DMA Form 1

DEFENSE MINERALS ADMINISTRATION
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DMA Docket No. 2537

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FILE COPY
SURNAME:

Ellis
Nuttendorf

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

Denied on 10/30/53 as per the Auth. rqst.

NOV 2 1953

Mr. . . Ludwig, President
Rare Earth Mining Company
Silverville, Colorado

Re: Docket No. [illegible]-2537 (Thorium & Uranium)
L. C. Knobbe and Ernest Sperling
Thorium Mountain claims
Custer County, Colorado

Dear Mr. Ludwig:

This will acknowledge receipt of your letter dated October 23, 1953, appertaining to the captioned property, which property was acquired by your company according to the information in your letter of June 2, 1953, addressed to Mr. R. H. King, Executive Officer, Region IV.

We note in your letter of October 23 that you are requesting withdrawal of the subject application. We furthermore noted that you state such withdrawal request was made several months ago. The only correspondence we received regarding this procedure is dated July 6, 1953, in which you state: " . . . with regard to the Wet Mountain property will you please disregard my previous request to have action taken on this application and hold the same in abeyance until some future date." In accordance with that request we have been holding this application in abeyance. However, in view of your recent letter we are considering the application withdrawn and the docket closed, without prejudice to reopening of the application should future conditions warrant.

Thank you for advising us in this matter.

Sincerely yours,

SIGNED
Ernest Wm. Ellis, Chief
Rare Misc. Metals Division

EWEllis/gla/db
10-30-53
cc to: Adm. Reading File
Docket
Messrs: H. L. Keiser, Rm. 3641
A. P. Butler, Jr., Rm. 3212, CSA
Ellis
DMA Field Team, Region IV (2)

R.C.J. 11-2-53

URANIUM THORIUM RARE EARTHS

10/30/53 gla

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 30 1953

TELEPHONE—PLACERVILLE 7

RARE EARTH MINING COMPANY

PLACERVILLE, COLORADO

October 28,1953

Department of the Interior,
Defense Minerals Exploration Authority,
Washington 25, D.C.

Gentlemen: Attention: Mr. Ellin
INRE-DMEA No. 2537

At the request of Mr. Jas. B. Murray of Lindsay Chemical Company, West Chicago, Illinois, I wrtoe you several months ago requesting the withdrawal of application for exploration funds covering the Sparling-Knobbe property in Custer County, Colorado under the Docket Number 2537.

In view of the departments action with regard to our own application covering the Powderhorn properties in Gunnison county and past exploration activities on the Haputa Ranch in Custer County we do not wish to proceed with this application at this time.

We request this application No. 2537, Sparling-Knobbe be removed from the active list and held in abeyance for such action as may in the future be requested.

Very truly yours,

R. Ludwig

Rare Earth Mining Company
Rresident

RIL/c

C O P Y

Uranium Thorium Rare Earths

Telephone-Placerville 7 RARE EARTH MINING COMPANY

Placerville, Colorado

July 8, 1953.

U. S. Department of the Interior,
Defense Minerals Administration,
Washington 25, D. C.

Gentlemen: INRE: DMEA 3032. . Rare Earth Mining Co.

With reference to the above application we are in receipt today of a letter from Mr. Jas. B. Murray of Lindsay Chemical Company written from Washington requesting we forward you assignment of lease between Neil Foreman and Albert McGregor and Robert I. Ludwig which has been assigned to the Rare Earth Mining Company. On June 8th I delivered the original copy of this assignment to Mr. John Shaw in your Region IV office in Denver for inclusion with the original application. This was the original assignment taken direct from the corporate minute books.

Upon receipt of Mr. Murray's letter today I immediately called Mr. Shaw to learn of his absence from Denver, however, I talked with Mr. King who advises me this document went forward, to the best of their knowledge, with the docket when forwarded to you on June 16th. He will however, check the Denver files and should this have been left out will forward the same to you immediately.

In the event this document does not arrive please advise me by Air Mail and a new assignment will be prepared and forwarded you without delay.

New Consent to Lein forms properly executed by the Owner's are enclosed.

Mr. Murray further refers to my recent letter to you with regard DMEA No. 2537, the Sparling-Knobbe property. As this lease has not of this date been assigned to the corporation and further because of the apparent lack of ability for the Lindsay Company to determine its position with regard to the Wet Mountain property will you please disregard my previous request to have action taken on this application and hold the same in abeyance until some future date. In the meantime we are working with the Lindsay firm towards some evaluation of the Wet Mountain group and upon determination of their interest we will advise you of our desire in this connection.

This writer will be absent from Placerville from the 9th thru the 16th of this month. In the event you should require further information please advise me and upon my return every requirement will immediately be fulfilled.

Your cooperation and consideration is sincerely appreciated and you may count upon our most wholesome cooperation in every way.

Very truly yours,

/s/ Robert I. Ludwig
Rare Earth Mining Company
Robert I. Ludwig, President

cc-Jas. B. Murray - Chevy Chase, Md.,
Lindsay Chem. Co. West Chicago.

6-12-53

Re: Docket No. DMEA 257 (Thorium)
KNOBBE & Sparling

6-12-53

Re: Discussion with Mr. Jas S. Murray
Asst. to Pres. Linsay Chemical Company.
Who controls Rare Earth Mining Company.
and who has leased the captioned property.
Mr. Murray will instruct messrs. Knobbe and
Sparling to write a letter withdrawing application
and transferring contents of docket to the Rare
Earth Mining Co. Also he will instruct Mr.
R.T. Ludwig to write DMEA a letter ~~asking~~
stipulating that no further action be taken on
the case until the investigation now being
conducted of the area by B.E.L. is completed.

J.L.K.

NDARD FORM NO. 64

6/15/53 gla

Office Memorandum • UNITED STATES GOVERNMENT

TO : E. Wm. Ellis, DMEA Member
Uranium Commodity Committee

DATE: June 12, 1953

FROM : Arthur P. Butler, Jr., USGS Member
Uranium Commodity Committee

SUBJECT: Final Field Team Report, DMEA Docket 2537 (Uranium and thorium) L. C. Knobbe, Spearville, Kans., and E. Sparling, Rosita, Colo. applicants Thorium Mtn. and six other claims, Custer Co. Colo.

The Field Team Report on the results of examination of the property identified in the subject above, has been reviewed and discussed with H. D. Keiser, Bureau of Mines member of the Uranium Commodity Committee, and J. O. Hosted, U. S. Atomic Energy Commission.

The applicants proposed to explore thorium-bearing veins in shear zones by trenches on six claims, cleaning out an adit on one claim, sinking a shaft on one claim and repairing a shaft on another.

Comment

Thorium minerals occur in narrow lenses within shear zones that cut a variety of pre-Cambrian metamorphic and igneous rocks. The zones range from knife-blade thin fractures to 5 feet in width. Thorite is the principal radioactive minerial, and small amounts of rare-earth oxides, of unidentified mineral form, are associated with it. Channel samples collected on five of the claims contain from 0.017 to 1.01 equivalent thorium. Locally selected high-grade material contains 1.59 percent thorium by chemical analysis. Total content of rare-earth oxide is estimated as less than 0.5 percent and uranium is negligible.

At the time that the Field Team Report was prepared thorium was not named as an element on the critical list, and no recommendations were made concerning exploration for thorium. They did point out, however, that the prosed exploration consisted mainly of surface work and would not add materially to the knowledge of the thorium deposits. Owing to the extent of the thorium bearing structures and the sporadic distribution of more concentrated masses of thorium bearing minerals in those structures, development of a sound exploration program would depend on thorough working out of the geology not only on the specific claims but in adjacent ground as well. Detailed study by the Geological Survey of the area within which the claims lie is in progress on behalf of the Atomic Energy Commission. Results of this study will provide a much better basis than now exists for planning an exploration program. A similar study by DMEA would be unnecessary duplication of effort. Decision with regard to plans for most exploration in that area would best be held in abeyance until results of the Survey's study are available.

It is possible, however, that a small amount of subsurface work such as rehabilitating existing openings would furnish information on the character of the thorium-bearing structures in the shallow subsurface that would be useful in not only for appraising the particular claim but also contribute to knowledge and appraisal of the thorium-bearing structures in general. As thorium is now specified in the list of critical materials, a small amount of such work, such as rehabilitation of the adit on Starbuck, claim may be warranted. The highest grade channel sample was taken on that claim.

Recommendations

I recommend that application for assistance for the proposed surface work be denied or held in abeyance until results of the Geological Survey's general study are available, but that the Field Team be asked to make recommendations concerning the desirability of rehabilitating some of the underground openings at this time.

Arthur P. Butler, Jr.

Copy to : E. Wm. Ellis
H. D. Keiser

IN REPLY REFER TO:

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

June 12, 1953

E. Wm. Ellis, DMEA Member
Uranium Commodity Committee
Arthur P. Butler, Jr., USGS Member
Uranium Commodity Committee
Final Field Team Report, DMEA Docket 2537 (Uranium and thorium) L. C. Knobbe, Spearville, Kans., and E. Sparling, Rosita, Colo. applicants Thorium Mtn. and six other claims, Custer Co. Colo.

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Recommendations

I recommend that application for assistance for the proposed surface work be denied or held in abeyance until results of the Geological Survey's general study are available, but that the Field Team be asked to make recommendations concerning the desirability of rehabilitating some of the underground openings at this time.

Copy to : R. Wm. Allis
H. D. Keiser

IN REPLY REFER TO:

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

E. Wm. Ellis, DMEA Member
Uranium Commodity Committee
Arthur F. Butler, Jr., USGS Member
Uranium Commodity Committee
Final Field Team Report, DMEA Docket 2537 (Uranium and thorium) L. C. Knobbe, Spearville, Kans., and E. Sparling, Rosita, Colo. applicants Thorium Mtn. and six other claims, Custer Co. Colo.

June 12, 1953

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Recommendations

I recommend that application for assistance for the proposed surface work be denied or held in abeyance until results of the Geological Survey's general study are available, but that the Field Team be asked to make recommendations concerning the desirability of rehabilitating some of the underground openings at this time.

Copy to : E. Wm. Ellis
H. D. Keiser

6/11/53-dlb.

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

224 New Customhouse
Denver 2, Colorado

June 3, 1953

Memorandum

To: C.O. Mittendorf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA-2537 (Uranium and Thorium), L.C. Knobbe and Ernest Sparling

Enclosed is a copy of a letter from Robert I. Ludwig, President, Rare Earth Mining Company, in which he states he has leased six lode mining claims from Messrs. Knobbe and Sparling.

