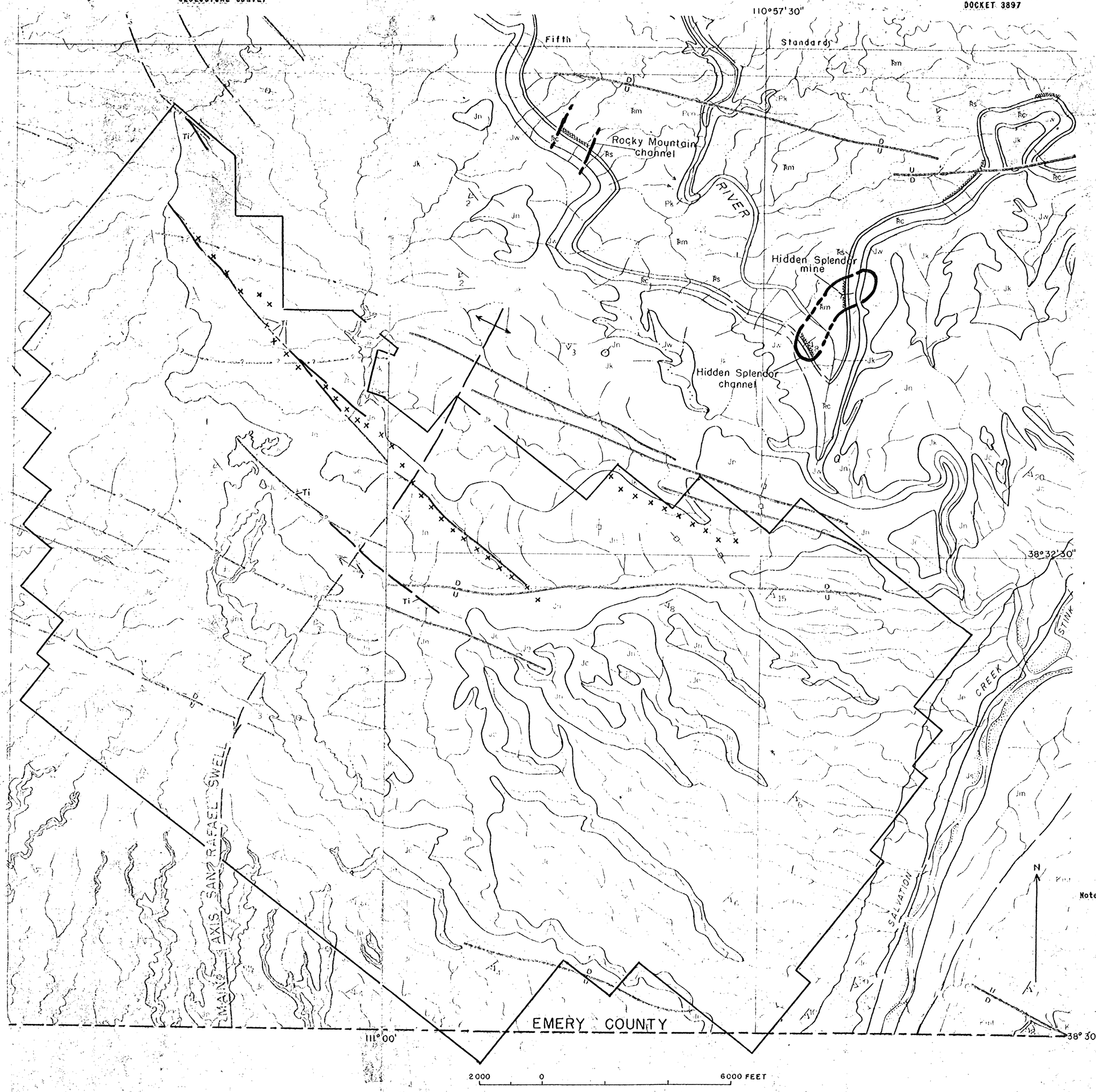
A sufficient share in the claims will be sold to finance the applicant's participation in the proposed exploration. Interest shown in the claims by several corporations and individuals has demonstrated this can be accomplished without losing the controlling interest.

Kirby C. Cornell

Kirby C. Cornell
922 Bunting Avenue
Grand Junction, Colorado

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEFENSE MINERALS EXPLORATION ADMINISTRATION
DOCKET 3897
OCTOBER 1955



EXPLANATION

Jc	CARMEL FORMATION	JURASSIC
Jn	NAVAJO SANDSTONE	JURASSIC(?)
Jk	KAYENTA FORMATION	
Jw	WINGATE SANDSTONE	
Ꞧc	CHINLE FORMATION	TRIASSIC
Ꞧs	SHINARUMP CONGLOMERATE	
Ꞧm	MOENKOPI FORMATION	
Pk	KAIBAB LIMESTONE	PERMIAN
Pco	COCONINO SANDSTONE	
Ti	DIABASE DIKES	

CONTACT
Dashed where located approximately

FAULT
Dashed where located approximately
(U, upthrown side; D, downthrown side)

ANTICLINE
Showing trace of axial plane and direction of plunge
(Dashed where approximately located)