Knobbe and Sparling submitted an application for exploration assistance on these claims. The final report was sent to Washington on April 7, 1953. This letter is being forwarded to you for your consideration inasmuch as the final report has already been submitted to the Washington office.

W.H. King

W.H. King

Enclosure

RECEIVED
JUN 12 1953
GENERAL COUNSEL
DEFENSE MINERALS
ADMINISTRATION

224 New Customhouse
Denver 2, Colorado

June 3, 1953

Memorandum

To: C.O. Mittenderf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA-2537 (Uranium and Thorium), L.C. Knobbe and Ernest Sparling

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W. H. King
W.H. King

Enclosure

COPY

RARE EARTH MINING COMPANY
Placerville, Colorado

June 2, 1953

Mr. W.H.King
Director Region IV
D.M.E.A.
New Custom House
Denver, Colorado

Dear Mr. King:

Recently we executed a lease covering six (6) lode Mining Claims known as:

Thorium Mountain Lode	Atomic Mountain Lode
Star Buck Lode	General Ike Lode
Lucky Find Lode	Mystery Lode

from Mr. Lawrence Knobbe and Ernest Sparling of R.F.D. Westcliffe, Colorado.

These properties are included in the presently classified Trace Element Investigation Report No. 250 prepared for the A.E.C. by the U.S. Geological Survey.

Messrs. Knobbe and Sparling have applied for an exploration loan which I understand has been given Docket No. 2537 and has been reported out of your office to Washington on April 17th.

We wish to assume the sponsorship of this application. Under such sponsorship we will assume all responsibilities usually borne by the applicant. Would you please advise us the proper proceedure for having this application transfered to our name?

Your earliest advise in this matter will be appreciated.

Very truly yours,

/s/ R. I. Ludwig

Rare Earth Mining Company
Robert I. Ludwig, President

cc: Mr. Jas. B. Murray,
Asst. to President
Lindsay Chemical Company
5524 Warwick Place
Chevy Chase, Md.

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

224 New Customhouse
Denver 2, Colorado

June 1, 1953

Memorandum

To: C.O. Mittendorf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket DMEA-2537, Knobbe and Sparling (Uranium and Thorium)

The original and three copies of the final report on Docket DMEA-2537 were sent to the Secretary of the Operating Committee on April 17, 1953. Please advise what action was taken on this application.

W. H. King

W. H. King

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

224 New Customhouse
Denver 2, Colorado

June 1, 1953

Memorandum

To: C.O. Mittenderf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket DMEA-2537, Knebbe and Sparling (Uranium and Thorium)

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W. H. King

W. H. King

[illegible]

[illegible]

DOEH-2[illegible]

III [illegible] 4 [illegible]

Amt. 12666

Discussed on appl[illegible] with

[illegible] M.C.

[illegible]

Suggest not withhold any [illegible]

until we see where [illegible]

is placed on the "list."

Note: He is under [illegible]

by U.S.G.S.

[illegible]

6-1-53

Discussed case with Joe Horbach

by telephone. He will discuss case

with me 6-3-53 in morning

J.H.

Hold Docket under comments

from Bethe are received

J.H. 6-1-53

Communicated by Hoskins 4/24/83

U.S.G.S. will carry on examination of this area and it would seem best that any physical exploration contemplated await report by survey.

Mr. Hosted.

Joe.

I think that Hugh, someone from Ellis' office, you and I should discuss this before Hugh and I make our recommendations.

He feels Lamb's [illegible] would be willing to handle the exploration.

(A.P. Butler ?)

F. Schmidt 4/24/53

MW

DMEA-2537

U.S. Geological Survey will carry an examination of this area this year and it would seem best that any physical exploration contemplated await report by Survey

Rm. 4640 Int

Dmea

5/28/53 gla

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C. May 26, 1953

Memorandum

To: Ernest William Ellis, DMEA Member
Uranium Commodity Committee, Room 4640

From: H. D. Keiser, Bureau of Mines Member
Uranium Commodity Committee

Subject: Final Report, DMEA Docket 2537, L. C. Knobbe and Ernest Sparling, Thorium Mountain Claims, Custer County, Colorado.

I have reviewed the subject report and discussed it with Arthur P. Butler, Geological Survey Member, and Joseph O. Hosted, representative of the Atomic Energy Commission.

It is understood that the Geologic Survey, on behalf of the Atomic Energy Commission, will conduct further investigations during the summer of 1953 in the area involved under the application included in the subject docket.

I recommend that action on the application be held in abeyance pending receipt of results of the work by the Survey this summer in the area.

The report has been forwarded to the Chief, Minerals Division, in accord with the routing slip attached thereto.

H D Keiser
H. D. Keiser

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

COPY

224 New Customhouse
Denver 2, Colorado

April 17, 1953.

Memorandum

To: Secretary to the Operating Committee, Defense Minerals Exploration.

From: Field Team, Region IV

Subject: Final Report, DMEA Docket 2537 (Uranium and Thorium), L. C. Knobbe and Ernest Sparling, Thorium Mountain Claims, Custer County, Colorado.

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

The A.E.C. information on this area consists of U. S. Geological Survey, Trace Elements Investigations Report 250, "Thorium Investigations 1950-1952, Wet Mountains, Colorado". The manuscript of this report was made available to the field examiners.

Since the DMEA policy in regard to thorium is not known to this office, it is recommended that this report be given your consideration and that you take appropriate action.

/s/ W. H. King

/s/ A. H. Koschmann

Enclosures

NOTED
APR 23 1953
TEPCO
Butler

Received
RCS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Mining Division
Region IV

April 17, 1953.

Memorandum

To: Field Team, Region IV

From: Chief, Mining Division, Region IV

Subject: Final Report, DMEA Docket 2537 (Uranium and Thorium), L. C. Knobbe and Ernest Sparling, Thorium Mountain Claims, Custer County, Colorado.

Enclosed are ten copies of the final engineering report on the subject docket.

The applicants proposed to explore the property by trenching and sampling seven unpatented claims at an estimated cost of $12,000.00.

Since DMEA policy is not known on thorium it is recommended that the final report be sent to the Operating Committee for their consideration and appropriate action.

W. H. King

W. H. King

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Region IV

Building 20, Room 137
Denver Federal Center
Denver 14, Colorado
March 16, 1953

Memorandum

To: Executive Officer, Field Team, Region IV

From: Chief, Mineral Resources Branch, Mining Division, Region IV

Subject: DMMA 2537, L. C. Hubbe and Ernest Sparling (Uranium-thorium), Custer County, Colorado

Please find enclosed the original and ten copies of the "Summary, Conclusions, and Recommendations", by C. M. Harver, Bureau of Mines, and T. N. Hahn, Geological Survey, and of Harver's engineering report on the subject deposit.

Harver concludes the claims do not justify exploration with DMMA assistance and recommends denial of the loan pending establishment of Government policy with regard to uranium-thorium-rare earths deposits of the type of those existing on Hubbe and Sparling's claim. He expects the Survey will continue field work in the 1953 and succeeding seasons.

I concur with the conclusions and recommendations.

W. M. Traver

W. M. Traver

enclosures

WMT/eb

cc 10
DMMA 2537
Chron

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

200 New Customhouse
Denver 2, Colorado

April 10, 1953

Memorandum

To: DMEA Field Team, Region IV

From: A. H. Koschmann

Subject: DMEA Docket 2557, Nightengale, Mystery, Lucky Find, Atomic Mountain, Starbuck, General Lee, Thorium Mountain Claims, Hardscrabble Mining District, Custer County, Colorado.

Attached are 10 copies of the geological report by Truman H. Kuhn covering DMEA Docket 2557, Hardscrabble Mining District, Custer County, Colorado.

The applicant has proposed to explore by trenching for uranium and thorium on seven unpatented claims at an estimated cost of $12,000. Samples collected from the mineralized shear zones indicate that any reserves developed would average less than 0.002 percent uranium, less than 0.90 percent total rare earth oxides, and less than one percent thorium oxide. Since the strategic importance of thorium has not been specified by DMEA, recommendation for thorium exploration must be contingent on DMEA policy, and only if the development of 0.1 to 1.0 percent thorium oxide is significant. The grade of uranium and rare earths is too low grade to warrant exploration.

I concur in Kuhn's conclusions and recommendations.

A. H. Koschmann

A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (10)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMEA 2537, L. C. Knobbs and Ernest Sparling

Custer County, Colorado

Uranium-Thorium

Truman H. Kuhn, Geologist
Geological Survey

C. M. Harrer, Mining Engineer
Bureau of Mines

March 10, 1953

Reviewed by
DMEA OPERATING COMMITTEE

_____
(date)

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

Summary, Conclusions, and Recommendations

By Truman H. Kuhn
Geologist
Geological Survey

and

C. M. Harrer
Mining Engineer
Bureau of Mines

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

By Truman H. Kuhn and C. M. Harrer

L. C. Knobbe, of Spearville, Kans., and E. Sparling, of Rosita, Colo., have applied for Defense Minerals Exploration Administration assistance to explore on seven unpatented mining claims for uranium and thorium. The cost of the proposed exploration program is estimated by the applicants to be $12,000.00. Trenching, rehabilitating underground workings, and sinking one shaft to a depth of 50 feet are proposed and the applicants request 2 years to complete the work.

The applicants' mining claims are in an area known as the "Wet Mountains Thorium District" which, since its discovery during reconnaissance for uranium in 1950, has been under investigation by the Geological Survey for the Atomic Energy Commission. Investigations and detailed geologic mapping of the district are still in progress.

The claims are in Tps. 21 and 22 S., R. 71 W., Hardscrabble Mining District, Custer County, Colo., at altitudes between 8,000 and 9,000 feet. The nearest town of importance is Westcliffe, Colo.

Thorium and rare earth minerals and very minor amounts of uranium occur in northwesterly trending shear zones cutting pre-Cambrian amphibolite, granite gneiss, gabbro, migmatite, granite, and pegmatite. The radioactive material, which occurs as fracture filling, as coating on fractures, and

as replacement bodies, is restricted to the shear zones. Some shears appear to extend for considerable distances, but the thorium concentration within any one zone has very irregular distribution. Thorite has been tentatively identified as the principal radioactive mineral. Closely associated with the thorite are rare earth minerals, quartz, barite, limonite, hematite, and less common fluorite, galena, chalcopyrite, and pyrite. Much of the radioactive material has the general appearance of reddish-brown or dark reddish limonite and is difficult to recognize in the field except by the use of a Geiger counter and scintillometer.

On the basis of sampling data, present knowledge of the district,[1/] and evaluation of exploratory drilling at the Saputa ranch, any reserves developed would average less than 0.002 percent uranium, less than 0.5 percent total rare earth oxides, and less than 1.0 percent thorium oxide. No estimate other than the approximate grade of the reserves is possible at the present time.

The proposed program is principally surface exploration and would not add materially to the present knowledge of the thorium deposits.

Further exploration on the claims is not justified at this time.

Sampling and Geiger counter - scintillometer reconnaissance indicate that uranium is present in very minor amounts and that concentrations of thorium-bearing minerals are small and very spotty.

Since the strategic importance and quality of acceptable thorium reserves have not been defined by either the Defense Minerals Exploration

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1/ Christman, R. A., Heyman, A. M., Dellwig, L. F., and Gott, G. G., Thorium Investigations 1950-1952, Wet Mountains, Colorado: U. S. Geol. Survey Trace Elements Investigations Report 250, 1953.

Administration or the Atomic Energy Commission, recommendations for thorium exploration are contingent upon the establishment of future policy.

Denial of the request for Defense Minerals Exploration Administration assistance to explore for uranium and thorium on the seven claims controlled by Knobbe and Sparling is recommended.

If the development of 0.1 to 1.0 percent reserves of thorium oxide assumes sufficient importance, an exploration program by interested Government agencies would be advisable. A program similar to that established for uranium may be necessary to promote sustained interest in thorium in the Wet Mountains district.

WINDSENDALE, MYSTERY, LUCKY FIND, ATOMIC MOUNTAIN, STANDARD, GENERAL MIX, THORIUM MOUNTAIN CLAIMS

HANGMANSDALE MINING DISTRICT

CUSTER COUNTY, COLORADO

AMEA DOCKET 2037

Geologic Report

By Truman H. Kohn
U. S. Geological Survey

NIGHTINGALE, MYSTERY, LUCKY FIND, ATOMIC MOUNTAIN, STARBUCK, GENERAL ICE, THORIUM MOUNTAIN CLAIMS CUSTER COUNTY, COLORADO

INTRODUCTION

In a revised application, L. C. Hubbs (Spearville, Kansas) and Ernest Sperling (Pueblo, Colorado) have applied to Defense Minerals Exploration Administration for Government assistance to explore for uranium and thorium on seven unpatented lode claims in the Hardscrabble Mining District, Custer County, Colorado. The cost of the proposed exploration program is estimated by the applicants to be $12,000.

The seven unpatented claims are located as follows:

Claim	Location		
Nightingale lode	Sec. 22	T. 22 S.	R. 71 W.
Mystery lode	35	21	71
Lucky Find lode	35	21	71
Atomic Mountain lode	27	21	71
Starbuck lode	28	21	71
General Ike lode	21	21	71
Thorium Mountain lode (Atomic Valley lode)	21	21	71

The claims, which are at an altitude of 8,000 to 9,000 feet, lie within a northwesterly trending area which is approximately 6 miles long and 2 miles wide, and about 9 miles east of Westcliffe, Colorado. Poor, unimproved roads lead to within easy walking distance of each claim, but because the exploration pits are small and difficult to find, a guide is necessary to find the exposed mineralized zones. The location map (fig. 2) gives the relative approximate location of each claim.

Except for several shallow trenches and pits, no exploration work for uranium and thorium has been done on the claims. In the past, there was

some exploration for gold, silver, barite, and lead, but these older drifts, crosscuts, and shafts are now inaccessible.

All claims were visited on July 8, 1952, accompanied by L. C. Knobbe and Ernest Sparling, and several were revisited on July 9, 1952, in company with Quentin D. Singewald, R. A. Christman, and A. M. Heyman of the U. S. Geological Survey. On January 27, 1953, the new claims included in the revised application were visited accompanied by C. M. Harrer of the U. S. Bureau of Mines, R. A. Christman and A. M. Heyman of the U. S. Geological Survey, and Ernest Sparling.

GEOLOGY

The geology of the thorium-bearing area in the general Westcliffe-Hot Mountains area currently is being studied in detail by the Geological Survey under the supervision of Quentin D. Singewald. Preliminary results of previous investigations are discussed by R. A. Christman, A. M. Heyman, L. F. Dellwig, and G. G. Gott in U. S. Geological Survey Trace Elements Investigations Report 230, "Thorium Investigations, 1950-52, Hot Mountains, Colorado."

Some thorium and rare earth minerals and very minor amounts of uranium occur in shear zones cutting dikes and irregular masses of pre-Cambrian amphibolite, granite gneiss, gabbro, migmatite, granite, and pegmatite. Mineralized exposures range from single, small, isolated, knife-edge fractures up to zones 3 feet in width. In the wider zones thorium mineralization more commonly is limited to one or more narrow lenses within the zone.

The radioactive material, which occurs as fracture filling, as coating on fracture walls, and as replacement bodies in sheared rock, is restricted to the shear zones. The zones appear to extend for considerable distances,

but the thorium concentration within any one zone has very irregular distribution. The shear zones strike N. 10°-75° W., although most of the mineralized shears trend approximately N. 30° W. The shears are steeply dipping.

The localization of thorium deposits in the shear zones shows no obvious relation to structural features or to types of country rock.

Thorite has been tentatively identified as the principal radioactive mineral. Closely associated with the thorite are rare earth minerals, quartz, barite, limonite, hematite, and less commonly, fluorite, galena, chalcopyrite, and pyrite. Much of the radioactive material has the general appearance of reddish-brown or dark reddish limonite and is difficult to recognize in the field except by the use of a Geiger counter. Rare earth oxides are associated with the thorium but the exact form and amount is not known. No uranium minerals have been identified.

INDIVIDUAL CLAIMS

In the revised application, the applicants list an "Atomic Valley lode claim." The location notice posted on this claim was examined in the presence of one of the applicants, Ernest Spurling, and it was determined that the claim was erroneously named in the application. The name of the claim, as shown on the location notice, is Thorium Mountain, and in this report it is correctly referred to as the Thorium Mountain lode claim.

A scintillometer reconnaissance of each of the radioactive zones on the seven claims was made by R. A. Christman of the U. S. Geological Survey, and the results of his survey are given with the description of the individual claims.

Nightengale Claim: A 5-foot, vertical shear zone, striking N. 45° W., is exposed for a length of 100 feet by three shallow prospect pits on the Nightengale claim. The radioactive material appears to be confined to coatings on fracture surfaces and the highest reading, 10 on the 2.0 scale of a Nuclear Geiger-Mueller counter, was obtained on approximately 1 square foot of a vertical fracture surface exposed on one side of the deepest pit.

According to Christman, scintillometer readings at the dump near the deepest pit read a maximum of 29 times background, with an average of 15 times background. A reading of 7 times background was obtained 110 feet to the south of the dump through 6 inches of snow and an unknown amount of cover.

Mystery Claim: A fractured and broken zone, a maximum of 2 feet in width, is exposed in a 20-foot shaft on the Mystery claim. The zone, which strikes N. 15° W., and dips 60° W., cuts across the structure of the enclosing gneiss. Some thorium-bearing material occurs along the hanging wall of a small quartz lens within the shear zone.

The scintillometer reading over the dump was 10 times background and a covered area 140 feet south of the dump read 4 to 5 times background.

Lucky Find Claim: Thorium mineralization on the Lucky Find claim is in a vertical shear zone, 2 to 7 feet in width, that has a known length of about 1,500 feet. The zone has an average strike of N. 70° W. A thorium-bearing, barite, and quartz vein within the shear zone, ranges up to 3 feet in width. Silicensides are common in the shear zone and are coated with thorite. The mineralized zone has been explored by one shallow shaft and several small pits and trenches.

Christman, in his scintillometer reconnaissance survey, obtained a maximum reading of 46 times background over a small portion of an open trench and 8 times background over the dump of the southernmost pit. For a distance

of 140 feet over the more highly mineralized portion of the zone, spotty readings (mostly background with several small areas of 5 times background) were obtained.

Atomic Mountain Claim: A series of small fractures, forming a zone as much as 4 feet wide, are exposed in an old, inaccessible shaft, 2 adits, and several pits and trenches on the Atomic Mountain claim. The zone strikes N. 30° W., and dips 80°-85° S. The radioactive material apparently is confined to a lens ranging from 1 to 24 inches in width. Quartz, barite, and limonite have been deposited with the radioactive material. The maximum reading obtained with a Nuclear Geiger-Mueller counter was 15 on the 2.0 scale.

Several hundred feet to the northeast of the Atomic Mountain shaft, the extension of the Little Maud vein onto the Atomic Mountain claim was explored by a now inaccessible shaft. The Little Maud vein, which strikes N. 30° W., and dips 80° S., is in a fractured and brecciated zone approximately 4 feet wide. Quartz occurs with the thorium-bearing material in the vein. Both the Atomic Mountain and Little Maud shafts are near the end line of the older Little Maud claim.

Material on the dump of the Atomic Mountain shaft gave scintillometer readings of 20 times background and on the Little Maud dump the readings were 15 times background. On the slope below the Little Maud shaft, readings were 4 times background for 100 feet from the shaft with a maximum reading of 6 times background.

Starbuck Claim: On the Starbuck claim a thorium-bearing zone has been explored by several shallow pits and trenches. One crosscut, now inaccessible, was driven to the vein and an unknown amount of drifting was done along the vein in search for gold (fig. 1).

The shear zone appears to be at least 1000 feet in length, but because of overburden, the outcrop cannot be traced continuously over that distance. Width of the zone ranges from 4 inches of radioactive material in Pit No. 5, to a coating on the fracture surface in Pit No. 4, and up to 3 feet of radioactive material in Pit No. 1. At Pit No. 1, the 3-foot zone strikes N. 30° W., and dips 80° N., and contains in addition to the radioactive material, quartz, barite, hematite, and limonite. The thorium-bearing minerals occur in pods or small, discontinuous lenses within the shear zone. Large specimens of barite were observed on the dump at the crosscut.

The highest scintillometer readings obtained on the Starbuck claim were 6 times background at Pit No. 1 and 3 times background near the adit portal.