STRIKE AND DIP OF BEDS

STRIKE OF APPROXIMATELY VERTICAL JOINT SYSTEM

APPROXIMATE BOUNDAY OF CHANNEL, DASHED WHERE INFERRED

MINERALIZED OUTCROP

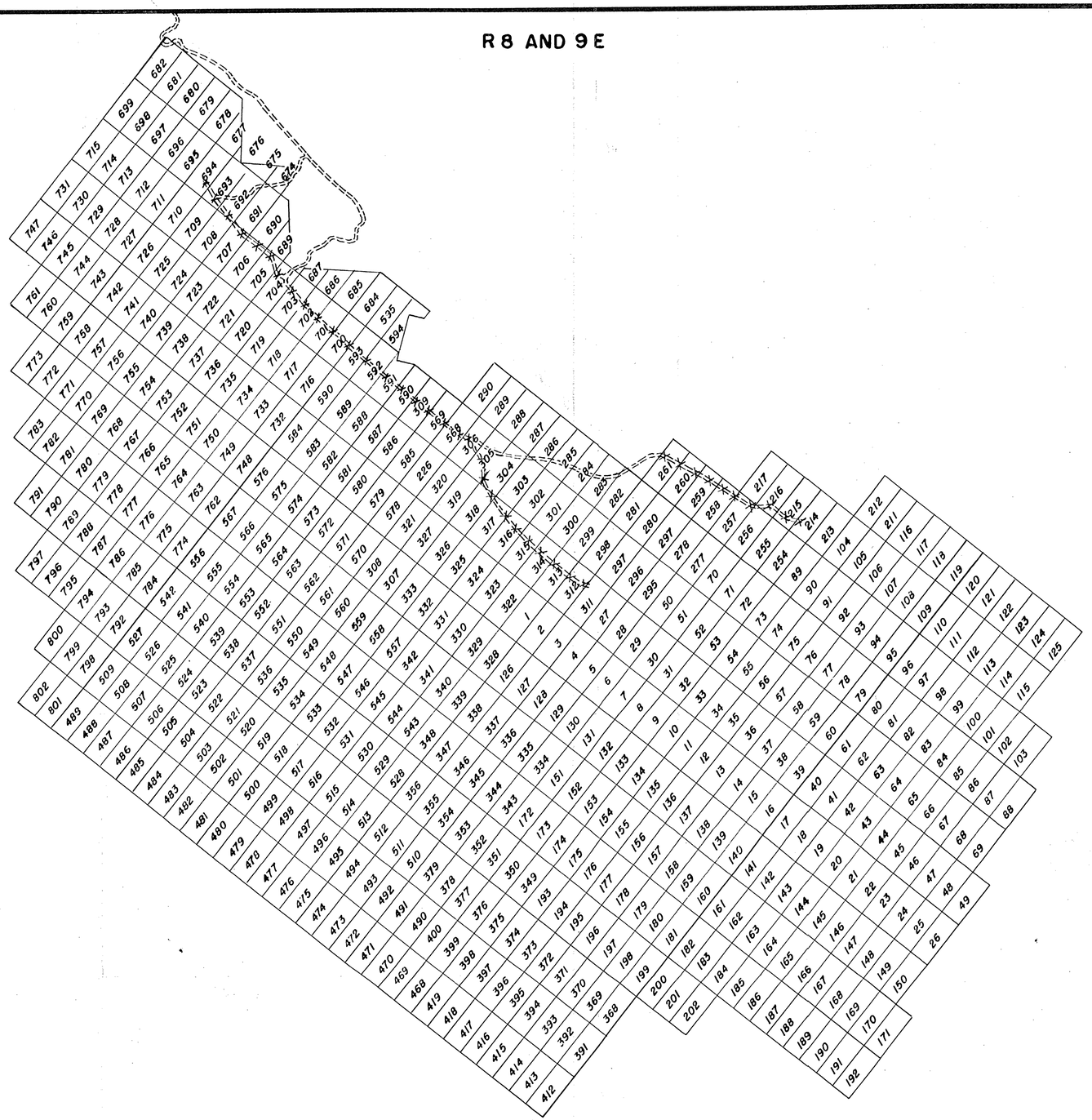
BOUNDARY OF KIRBY C. CORYELL PROPERTY

× LOCATION OF PROPOSED DRILL HOLE

Note: BASE MAP FROM U.S.G.S. PHOTOGEOLOGIC QUADRANGLE MAPS EMERY 16 AND STINKING SPRING CREEK 13 WITH ADDITIONS AND MODIFICATIONS BY APPLICANT.

Figure 2. GEOLOGIC MAP SHOWING LOCATION OF INFERRED CHANNELS IN VICINITY OF KIRBY C. CORYELL PROPERTY, EMERY COUNTY, UTAH.

MINERAL DEPOSITS
DMEA
RECEIVED
DEC 19 1955
U.S.
GEOLOGICAL SURVEY
DENVER, COLORADO



LEGEND

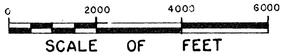
× LOCATION OF PROPOSED DRILL HOLES OF PHASE I.

PROPOSED ACCESS ROADS.

NOTES

1) MAP DATA SUPPLIED BY APPLICANT.