General Ike Claim: A shear zone, containing radioactive material and some galena, is exposed in three shallow pits and one caved shaft on the General Ike claim. This vein, as seen in the most northwesterly pit, is approximately 4 feet wide, strikes N. 55° W., and dips 80° N. The material on the dump of the main, or southwesterly pit, gave scintillometer readings of 25 times background. Along the shear to the southwest, irregularly scattered scintillometer readings of 2 times background were obtained.

Another shear zone, containing some barite, trends N. 30° W. toward the main pit on the General Ike claim. Scintillometer readings over portions of this zone were 2 to 3 times background.

Thorium Mountain (Atomic Valley) Claim: The Thorium Mountain claim is erroneously named "Atomic Valley" claim in the revised application.

A vertical, thorium-bearing shear zone, striking N. 60° W., and having a width of approximately 3 feet, can be seen near the collar of an inaccessible,

vertical shaft and in several pits on the Thorium Mountain claim. The vein contains barite, galena, and thorium minerals in a host rock of altered, reddish granite. Geiger counter and scintillometer reconnaissance indicate that the red-stained granite, which appears to trend in the same general direction as the barite-galena-thorium vein, is as radioactive as the mineralized material making up the vein.

Because of overburden, the shear zone on the Thorium Mountain claim cannot be traced continuously, but probably the shear is a continuation of the radioactive zone on the adjoining General Ike claim.

Near the Thorium Mountain dump, scintillometer readings over a 200 foot length of the shear were 10 times background. Readings over the red granite were 4 times background.

GRADE

The thorium-bearing material on each of the claims has been sampled by the applicants, by the U. S. G. S. geologists, and by D. M. E. A. geologists and engineers. Eighteen of the 28 samples were selected either by the applicants or after examination with a Geiger counter and represent only the highest grade material. Ten samples are channel cuts which are fairly representative of the exposed veins. Samples taken by the applicants were sent to the U. S. Bureau of Mines laboratories at Salt Lake City, Utah, and Rolla, Missouri. The U. S. G. S. and D. M. E. A. samples were analyzed by the Denver Laboratory of the Trace Elements Section, U. S. G. S. All sample data are given in Table 1.

The uranium content in the thorium-bearing shear zones is low. Assays range from 0.001 to 0.010 percent, with an average of less than 0.002 percent uranium.

Seven samples were analyzed for total possible rare earth content. The average for the seven samples was 0.24 percent total rare earth oxide with a range from 0.00 to 0.57 percent.

Because of complexity of analysis, the thorium content is difficult to determine accurately. Twelve chemical analyses range from 0.03 to 1.59 percent thorium oxide and 22 equivalent thorium oxide analyses range from 0.017 to 2.16 percent. For the seven scattered claims, the average chemical thorium oxide analysis is 0.77 percent and the average equivalent thorium oxide content is 0.59 percent.

Sampling and scintillometer reconnaissance indicate that the grade and amount of thorium may be greater on the Thorium Mountain claim than on any of the other claims included in this application.

ORE RESERVES

Because of limited exposures and extreme variability and discontinuity of the grade and size of the uranium and thorium-bearing lenses, a prediction or estimation of ore reserves cannot be made.

PROPOSED WORK

The following exploration work has been proposed by the applicants:

Claim	Cost	Type of Work
Nightengale	$ 1,310	3 trenches
Mystery	880	2 trenches
Lucky Find	1,310	3 trenches
Atomic Mountain	880	2 trenches
Starbuck	1,310	Clean out adit
General Ike	4,880	2 trenches, sink 30-ft. shaft
Thorium Mountain	2,000	2 trenches and repair shaft
	$12,000	

CONCLUSIONS

1. Because of extreme variability and discontinuity of the thorium occurrence, an estimate of ore reserves cannot be made at the present time.

2. Based on sampling data and the present knowledge of the district, any reserves developed would average less than 0.002 percent uranium, less than 0.30 percent total possible rare earth oxides, and less than one percent thorium oxide.

3. The proposed exploration program is principally surface exploration and would not add materially to the present knowledge of the thorium deposits.

RECOMMENDATIONS

1. Denial of the request for Defense Minerals Exploration Administration assistance to explore for uranium and thorium on the seven claims controlled by Knobbe and Sperling is recommended.

2. Since the strategic importance of thorium has not been specified by Defense Minerals Exploration Administration, recommendations for thorium exploration are contingent upon DMEA policy toward thorium.

3. If the development of 0.1 to 1.0 percent reserves of thorium oxide assumes sufficient importance, an exploration program by interested government agencies would be advisable.

TABLE I

SAMPLE DATA

Claim	Sample No.	%U	%U	Possible $\%(RE)_2O_3$	Chemical $\%ThO_2$	$\%ThO_2$	Type of Sample*	Width in ft.	Sampled by
Nightingale	27	0.92					SA		Applicants
	69438	0.26	0.004	0.37	1.28	1.46	HG		DMEA
	LD 33	0.049	0.001			0.274	CV	5.0	USGS
	LD 34	0.14	0.002			0.787	CV		USGS
	LD 35	0.08	0.002			0.443	HG		USGS
Mystery	2-Purple	0.13					SA		Applicants
	69439	0.10	0.001	0.25	0.40	0.564	HG		DMEA
	LD 36	0.006	0.001			0.029	HG		USGS
	LD 25	0.097	0.001			0.547	HG		USGS
Lucky Find	4-6	0.25					SA		Applicants
	69437	0.14	0.002	0.18	0.55	0.787	HG		DMEA
	LD 26	0.006	0.001			0.029	CV	20.0	USGS
	LD 27	0.004	0.004			0.017	CV	7.0	USGS
	LD 28	0.013	0.001			0.065	CV	3.0	USGS
Atomic [illegible]	69442	0.17	0.001	0.09	0.02	0.963	HG		DMEA
	RA 23	0.38	0.001		1.98	2.16	HG		USGS
	KR-12	0.034	0.001			0.19	HG		DMEA
	KR-13	0.031	0.001			0.17	HG		DMEA
Starbuck	4-6-4	0.41					SA		Applicants
	69441	0.18	0.001	0.12	0.81	1.02	HG		DMEA
	RA 22	0.021	0.001		0.03	0.11	CV-Pit#1	3.0	USGS
	RA 26	0.15	0.002		0.84	1.01	CV-Pit#1	1.0	USGS
	RA 27	0.06	0.001		0.03	0.34	CV-Pit#3	0.5	USGS
	RA 28	0.30	0.001		1.39	1.384	HG		USGS
General Lee	69436	0.004	0.004	0.35	0.03		HG		DMEA
	KR-10	0.025	0.004			0.16	CV	4.0	DMEA
Thorium Mt.	69440	0.21	0.010	0.38	1.26		HG		DMEA
	KR-11	0.033	0.001			0.18	CV	3.0	DMEA

*--CV - Channel sample across vein
HG - Selected high grade material from dump
SA - High grade specimen selected by applicants

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

Engineering Report

By C. M. Harker
Mining Engineer
Bureau of Mines

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

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DMEA 2537
(URANIUM - THORIUM)

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

ENGINEERING REPORT

By

C. M. Harrer

INTRODUCTION

L. C. Knobbe, of Spearville, Kans., and Ernest Sparling, of Rosita, Colo., have applied for a Defense Minerals Exploration Administration loan of $12,000.00 to explore seven unpatented mining claims for uranium and thorium by trenching, rehabilitating underground workings, and sinking one shaft to a depth of about 50 feet. The project has been estimated to require 360 working days for completion. The applicants have asked for 2 years' time to complete the project.

The Wet Mountains thorium district, of which the applicants' claims are a part, has been under study by the Geological Survey in cooperation with the Atomic Energy Commission since its discovery during reconnaissance for uranium in 1950. Investigations in progress include detailed geologic mapping of the district.

An examination of surface exposures on the applicants' properties for the Defense Minerals Exploration Administration was completed by T. H. Kuhn, of the Geological Survey, on July 8 and 9, 1952.

A final examination of the properties was completed by the Defense Minerals Exploration Administration examining team and R. A. Christman and A. M. Heyman, Trace Elements Section, Geological Survey,

from January 26 through 28, 1953.

ACKNOWLEDGMENTS

R. A. Christman and A. M. Heyman, of the Geological Survey, made the results of their field work on uranium and thorium investigations in the Wet Mountains, Colo., and their manuscript--Trace Elements Investigations Report 250--available. The above work was for the Atomic Energy Commission. All analyses mentioned as taken by the Geological Survey are from the above source.

E. Sparling accompanied the examining team on January 27 and described the work intended with Government assistance.

All quantitative radiometric and chemical analyses of samples included in this report were made by the Denver laboratory, Trace Elements Section, Geological Survey.

LOCATION, TOPOGRAPHY, AND PHYSICAL FEATURES

Thorium occurs in an incompletely defined area about 20 miles long and 6 miles wide, extending north of Rosita, Colo., in parts of Custer and Fremont Counties. It is known as the Wet Mountains thorium district. Within part of this area, just east of Silver Cliff, Colo., and bounded by parts of Colorado State Highways 96, 143, and 277 (fig. 1), L. C. Knobbe and E. Sparling control seven unpatented mining claims, scattered over a northwest-trending area, starting with the Nightengale claim, about 1.4 miles east of Querida, to the Thorium Mountain claim, about 6 miles north of Querida. Altitudes range between 8,000 and 9,000 feet. All the claims are in Tps. 21 and 22 S., R.71W., in the Hardscrabble Mining District,

Custer County, Colo. The properties are within 1 mile of jeep and truck trails. The terrain is rough and slopes are scantily forested. There is no water on the properties. The nearest town of consequence is Westcliffe, 8 miles west of Querida, Colo.

HISTORY AND PRODUCTION

The Wet Mountains thorium district was discovered during 1950 by members of the Geological Survey during reconnaissance investigations for uranium on behalf of the Atomic Energy Commission. Investigations and detailed geologic mapping are still in progress. One particularly favorable thorium occurrence, known as the Haputa Ranch lode, according to Trace Elements Report 250, has been explored by diamond drilling to a depth of 400 feet. There has been no production of either uranium, thorium, or rare earth oxides from this area. The subject claims were located during 1951-1952.

OWNERSHIP AND EXTENT

The applicants, as partners, have located the following seven unpatented, standard mining claims in the Hardscrabble Mining District, in Custer County, Colo., as uranium-thorium prospects.