2) ALL OF THE CLAIMS ARE NUMBERED BETH NO. 1, BETH NO. 2, ETC., BUT ON THIS MAP ARE ONLY DESIGNATED BY NUMBER.



U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

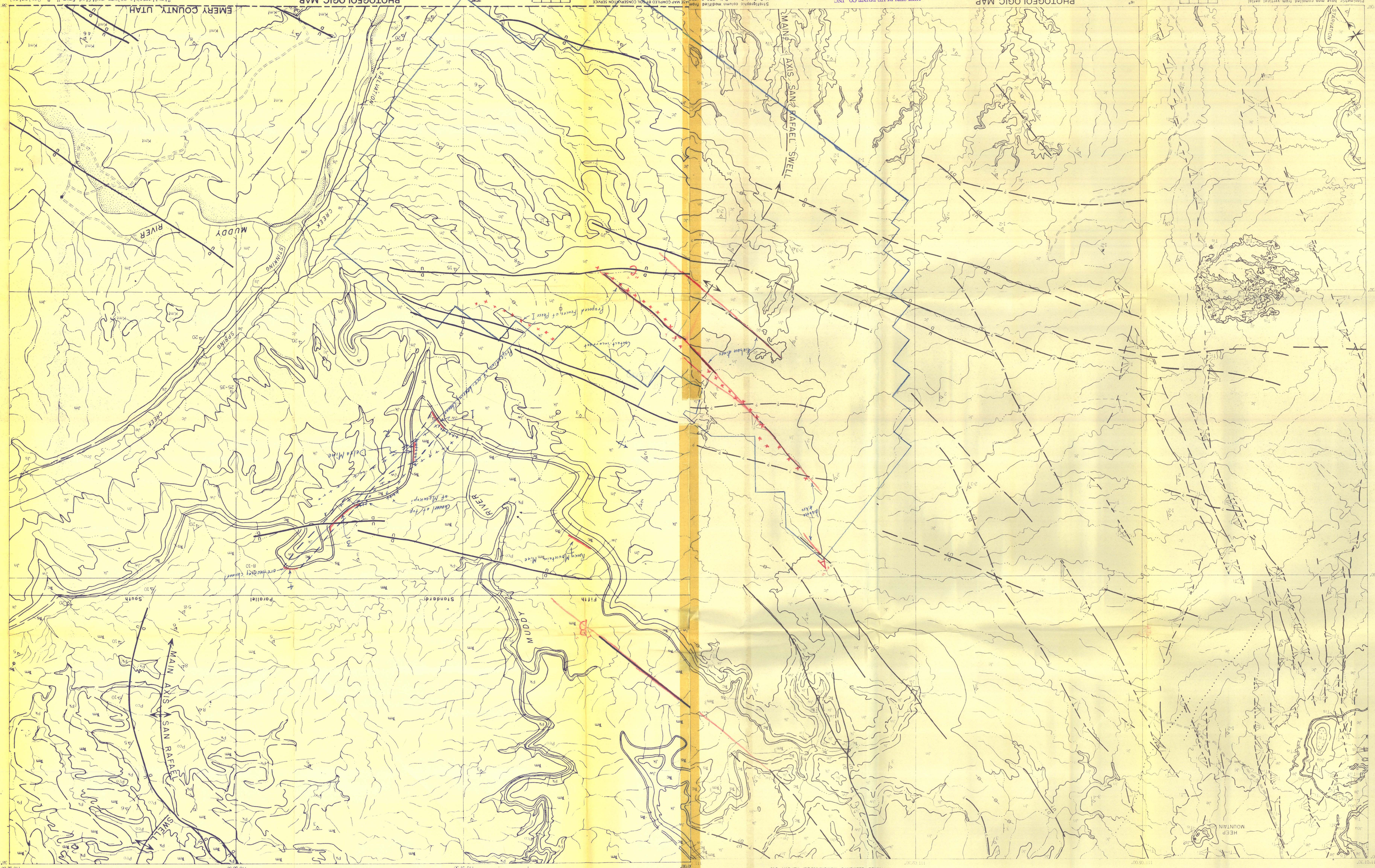
Fig. 2 DMEA Docket No. 3897

Claim Map showing Proposed Drill Hole Locations and Access Roads for Phase I

KIRBY C. CORYELL, BETH CLAIMS

EMERY COUNTY, UTAH

ENGINEER: *M. H. HOWES*	DATE: OCT. 31, 1955
TRACED: OCT. 1955; BY: A.P.T.S.	1900 - 360 - C
CHECKED:	