Name of Claim	Kind	Date Recorded	Location
Nightengale lode	Unpatented	No date (1951)	Sec.22,T.22S.,R.71W.
Mystery lode	"	May 4, 1951	Sec.35,T.21S.,R.71W.
Lucky Find lode	"	May 8, 1951	Sec.33,T.21S.,R.71W.
Atomic Mountain lode	"	Aug.25,1951	Sec.27,T.21S.R.71W.
Starbuck lode	"	Aug.9, 1951	Sec.28,T.21S.,R71W.
General Ike lode	"	Aug.27,1952	Sec.21,T.21S.,R71W.
Thorium Mountain lode	"	April 16,1952	Sec.21,T.21S.,R.71W.

Encroachments: Part of the patented Little Maud claim extends into the Atomic Mountain claim and limits exploration on both the Little

Maud and Atomic Mountain veins.

The easternmost corner of the Mystery claim may or may not conflict with a patented homestead. It would not, however, conflict with proposed exploration.

DESCRIPTION OF THE DEPOSITS

General

Thorium minerals, with small amounts of uranium, and rare earth oxides occur in barite-sulfide veins along northwest-trending shear zones in pre-Cambrian granite, gneiss, and schist. Because of the generally fine-grained texture and masking by iron oxides, the thorium- and rare earth-bearing minerals are seldom recognized without the use of radiometric detection instruments, such as the Geiger counter or scintillometer. Significant concentrations of thorium now exposed on the surface of the mining claims under consideration appear small and spotty in their present state of development.

A clue to possible subterranean extensions is furnished in the results of diamond drilling on the Haputa Ranch by the Atomic Energy Commission where thorium mineralization was shown to extend to depths of over 400 feet.

Information available on the uranium-thorium-rare earth oxides content of mineralized shear structures on the claims and the Wet Mountains thorium district in general is limited to inconclusive surface sampling and investigations not yet completed by the Geological Survey for the Atomic Energy Commission.

Radioactivity was noted in spots along the shear structures on all the claims under consideration. On the basis of sampling data incorporated in the discussion of the individual claims and ore reserves, the uranium content of the veins examined and the district in general is less than 0.01 percent. The rare earth oxides, on the same basis, are less than 1 percent. The highest ThO_2 values from selected samples was less than 2 percent.

References on the subject uranium-thorium-rare earths district and claims under consideration are included in the following sources of information:

Cross, Whitman, Geology of Silver Cliff and the Rosita Hills, Colo.: 17th Annual Report, U. S. Geol. Survey, pp. 269-403, 1896.

Emmons, S. F., The Mines of Custer County, Colo.: 17th Annual Report, U. S. Geol. Survey, pp. 411-472, 1896.

Dellwig, L. F., Preliminary Summary Report of the Wet Mountains Thorium Area, Custer and Fremont Counties, Colo.: U. S. Geol. Survey Trace Elements Memorandum Report 287, 1951.

Christman, R. A., Hayman, A. M., Dellwig, L. F., and Gott, G. G., Thorium Investigations 1950-1952, Wet Mountains, Colo.: U. S. Geol. Survey Trace Elements Investigations Report 250, December, 1952.

Individual Claims

(Locations shown from Querida or Ilse, fig. 1)

The Nightingale claim, about 1.4 miles east of Querida, encloses a poorly defined, vertical shear zone striking N. 45° W. Three shallow prospect pits expose the vein. Galena, chalcopyrite, and pyrite are present in minute quantity. The rock at the largest discovery pit is altered, stained black granite. The vein is concealed by about 3 feet

of soil. The discovery pit was sampled by the geologist member of the examining team and the Geological Survey, with the following results:

Sampling data on the Nightengale claim

Sample	Type	Source	Location	Width, feet	Percent eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
ER-2	Character	DMEA	Dump	-	0.26	0.004	1.46	1.85	1.28	0.57
LD-33	Channel	USGS	Bottom of discovery pit about 8 feet deep	5.0	0.049	0.001	0.274	-	-	-

Scintillometer reconnaissance by the Geological Survey established a maximum count of 25 times background at the discovery shaft, with an average of 15 times background. A reading of 7 times background was obtained 110 feet to the southeast through 6 inches of snow and an unknown depth of soil. The hidden shear zone can be traced for about 110 feet with a scintillometer.

The Mystery claim, about 3.2 miles southwest of Ilse, encloses a poorly exposed 2-foot quartz vein of unknown length that cuts injection gneiss. The vein strikes N. 15° W. and dips 60° southwest. One discovery shaft about 20 feet deep and one shallow pit expose the vein. The vein is almost completely concealed by about 3 feet of soil. Barite, sphalerite, galena, and chalcopyrite are present in small quantities as stringers and isolated blebs in a gangue of vuggy quartz. Some thorium-bearing material occurs along the hanging wall of a small quartz

lens. The discovery shaft dump was sampled by the geologist member of the examining team and the Geological Survey, with the following results:

Sampling data on the Watary claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	eThO2	(RE)2O3 +ThO2	ThO2	(RE)2O3
KE-5	Character	DMEA	Dump	-	0.10	0.001	0.564	0.63	0.40	0.23
LD-24	Character	USGS	Dump	-	0.006	0.001	0.029	-	-	-
LD-25	Character	USGS	Dump	-	0.097	0.001	0.547	-	-	-

A scintillometer reconnaissance by the Geological Survey established a maximum of 10 times background count at the discovery shaft dump, and the covered area 140 feet to the southeast read 4 to 5 times background count.

The Lucky Find claim, about 4 miles north of Querida, encloses a vertical shear zone, 2 to 7 feet wide, in injection gneiss. The shear zone can be traced for about 1,500 feet, with an average strike of N. 70° W. and an almost vertical dip. The vein is exposed in the discovery shaft, 15 feet deep, and three shallow pits. Overburden is about 2 feet thick. The vein in the shear zone pinches and swells to thicknesses ranging between 1 and 2 feet. Principal vein minerals are red and brown barite, and quartz.

One character sample (KE-4) was taken of dump rock at the central pit by the geologist member of the examing team. Three channel samples

of the vein were taken by the Geological Survey. Two samples are components across the 7-foot vein exposed in the discovery shaft. Sample components consisted of 1.8 feet of reddish brown barite (sample LD-26) and 5.2 feet of mixed vein material (sample LD-27). In addition, a 3-foot channel sample (LD-28) was taken across the vein width in a pit about 400 feet to the east of the discovery shaft. Results of sampling follow:

Sampling data on the Lucky Find claim

Sample	Type	Source	Location	Width, feet	Percent					
					*U	U	*ThO_2	*$(RE)_2O_3$	ThO_2	$(RE)_2O_3$
[illegible]-4	Character	DMEA	Dump	-	0.14	0.002	0.787	0.73	0.55	0.18
LD-26	Channel	USGS	Barite component of vein in discovery shaft	1.8	0.006	0.001	0.029	-	-	
LD-27	Channel	USGS	Remainder of vein, component with LD-26	5.2	0.004	0.001	0.017	-	-	
LD-28	Channel	USGS	Vein 400 feet east of discovery shaft	3.0	0.013	0.001	0.068	-	-	

Scintillometer reconnaissance by the Geological Survey established readings of 3 times background at the discovery shaft and erratic values of 2 to 40 times background count in an open trench about 250 feet to the east. Readings of 2 to 8 times background count were recorded for about 275 feet farther east. The latter values were mainly negative.

The Atomic Mountain claim, about 5 miles northwest of Queride, encloses two veins, one of which is known as the Atomic Mountain vein. It strikes N. 50° W. and dips 80° to 85° southwest and is in layered granite and injection gneiss. The vein is exposed in one rock-cut, a presently inaccessible shaft, and several shallow pits. The vein is masked by 1 to 3 feet of soil and loose rock. The radioactive material appears to be 1 to 6 inches thick and of indeterminate length, containing quartz, barite, limonite, and siderite. Radioactivity is low to moderate.

A character sample of radioactive material from the discovery shaft dump was taken by both the geologist member of the examining team and the Geological Survey--samples KR-9 and RA-23, respectively. In addition, sample KR-12 was taken from a rock-cut about 50 feet southeast of the discovery shaft. The results are tabulated as follows:

Sampling data on the Atomic Mountain vein

Sample	Type	Source	Location	Width, feet	Percent eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-9	Character	DMEA	Discovery shaft dump	-	0.17	0.001	0.963	0.82	0.82	0.00
KR-12	Character	DMEA	Rock-cut 50 feet northwest of discovery shaft	-	0.034	0.001	0.19	-	-	-
RA-23	Character	USGS	Discovery shaft dump	-	0.38	0.001	2.16	-	1.93	-

Scintillometer reconnaissance by the Geological Survey established a value of 20 times background at the discovery shaft dump; this, however, was over a very small area.

The second vein mentioned is the extension of the Little Maud vein beyond the southeast end line of the patented claim of the same name and on to the Atomic Mountain claim. The shear zone can be traced from the southeast end line of the Little Maud claim to the northwest by shallow pits. It is covered by from 0 to 5 feet of soil and loose rock. It is well exposed in an untimbered shaft near the southeast end line of the Little Maud claim to a depth of 20 feet. The vein strikes N. 27° W. and dips vertically. It is about 6 feet wide, consisting of iron-stained vuggy quartz, with some barite. Partly developed quartz crystals are common.

Owing to inaccessibility, one character sample (MR-13) of radioactive material from the shaft dump was taken by the geologist member of the examining team.

Sampling data on the Little Maud vein on the Atomic Mountain claim

Sample	Type	Source	Location	Width, feet	Percent *U	U	*ThO_2	$(RE)_2O_3$ +ThO_2	ThO_2	$(RE)_2O_3$
MR-13	Character	DMEA	Shaft dump, Little Maud vein, southeast end line	-	0.031	0.001	0.17	-	-	

Scintillometer reconnaissance by the Geological Survey gave a reading of 15 times background on the Little Maud shaft dump. The slope below

the Little Maud, where trenching is proposed, reads 4 times background count for 100 feet southeast of the shaft.

The Starbuck claim, about 5.2 miles north of Querida, encloses a vertical shear zone which strikes N. 35° W. and cuts granite gneiss, biotite schist, and amphibolite. The vein is exposed along a steep slope by eight prospect pits and an inaccessible adit and included winze. The shear zone has been traced for about 1,000 feet. It is covered by 1 to 3 feet of soil and loose rock. The thorium-bearing zone ranges in width from 4 inches to 3 feet. The vein consists of quartz and barite, with considerable limonite and hematite. Although the entire shear zone is weakly radioactive, concentration of thorium was found only at the discovery pit and on the adit dump.