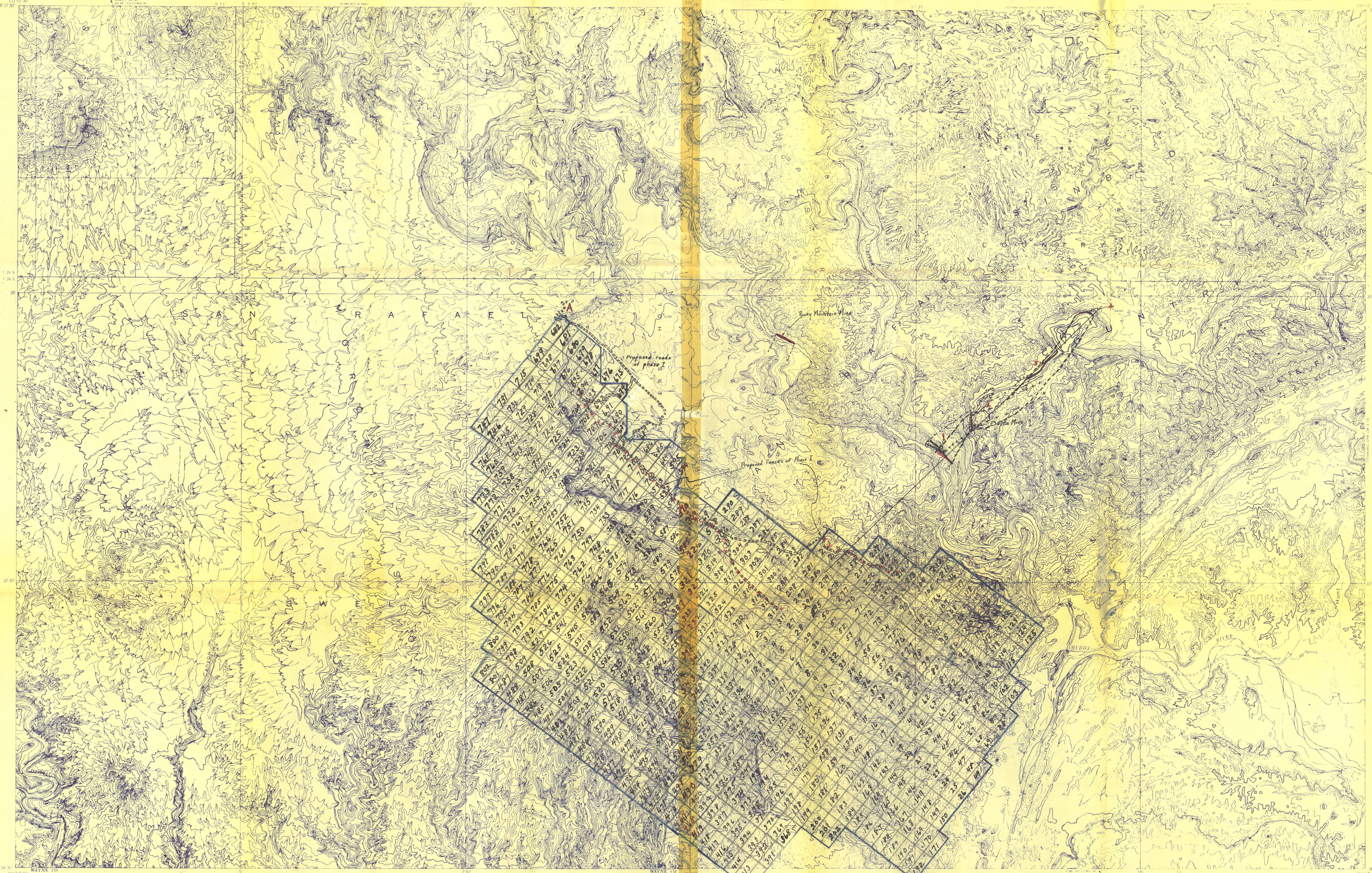

U 240 SE
U-241 SW
MAIN AXIS SAN RAFAEL SWELL
MUDDY RIVER
STINKING SPRING CREEK
Dalton Mine
Proposed Fence of Fence I
Fault
Contact
EXPLANATION
CRETACEOUS
JURASSIC
JURASSIC (?)
TRIASSIC
PERMIAN
Morrison Formation
Summerville Formation
Curtis formation
Entrada Formation
Carmel formation
Navajo sandstone
Kayenta formation
Wingate sandstone
Chinle formation
Shinarump conglomerate
Moenkopi formation
Kaibab limestone
Coconino sandstone
Strike and dip of beds (Based on photo-interpretation)
Strike of approximately vertical joint system (Based on photo-interpretation)
Secondary road
County boundary
Stratigraphic column modified from U.S. Geol. Survey Bull. 806-C(1929)
Stratigraphic column modified from Survey Oil and Gas Inv. Map OM 131 and Bull. 806.
EMERY COUNTY, UTAH
STINKING SPRING CREEK-13
PHOTOGEOLOGIC MAP
EMERY-16
PHOTOGEOLOGIC MAP
EMERY COUNTY, UTAH
PHOTOGEOLOGY BY C.E. BATES
SCALE 1:24,000
PHOTOGEOLOGY BY W.H. CONDON
SCALE 1:24,000
DECEMBER 1962
MAY 1962
NIELSEN BLUE PRINT CO., INC.
105 North 3rd St. Phone 2124
Grand Junction, Colorado
ADDITIONAL COPIES OF THESE MAPS MAY BE BOUGHT AT: NIELSEN BLUE PRINT INC. 108 NORTH 3rd ST. GRAND JUNCTION, COLO.
U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
PREPARED IN COOPERATION WITH THE ATOMIC ENERGY COMMISSION
COMPILATION OF PHOTOGEOLOGY AND SURFACE GEOLOGY
COLORADO PLATEAU AREA, UNITED STATES
TRACE ELEMENTS MEMORANDUM REPORT 546
TRACE ELEMENTS INVESTIGATIONS REPORT 797

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EMERY 4 SE QUADRANGLE
UTAH-EMERY CO.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STINKING SPRING CREEK 3 SW QUADRANGLE
UTAH-EMERY CO.



Mapped by the Geological Survey 1953

Topography by multiplex methods from aerial photographs taken 1951

Data subject to minor corrections when incorporated in a standard series map

SCALE 1:24000

1 MILE

7000 FEET

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

ROAD CLASSIFICATION

Improved ..... Unimproved .....

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1951

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

NIELSEN BLUE PRINT CO., INC.
108 North 3rd St. Phone 2124
Grand Junction, Colorado

EMERY 4 SE, UTAH
N38°30'—W110°00'/7.5'

U 240

Mapped by the Geological Survey 1953

Topography by multiplex methods from aerial photographs taken 1951

Data subject to minor corrections when incorporated in a standard series map

SCALE 1:24000

1 MILE

7000 FEET

ROAD CLASSIFICATION

Improved ..... Unimproved .....

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

NIELSEN BLUE PRINT CO., INC.
108 North 3rd St. Phone 2124
Grand Junction, Colorado

STINKING SPRING CREEK 3 SW, UTAH
N38°30'—W110°22'5/7.5'

U 241 SW

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
ATOMIC ENERGY COMMISSION

COMPILATION OF PHOTOGEOLOGY AND SURFACE GEOLOGY
COLORADO PLATEAU AREA, UNITED STATES

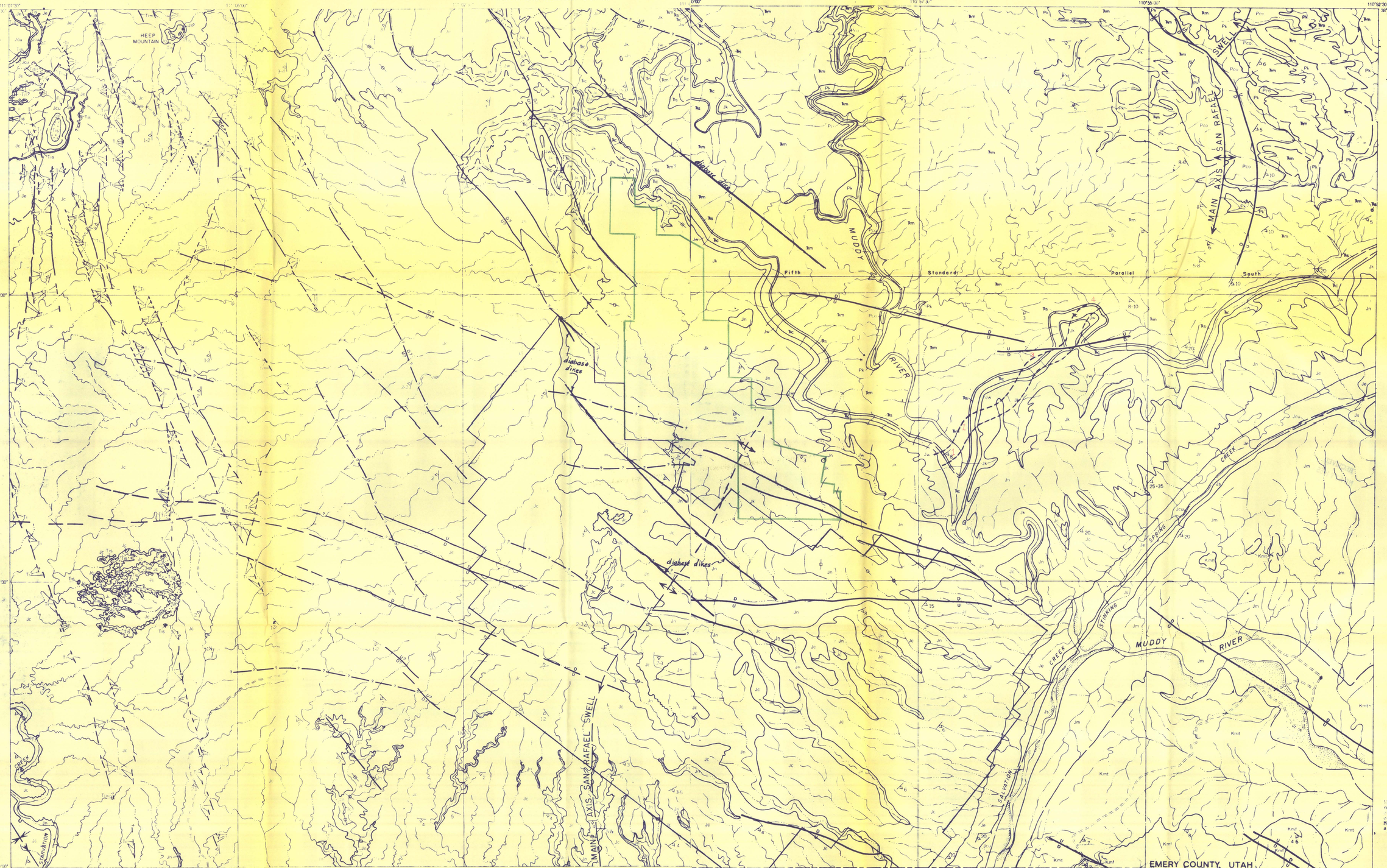
TRACE ELEMENTS MEMORANDUM REPORT 546

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
ATOMIC ENERGY COMMISSION

COMPILATION OF PHOTOGEOLOGY AND SURFACE GEOLOGY
COLORADO PLATEAU AREA, UNITED STATES

TRACE ELEMENTS MEMORANDUM REPORT 597



EXPLANATION

Upper	Kmf	Mancos shale Ferron sandstone member, Kmf; Tununk shale member, Kmt	CRETACEOUS
	Kmt		
Upper	Jm	Morrison formation	JURASSIC
	Js	Summerville formation	
	Jcu	Curtis formation	
Middle and Upper	Je	Entrada formation	
	Jc	Carmel formation	
	Jn	Navajo sandstone	
	Jk	Kayenta formation	JURASSIC (?)
	Jw	Wingate sandstone	
Upper	Jr	Chinle formation	TRIASSIC
	Ts	Shinarump conglomerate	
Lower	Tm	Moenkopi formation	
	Pk	Kaibab limestone	PERMIAN
	Pco	Coconino sandstone	

Contact
(Can be accurately located within 30 feet horizontally)

Contact
(Can be approximately located within 30 to 200 feet horizontally)

Fault
(Dashed where approximately located)

High-angle fault
(U, upthrown side; D, downthrown side)

Anticline
Showing trace of axial plane and direction of plunge
(Dashed where approximately located)

Strike and dip of beds
(Based on photo-interpretation)

Strike of approximately vertical joint system
(Based on photo-interpretation)

Secondary road

County boundary

Note: In the areas of Stinking Spring Creek quadrangles 11, 12, 13 and 14, the contacts of the Moenkopi formation are approximate on the aerial photographs. However, the Moenkopi formation is here mapped as a single formation.

Planimetric base map compiled from vertical aerial photographs by U.S. Geological Survey by radial-templet methods. Horizontal control extended west from Soil Conservation Service Map No 241.

4	3	2	1
5	6	7	8
12	11	10	9
13	14	15	16

EMERY QUADRANGLE

16° TRUE NORTH

PHOTOGEOLOGIC MAP
EMERY-16
EMERY COUNTY, UTAH

PHOTOGEOLOGY BY W. H. CONDON
PHOTOGEOLOGY UNIT, ALASKAN GEOLOGY BRANCH
SCALE 1:24,000

1 MILE

DECEMBER 1952

Stratigraphic column modified from U.S. Geol. Survey Bull. 806-C, 1929

BASE MAP COMPILED BY SOIL CONSERVATION SERVICE
U. S. DEPT. OF AGRICULTURE

MAY 1952

U 240 SE

4	3	2	1
5	6	7	8
12	11	10	9
13	14	15	16

STINKING SPRING CREEK QUADRANGLE

TRUE NORTH

PHOTOGEOLOGIC MAP
STINKING SPRING CREEK-13
EMERY COUNTY, UTAH

PHOTOGEOLOGY BY C.E. BATES
SCALE 1:24,000

1 MILE

Stratigraphic column modified from U. S. Geological Survey Oil and Gas Inv. Map OM 131 and Bull. 806.