A character sample (RA-8) of radioactive material in the discovery pit was taken by the geologist member of the examining team. Two channel samples (RA-25 and RA-26) were taken by the Geological Survey across portions of the vein exposed in the discovery cut. A character sample (RA-28) of radioactive material from the adit dump was also taken. In addition, a channel sample (RA-27) was taken across a radioactive vein exposure in a prospect pit northwest of the adit portal.

The results of sampling are tabulated as follows:

Sampling data on the Starbuck claim

Sample	Type	Source	Location	Width, feet	Percent eU	U	eThO2	+ThO2	ThO2	(RE)2O3
RR-8	Character	DMEA	Discovery pit, top of hill	-	0.18	0.001	1.02	0.93	0.81	0.12
RA-25	Channel	USGS	Discovery pit, top of hill	3.0	0.021	0.001	0.11	-	0.03	-
RA-26	Channel	USGS	Discovery pit, top of hill	1.0	0.18	0.002	1.01	-	0.84	-
RA-27	Channel	USGS	Pit northwest of adit	0.5	0.060	0.001	0.34	-	0.03	-
RA-28	Character	USGS	Adit dump	-	0.30	0.001	1.704	-	1.59	-

Scintillometer reconnaissance by the Geological Survey gave the highest reading at the southeasternmost pit as 6 times background and 5 times background at the adit. The other pits were generally low and intervening areas appear negative.

The General Ike claim, about 4.8 miles west of Ilse, encloses two shear structures, in granite, which junction about 50 feet east of the discovery shaft and center line of the claim. The main vein strikes about N. 60° W. and dips 80° to the north and is approximately the center line of the claim. The vein is exposed in two shafts and one pit at about 200-foot intervals, and to a depth of 10 feet. It is about 2 feet wide. Soil and loose rock cover the vein to thicknesses

of 1 to 3 feet. The vein consists of altered granite, barite, quartz, and a small amount of galena. It is weakly radioactive. No uranium, thorium, or rare earth oxides could be determined visually.

The second vein mentioned is poorly exposed in two very small pits and can be traced partly by its reddish color and partly by radioactivity. It, also, is a quartz-barite vein in granite and strikes N. 30° W.

Two samples were taken by the geologist member of the examining team. Sample KR-6 included high-grade material selected by the applicants from the dump at the discovery shaft. Sample KR-10 was across 4 feet of vein exposed in a pit about 50 feet northwest of the discovery shaft.

Sampling data on the General Tso claim

Sample	Type	Source	Location	Width, feet	eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-6*	Character	DMEA	Discovery shaft dump	-	0.094	0.004	-	0.38	0.03	0.35
KR-10	Channel	DMEA	Vein in pit 50 feet northwest of discovery shaft	4.0	0.033	0.004	0.16	-	-	-

*This sample also assayed 1.06 percent lead.

Scintillometer reconnaissance by the Geological Survey gave a reading of 25 times background on the discovery dump and readings of 2 times

background irregularly scattered along 500 feet of the shear zone. Radioactivity other than in the main pit was weak and spotty, with some negative values.

The Thorium Mountain claim, about 5 miles west of Ilse, is just west of the General Ike claim and is on the same shear structure. The vein is in reddish, iron-stained granite and strikes N. 60° W. It has a vertical dip and a width of about 1 foot. The vein consists of altered granite, quartz, barite, and a small amount of galena, and is radioactive. No uranium, thorium, or rare earth oxides could be identified. The vein is traceable for about 1,000 feet through a 60-foot discovery shaft, now inaccessible, and five shallow pits. Soil and loose rock cover the vein to depths of 1 to 3 feet.

Two samples were taken by the geologist member of the examining team. Sample KR-7 included high-grade material selected by the applicants from the dump at the discovery shaft. Sample KR-11 is a channel sample across 1.3 feet of vein width exposed in a 10-foot pit just west of the discovery shaft and at a depth of 6 feet below the surface.

Results of sampling are as follows:

Sampling data on the Thorium Mountain claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ + ThO_2	ThO_2	$(RE)_2O_3$
KR-7	Character	DMEA	Discovery dump	-	0.21	0.010	-	1.64	1.26	0.38
KR-11	Channel	DMEA	Vein exposed in pit 10 feet deep, just west of discovery shaft	1.2	0.033	0.001	0.19	-	-	-

Scintillometer reconnaissance by the Geological Survey indicated that the amount of radioactivity on this claim compares favorably with that found on the surface at the largest ore body discovered at Haputa ranch. At Thorium Mountain the discovery dump reads 10 times background over a shear zone length of 200 feet. The 2 times background count extends over a length of 500 feet. This claim appears most promising of the group.

MINEABLE ORE RESERVES

The results of sampling on the individual claims under consideration, as shown in the section "Description of Deposits", represents the best values obtainable at the present time.

On the basis of the sampling data, the uranium content of the veins examined is less than 0.01 percent, and the possibility of developing reserves of strategic importance is very poor.

The rare earths content is considerably less than 1 percent and the possibility of developing reserves of strategic importance is extremely doubtful.

Thorium reserves which could be developed would probably average less than 1 percent ThO_2.

There is no basis on which to estimate ore reserves.

PRESENT STATUS

Exploration and Development

Many prospect pits, surface exposures, short adits, and shallow shafts were made while prospecting for gold, silver, lead, and barite.

The older underground workings are now inaccessible. Except for a few shallow trenches and pits on the claims, no exploration work has been carried on in the search for uranium, thorium, or rare earth oxides.

Mining and Milling Equipment

There are no mining or milling facilities on the property and none are contemplated at this time.

PROJECT PROPOSALS

L. C. Knobbe and E. Sparling propose to explore their scattered claims with fourteen rock trenches, using a gasoline-operated jackhammer, across and along favorable radioactive zones at an estimated cost of $5,803.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 160 days at $24.00 per day	$3,840.00
Operating materials and supplies	
Explosives	486.00
Other (drill steel, bits, fuel, lubricants, tools, etcetera)	750.00
Equipment purchased	
1 Jackhammer drill, complete	610.00
Repairs to equipment	67.00
Sampling and analyses	50.00
Total cost of trenching	$5,803.00

In addition, they propose to rehabilitate the Starbuck adit for radiometric examination at a cost of $1,210.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 40 days at $24.00 per day	$ 960.00
Operating materials and supplies	
Timber, tools, and miscellaneous supplies	250.00
Total cost of rehabilitating the Starbuck adit	$1,210.00

A 60-foot shaft, 4- by 8-foot cross section, on the Thorium Mountain claim would be rehabilitated for examination at a cost of $1,210.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 40 days at $24.00 per day	$ 960.00
Operating materials and supplies	
Stulls, sheeting, ladders, windlass, rope, etcetera	250.00
Total cost of rehabilitating the Thorium Mountain shaft	$1,210.00

Finally, a 4- by 8-foot shaft would be sunk 50 feet on the General Ike claim at a cost of $75.54 to $91.54 per foot, depending on whether a gasoline jackhammer is used or a 105-cubic-foot compressor and 30-pound pneumatic drill are rented.

Details of Proposed Exploration Work

On the Nightengale claim, the discovery shaft and location stake are at its center. Three rock trenches are proposed, 8 to 10 feet deep. Overburden is about 3 feet deep. One trench would be across the vein at the location stake. A second would be 70 feet to the southeast at a radioactive high. A third trench is proposed at or between the above, but along the strike of the vein, as warranted by field evidence.

On the Mystery claim, the discovery shaft and location stake are at its center. Two rock trenches are proposed, 8 to 10 feet deep. Overburden is about 3 feet deep. The trenches would be about 100 and 150 feet southeast of the discovery stake at radioactive highs.

On the Lucky Find claim, the discovery shaft and location stake are 600 feet and 900 feet, respectively, from the northwest and southeast end lines. Three rock trenches are proposed, 8 to 10 feet deep, on radioactive highs. Overburden is about 2 feet thick. Two trenches, one along and one across the strike of the shear zone, would be located about 250 feet southeast of the location stake. A third trench would be dug to the southeast or northwest, depending on the results in the first two.

On the Atomic Mountain claim, the discovery shaft and location stake are 700 feet and 800 feet, respectively from the southeast and northwest end lines. Two rock trenches, 8 to 10 feet deep, are proposed on radioactive highs. Overburden is 1 to 3 feet deep. One trench would be on the Atomic Mountain shear zone, about 50 feet southeast of the location stake. The other would be on the Little Maud vein extension, about 200 feet northeast of the location stake.

On the Starbuck claim, the discovery pit and location stake are 100 feet and 1,400 feet, respectively, from the southeast and northwest end lines. Eight prospect pits and an adit trace the weakly radioactive shear zone for a strike length of 1,000 feet. Overburden is 1 to 3 feet deep. Strong radioactivity was noted only in the discovery pit and in samples from the adit dump. The only work proposed

is to rehabilitate the adit for radiometric examination. This may include unwatering of a shallow winze.

On the General Ike claim, the discovery pit and location stake are at its center. Two rock trenches and a 50-foot exploration shaft are proposed. The trenches would be about 10 feet deep. The shaft would be about 50 feet deep. Overburden is 1 to 3 feet deep. The trenches would be across the shear structure at radioactive highs, 50 and 200 feet S.30°E. of the location stake. The shaft would be sunk on the vein at the center of the claim.

On the Thorium Mountain claim, the discovery shaft and location stake are 400 feet and 1,100 feet, respectively, from the west and east end lines. Two rock trenches are proposed, 8 to 10 feet deep, and one shaft, about 60 feet deep, would be rehabilitated for examination. Overburden is 1 to 3 feet deep. One trench would be across the shear structure, about 100 feet west of the location stake. The other is tentatively located about 500 feet east on a radioactive high. The shaft is on the vein at the center of the claim.

CONCLUSIONS

On the basis of sampling data, present knowledge of the district, and evaluation of exploratory drilling at the Haputa ranch, any reserves developed would approximate less than 0.01 percent uranium, less than 1 percent rare earths, and less than 1 percent thorium oxide.

No estimate of reserves, other than their quality, is possible at this time due to lack of information.

Most of the area covered by the proposed loan will be mapped by the Geological Survey during the 1953 field season in conjunction with

continuing studies of the Wet Mountains thorium district for the Atomic Energy Commission.