13

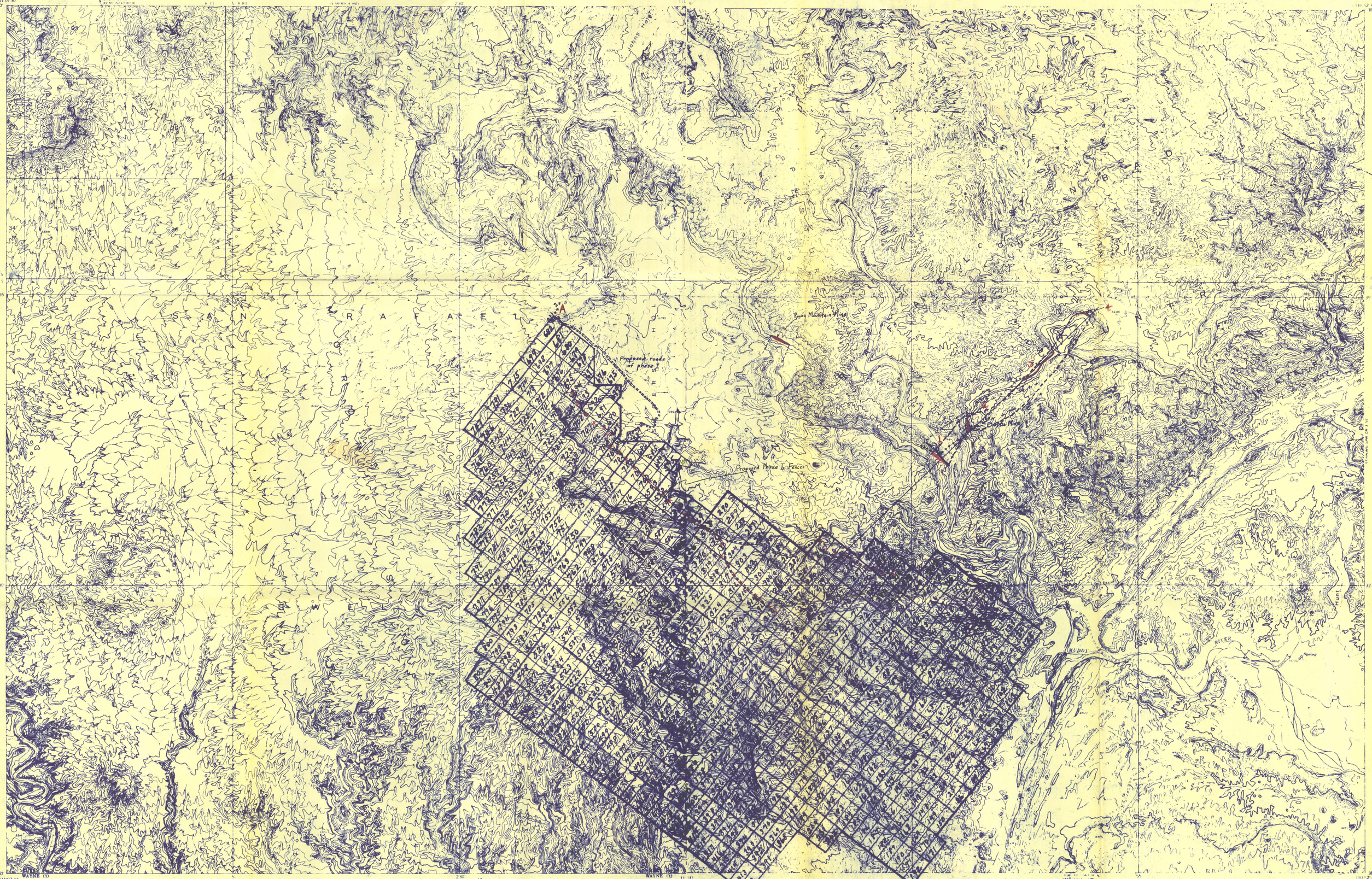
U-241 SW

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EMERY 4 SE QUADRANGLE
UTAH-EMERY CO

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STINKING SPRING CREEK 3 SW QUADRANGLE
UTAH-EMERY CO



Mapped by the Geological Survey 1953

Topography by multiplex methods from aerial photographs taken 1951

Data subject to minor corrections when incorporated in a standard series map

Kirby C. Coryell
922 Bunting Ave.
Grand Junction, Colo.

SCALE 1:24000

1 MILE

7000 FEET