The claims do not justify further exploration at this time since radioactivity and significant concentrations of thorium now appear small and spotty as exposed on the surface and outlined by scintillometer reconnaissance. Sampling data also indicates that any reserves developed would be of submarginal quality.

There is no known established Government policy which defines the status of this type and quality of uranium-thorium-rare earths occurrence.

Should development of thorium-rare earth reserves of the above-mentioned quality assume sufficient importance, an exploration program by interested Governmental agencies may be advisable after completion and consideration of the present studies by the Geological Survey, probably not before 1954.

The proposed program is principally surface exploration and, by itself, would not add materially to data necessary to estimate ore reserves. It would have to be integrated with a diamond drilling program outlined on the results of the study of extensive surface exposures and sampling.

A program for thorium similar to that established for uranium would be necessary to promote sustained interest in regional development.

RECOMMENDATIONS

It is recommended that the application of L. C. Knobbe and E. Sparling for a Defense Minerals Exploration Administration loan of

$12,000.00 to explore their seven unpatented mining claims for uranium-thorium-rare earths be denied.

Should development of reserves containing less than 0.01 percent uranium, less than 1 percent rare earths, and less than 1 percent thorium oxide assume sufficient strategic importance, an exploration program by interested Governmental agencies would be advisable after a review of investigations now being made of the Wet Mountains thorium district by these agencies.

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

224 New Customhouse
Denver 2, Colorado

April 17, 1953.

Department of the Interior
Defense Minerals Exploration Administration
Received
APR 20 1953

Memorandum

To: Secretary to the Operating Committee, Defense Minerals Exploration Administration.

From: Field Team, Region IV

Subject: Final Report, DMEA Docket 2537 (Uranium and Thorium), L. C. Knobbe and Ernest Sparling, Thorium Mountain Claims, Custer County, Colorado.

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

The A.E.C. information on this area consists of U. S. Geological Survey, Trace Elements Investigations Report 250, "Thorium Investigations 1950-1952, Wet Mountains, Colorado". The manuscript of this report was made available to the field examiners.

Since the DMEA policy in regard to thorium is not known to this office, it is recommended that this report be given your consideration and that you take appropriate action.

W. H. King
W. H. King

A. H. Koschmann
A. H. Koschmann

Enclosures

Routed by
DMEA OPERATING COMMITTEE
4-24-53
(Date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Mining Division
Region IV

April 17, 1953.

Memorandum

To: Field Team, Region IV

From: Chief, Mining Division, Region IV

Subject: Final Report, DMEA Docket 2537 (Uranium and Thorium), L. C. Knobbe and Ernest Sparling, Thorium Mountain Claims, Custer County, Colorado.

Enclosed are ten copies of the final engineering report on the subject docket.

The applicants proposed to explore the property by trenching and sampling seven unpatented claims at an estimated cost of $12,000.00.

Since DMEA policy is not known on thorium it is recommended that the final report be sent to the Operating Committee for their consideration and appropriate action.

W. H. King

W. H. King

Enclosures

4-24-53

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Region IV

Building 20, Room 137
Denver Federal Center
Denver 14, Colorado
March 16, 1953

Memorandum

To: Executive Officer, Field Team, Region IV

From: Chief, Mineral Resources Branch, Mining Division, Region IV

Subject: DMA 2537, L. C. Rabbe and Ernest Sparling (Uranium-thorium), Custer County, Colorado

Please find enclosed the original and ten copies of the "Summary, Conclusions, and Recommendations", by C. M. Warner, Bureau of Mines, and T. N. Bain, Geological Survey, and of Warner's engineering report on the subject denial.

Warner concludes the claims do not justify exploration with DMA assistance and recommends denial of the loan pending establishment of Government policy with regard to uranium-thorium-rare earths deposits of the kind of those existing on Rabbe and Sparling's claim. He expects the Survey will continue field work in the 1953 and succeeding seasons.

I concur with the conclusions and recommendations.

W. M. Warner
W. M. Warner

Enclosures

WMW/eb

cc 10
DMA 2537
Chron

4-24-53

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

200 New Customhouse
Denver 2, Colorado

April 10, 1953

Memorandum

To: DMEA Field Team, Region IV

From: A. H. Koschmann

Subject: DMEA Docket 2537, Nightengale, Mystery, Lucky Find, Atomic Mountain, Starbuck, General Lee, Thorium Mountain Claims, Hardscrabble Mining District, Custer County, Colorado.

Attached are 10 copies of the geological report by Truman H. Kuhn covering DMEA Docket 2537, Hardscrabble Mining District, Custer County, Colorado.

The applicant has proposed to explore by trenching for uranium and thorium on seven unpatented claims at an estimated cost of $12,000. Samples collected from the mineralized shear zones indicate that any reserves developed would average less than 0.002 percent uranium, less than 0.50 percent total rare earth oxides, and less than one percent thorium oxide. Since the strategic importance of thorium has not been specified by DMEA, recommendation for thorium exploration must be contingent on DMEA policy, and only if the development of 0.1 to 1.0 percent thorium oxide is significant. The grade of uranium and rare earths is too low grade to warrant exploration.

I concur in Kuhn's conclusions and recommendations.

A. H. Koschmann

A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (10)

4-24-53

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMEA 2537, L. C. Knobbe and Ernest Sparling

Custer County, Colorado

Uranium-Thorium

Truman H. Kuhn, Geologist
Geological Survey

C. M. Harrer, Mining Engineer
Bureau of Mines

March 10, 1953

Reviewed by
DMEA OPERATING COMMITTEE
4-24-53
(date)

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

Summary, Conclusions, and Recommendations

By Truman H. Kuhn
Geologist
Geological Survey

and

C. M. Harrer
Mining Engineer
Bureau of Mines

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

By Truman H. Kuhn and C. M. Harrer

L. C. Knobbe, of Spearville, Kans., and E. Sparling, of Rosita, Colo., have applied for Defense Minerals Exploration Administration assistance to explore on seven unpatented mining claims for uranium and thorium. The cost of the proposed exploration program is estimated by the applicants to be $12,000.00. Trenching, rehabilitating underground workings, and sinking one shaft to a depth of 50 feet are proposed and the applicants request 2 years to complete the work.

The applicants' mining claims are in an area known as the "Wet Mountains Thorium District" which, since its discovery during reconnaissance for uranium in 1950, has been under investigation by the Geological Survey for the Atomic Energy Commission. Investigations and detailed geologic mapping of the district are still in progress.

The claims are in Tps. 21 and 22 S., R. 71 W., Hardscrabble Mining District, Custer County, Colo., at altitudes between 8,000 and 9,000 feet. The nearest town of importance is Westcliffe, Colo.

Thorium and rare earth minerals and very minor amounts of uranium occur in northwesterly trending shear zones cutting pre-Cambrian amphibolite, granite gneiss, gabbro, migmatite, granite, and pegmatite. The radioactive material, which occurs as fracture filling, as coating on fractures, and

as replacement bodies, is restricted to the shear zones. Some shears appear to extend for considerable distances, but the thorium concentration within any one zone has very irregular distribution. Thorite has been tentatively identified as the principal radioactive mineral. Closely associated with the thorite are rare earth minerals, quartz, barite, limonite, hematite, and less common fluorite, galena, chalcopyrite, and pyrite. Much of the radioactive material has the general appearance of reddish-brown or dark reddish limonite and is difficult to recognize in the field except by the use of a Geiger counter and scintillometer.

On the basis of sampling data, present knowledge of the district,[1] and evaluation of exploratory drilling at the Haputa ranch, any reserves developed would average less than 0.002 percent uranium, less than 0.5 percent total rare earth oxides, and less than 1.0 percent thorium oxide. No estimate other than the approximate grade of the reserves is possible at the present time.

The proposed program is principally surface exploration and would not add materially to the present knowledge of the thorium deposits.

Further exploration on the claims is not justified at this time.

Sampling and Geiger counter - scintillometer reconnaissance indicate that uranium is present in very minor amounts and that concentrations of thorium-bearing minerals are small and very spotty.

Since the strategic importance and quality of acceptable thorium reserves have not been defined by either the Defense Minerals Exploration

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1/ Christman, R. A., Hayman, A. M., Dellwig, L. F., and Gott, G. G., Thorium Investigations 1950-1952, Wet Mountains, Colorado: U. S. Geol. Survey Trace Elements Investigations Report 250, 1953.

Administration or the Atomic Energy Commission, recommendations for thorium exploration are contingent upon the establishment of future policy.

Denial of the request for Defense Minerals Exploration Administration assistance to explore for uranium and thorium on the seven claims controlled by Knobbe and Sparling is recommended.

If the development of 0.1 to 1.0 percent reserves of thorium oxide assumes sufficient importance, an exploration program by interested Government agencies would be advisable. A program similar to that established for uranium may be necessary to promote sustained interest in thorium in the Wet Mountains district.

WHITEHORSE, MYSTERY, LUCKY FIND, ATOMIC MOUNTAIN, STARBUCK, GENERAL IKE, THORIUM MOUNTAIN CLAIMS HARDSCRABBLE MINING DISTRICT CUSTER COUNTY, COLORADO

BMEA DOCKET 2337

Geologic Report

By Truman H. Kuhn
U. S. Geological Survey

NIGHTENGALE, MYSTERY, LUCKY FIND, ATOMIC MOUNTAIN, STARBUCK, GENERAL ISE, THORIUM MOUNTAIN CLAIMS CUSTER COUNTY, COLORADO

INTRODUCTION

In a revised application, L. C. Kaehle (Epworville, Kansas) and Brandt Sperling (Pueblo, Colorado) have applied to Defense Minerals Exploration Administration for Government assistance to explore for uranium and thorium on seven unpatented lode claims in the Hardscrabble Mining District, Custer County, Colorado. The cost of the proposed exploration program is estimated by the applicants to be $12,000.

The seven unpatented claims are located as follows:

Claim	Location		
Nightengale lode	Sec. 22	T. 22 S.	R. 71 W.
Mystery lode	25	21	71
Lucky Find lode	33	21	71
Atomic Mountain lode	27	21	71
Starbuck lode	28	21	71
General Ike lode	21	21	71
Thorium Mountain lode (Atomic Valley lode)	21	21	71

The claims, which are at an altitude of 8,000 to 9,000 feet, lie within a northeasterly trending area which is approximately 6 miles long and 2 miles wide, and about 9 miles east of Westcliffe, Colorado. Poor, unimproved roads lead to within easy walking distance of each claim, but because the exploration pits are small and difficult to find, a guide is necessary to find the exposed mineralized zones. The location map (fig. 2) gives the relative approximate location of each claim.