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Improved ____ Unimproved

EMERY 4 SE, UTAH
N3830—W11100/7.5
U 240

SCALE 1:24000

1 MILE

7000 FEET

ROAD CLASSIFICATION
Improved ____ Unimproved

STINKING SPRING CREEK 3 SW, UTAH
N3830—W11000/7.5
U 241 SW

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
ATOMIC ENERGY COMMISSION

COMPILATION OF PHOTOGEOLOGY AND SURFACE GEOLOGY
COLORADO PLATEAU AREA, UNITED STATES

TRACE ELEMENTS MEMORANDUM REPORT 546

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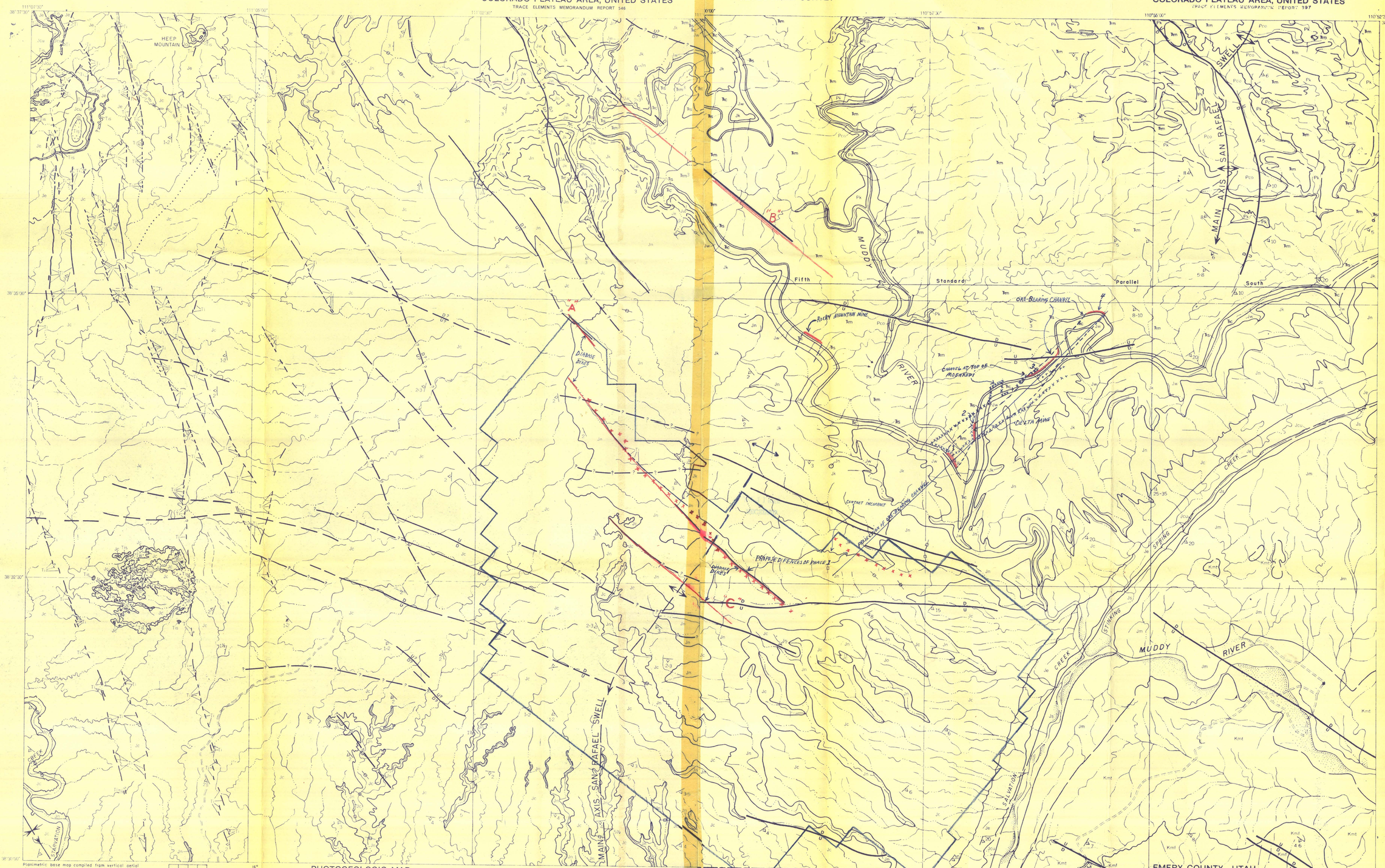
COLORADO PLATEAU AREA, UNITED STATES

TRACE ELEMENTS MEMORANDUM REPORT 397



EXPLANATION

Upper	Kmf, Kmt	Mancos shale Ferron sandstone member, Kmf; Tununk shale member, Kmt — CRETACEOUS
	Jm	Morrison formation — JURASSIC
Upper	Js	Summerville formation
	Jcu	Curtis formation
	Je	Entrada formation
Middle and Upper	Jc	Carmel formation
	Jn	Navajo sandstone
	Jk	Kayenta formation — JURASSIC (?)
	Jw	Wingate sandstone
Upper	Ttc	Chinle formation — TRIASSIC
	Ts	Shinarump conglomerate
Lower	Tm	Moenkopi formation
	Pk	Kaibab limestone — PERMIAN
	Pco	Coconino sandstone

Contact
(Can be accurately located within 30 feet horizontally)

Contact
(Can be approximately located within 30 to 200 feet horizontally)

Fault
(Dashed where approximately located)

High-angle fault
(U, upthrown side, D, downthrown side)

Anticline
Showing trace of axial plane and direction of plunge
(Dashed where approximately located)

Strike and dip of beds
(Based on photo-interpretation)

Strike of approximately vertical joint system
(Based on photo-interpretation)

Secondary road

County boundary

Note: In the areas of Stinking Spring Quadrangle 11, 12, 13, and 14, C, D, and E of the Moenkopi formation are represented on the aerial photographs. However, the Moenkopi formation is here mapped as a single formation.

Planimetric base map compiled from vertical aerial photographs by U. S. Geological Survey by radial-templet methods. Horizontal control extended west from Soil Conservation Service Map No. 241.

4	3	2	1
5	6	7	8
12	11	10	9
13	14	15	16

EMERY QUADRANGLE

TRUE NORTH 16°

PHOTOGEOLOGIC MAP
EMERY-16
EMERY COUNTY, UTAH
PHOTOGEOLOGY BY W. H. CONDON
PHOTOGEOLOGY UNIT, ALASKAN GEOLOGY BRANCH
SCALE 1:24,000
1 MILE

DECEMBER 1952

NIELSEN BLUE PRINT CO., INC.
108 North 3rd St. Phone 2124
Grand Junction, Colorado

U 240 SE

Stratigraphic column modified from MAP COMPILED BY SOIL CONSERVATION SERVICE
U.S. Geol. Survey Bull. 806-C, 1929 & DEPT. OF AGRICULTURE

MAY 1952

4	3	2	1
5	6	7	8
12	11	10	9
13	14	15	16

STINKING SPRING CREEK QUADRANGLE

TRUE NORTH 17°

PHOTOGEOLOGIC MAP
STINKING SPRING CREEK-13
EMERY COUNTY, UTAH
PHOTOGEOLOGY BY C.E. BATES
SCALE 1:24,000
1 MILE

KIRBY C. CORYELL
922 BUNTING
GRAND JUNCTION, COLO.

NIELSEN BLUE PRINT CO., INC.
108 North 3rd St. Phone 2124
Grand Junction, Colorado

EMERY COUNTY, UTAH

Stratigraphic column modified from U. S. Geological Survey Oil and Gas Inv. Map OM 131 and Bull. 806.

13

U-241 SW