Except for several shallow trenches and pits, no exploration work for uranium and thorium has been done on the claims. In the past, there was

some exploration for gold, silver, barite, and lead, but these older drifts, crosscuts, and shafts are now inaccessible.

All claims were visited on July 8, 1952, accompanied by L. C. Knobbe and Ernest Sparling, and several were revisited on July 9, 1952, in company with Quentin D. Singewald, R. A. Christman, and A. M. Heyman of the U. S. Geological Survey. On January 27, 1953, the new claims included in the revised application were visited accompanied by C. M. Harrer of the U. S. Bureau of Mines, R. A. Christman and A. M. Heyman of the U. S. Geological Survey, and Ernest Sparling.

GEOLOGY

The geology of the thorium-bearing area in the general Westcliffe-Wet Mountains area currently is being studied in detail by the Geological Survey under the supervision of Quentin D. Singewald. Preliminary results of previous investigations are discussed by R. A. Christman, A. M. Heyman, L. F. Dellwig, and G. G. Gott in U. S. Geological Survey Trace Elements Investigations Report 230, "Thorium Investigations, 1950-52, Wet Mountains, Colorado."

Some thorium and rare earth minerals and very minor amounts of uranium occur in shear zones cutting dikes and irregular masses of pre-Cambrian amphibolite, granite gneiss, gabbro, migmatite, granite, and pegmatite. Mineralized exposures range from single, small, isolated, knife-edge fractures up to zones 5 feet in width. In the wider zones thorium mineralization more commonly is limited to one or more narrow lenses within the zone.

The radioactive material, which occurs as fracture filling, as coating on fracture walls, and as replacement bodies in sheared rock, is restricted to the shear zones. The zones appear to extend for considerable distances,

but the thorium concentration within any one zone has very irregular distribution. The shear zones strike N. 10°-75° W., although most of the mineralized shears trend approximately N. 50° W. The shears are steeply dipping.

The localization of thorium deposits in the shear zones shows no obvious relation to structural features or to types of country rock.

Thorite has been tentatively identified as the principal radioactive mineral. Closely associated with the thorite are rare earth minerals, quartz, barite, limonite, hematite, and less commonly, fluorite, galena, chalcopyrite, and pyrite. Much of the radioactive material has the general appearance of reddish-brown or dark reddish limonite and is difficult to recognize in the field except by the use of a Geiger counter. Rare earth oxides are associated with the thorium but the exact form and amount is not known. No uranium minerals have been identified.

INDIVIDUAL CLAIMS

In the revised application, the applicants list an "Atomic Valley lode claim." The location notice posted on this claim was examined in the presence of one of the applicants, Ernest Sparling, and it was determined that the claim was erroneously named in the application. The name of the claim, as shown on the location notice, is Thorium Mountain, and in this report it is correctly referred to as the Thorium Mountain lode claim.

A scintillometer reconnaissance of each of the radioactive zones on the seven claims was made by R. A. Christman of the U. S. Geological Survey, and the results of his survey are given with the description of the individual claims.

Nightengale Claim: A 6-foot, vertical shear zone, striking N. 45° W., is exposed for a length of 100 feet by three shallow prospect pits on the Nightengale claim. The radioactive material appears to be confined to coatings on fracture surfaces and the highest reading, 10 on the 2.0 scale of a Nuclear Geiger-Mueller counter, was obtained on approximately 1 square foot of a vertical fracture surface exposed on one side of the deepest pit.

According to Christman, scintillometer readings at the dump near the deepest pit read a maximum of 25 times background, with an average of 15 times background. A reading of 7 times background was obtained 110 feet to the south of the dump through 6 inches of snow and an unknown amount of cover.

Mystery Claim: A fractured and broken zone, a maximum of 2 feet in width, is exposed in a 20-foot shaft on the Mystery claim. The zone, which strikes N. 15° W., and dips 60° W., cuts across the structure of the enclosing gneiss. Some thorium-bearing material occurs along the hanging wall of a small quartz lens within the shear zone.

The scintillometer reading over the dump was 10 times background and a covered area 140 feet south of the dump read 4 to 5 times background.

Lucky Find Claim: Thorium mineralization on the Lucky Find claim is in a vertical shear zone, 2 to 7 feet in width, that has a known length of about 1,500 feet. The zone has an average strike of N. 70° W. A thorium-bearing, barite, and quartz vein within the shear zone, ranges up to 3 feet in width. Slickensides are common in the shear zone and are coated with thorite. The mineralized zone has been explored by one shallow shaft and several small pits and trenches.

Christman, in his scintillometer reconnaissance survey, obtained a maximum reading of 40 times background over a small portion of an open trench and 8 times background over the dump of the southernmost pit. For a distance

of 140 feet over the more highly mineralized portion of the zone, spotty readings (mostly background with several small areas of 5 times background) were obtained.

Atomic Mountain Claim: A series of small fractures, forming a zone as much as 4 feet wide, are exposed in an old, inaccessible shaft, 2 adits, and several pits and trenches on the Atomic Mountain claim. The zone strikes N. 30° W., and dips 80°-85° S. The radioactive material apparently is confined to a lens ranging from 1 to 24 inches in width. Quartz, barite, and limonite have been deposited with the radioactive material. The maximum reading obtained with a Nuclear Geiger-Mueller counter was 15 on the 2.0 scale.

Several hundred feet to the northeast of the Atomic Mountain shaft, the extension of the Little Maud vein onto the Atomic Mountain claim was explored by a new inaccessible shaft. The Little Maud vein, which strikes N. 10° W., and dips 80° S., is in a fractured and brecciated zone approximately 4 feet wide. Quartz occurs with the thorium-bearing material in the vein. Both the Atomic Mountain and Little Maud shafts are near the end line of the older Little Maud claim.

Material on the dump of the Atomic Mountain shaft gave scintillometer readings of 20 times background and on the Little Maud dump the readings were 15 times background. On the slope below the Little Maud shaft, readings were 4 times background for 100 feet from the shaft with a maximum reading of 6 times background.

Starbuck Claim: On the Starbuck claim a thorium-bearing zone has been explored by several shallow pits and trenches. One crosscut, now inaccessible, was driven to the vein and an unknown amount of drifting was done along the vein in search for gold (fig. 1).

The shear zone appears to be at least 1000 feet in length, but because of overburden, the outcrop cannot be traced continuously over that distance. Width of the zone ranges from 4 inches of radioactive material in Pit No. 3, to a coating on the fracture surface in Pit No. 4, and up to 3 feet of radioactive material in Pit No. 1. At Pit No. 1, the 3-foot zone strikes N. 35° W., and dips 80° N., and contains in addition to the radioactive material, quartz, barite, hematite, and limonite. The thorium-bearing minerals occur in pods or small, discontinuous lenses within the shear zone. Large specimens of barite were observed on the dump at the crosscut.

The highest scintillometer readings obtained on the Starbuck claim were 6 times background at Pit No. 1 and 5 times background near the adit portal.

General Ike Claim: A shear zone, containing radioactive material and some galena, is exposed in three shallow pits and one caved shaft on the General Ike claim. This vein, as seen in the most northwesterly pit, is approximately 4 feet wide, strikes N. 35° W., and dips 80° N. The material on the dump of the main, or southwesterly pit, gave scintillometer readings of 25 times background. Along the shear to the southeast, irregularly scattered scintillometer readings of 2 times background were obtained.

Another shear zone, containing some barite, trends N. 30° W. toward the main pit on the General Ike claim. Scintillometer readings over portions of this zone were 2 to 3 times background.

Thorium Mountain (Atomic Valley) Claim: The Thorium Mountain claim is erroneously named "Atomic Valley" claim in the revised application.

A vertical, thorium-bearing shear zone, striking N. 60° W., and having a width of approximately 3 feet, can be seen near the collar of an inaccessible,

vertical shaft and in several pits on the Thorium Mountain claim. The vein contains barite, galena, and thorium minerals in a host rock of altered, reddish granite. Geiger counter and scintillometer reconnaissance indicate that the red-stained granite, which appears to trend in the same general direction as the barite-galena-thorium vein, is as radioactive as the mineralized material making up the vein.

Because of overburden, the shear zone on the Thorium Mountain claim cannot be traced continuously, but probably the shear is a continuation of the radioactive zone on the adjoining Mineral Ike claim.

Near the Thorium Mountain dump, scintillometer readings over a 200 foot length of the shear were 10 times background. Readings over the red granite were 4 times background.

GRADE

The thorium-bearing material on each of the claims has been sampled by the applicants, by the U. S. G. S. geologists, and by D. M. E. A. geologists and engineers. Eighteen of the 28 samples were selected either by the applicants or after examination with a Geiger counter and represent only the highest grade material. Ten samples are channel cuts which are fairly representative of the exposed veins. Samples taken by the applicants were sent to the U. S. Bureau of Mines laboratories at Salt Lake City, Utah, and Rolla, Missouri. The U. S. G. S. and D. M. E. A. samples were analyzed by the Denver Laboratory of the Trace Elements Section, U. S. G. S. All sample data are given in Table 1.

The uranium content in the thorium-bearing shear zones is low. Assays range from 0.001 to 0.010 percent, with an average of less than 0.002 percent uranium.

Seven samples were analyzed for total possible rare earth content. The average for the seven samples was 0.24 percent total rare earth oxide with a range from 0.00 to 0.57 percent.

Because of complexity of analysis, the thorium content is difficult to determine accurately. Twelve chemical analyses range from 0.03 to 1.30 percent thorium oxide and 22 equivalent thorium oxide analyses range from 0.017 to 2.16 percent. For the seven scattered claims, the average chemical thorium oxide analysis is 0.77 percent and the average equivalent thorium oxide content is 0.59 percent.

Sampling and scintillometer reconnaissance indicate that the grade and amount of thorium may be greater on the Thorium Mountain claim than on any of the other claims included in this application.

ORE RESERVES

Because of limited exposures and extreme variability and discontinuity of the grade and size of the uranium and thorium-bearing lenses, a prediction or estimation of ore reserves cannot be made.

PROPOSED WORK

The following exploration work has been proposed by the applicants:

Claim	Cost	Type of Work
Nightengale	$ 1,310	3 trenches
Mystery	580	2 trenches
Lucky Find	1,310	3 trenches
Atomic Mountain	580	2 trenches
Starbuck	1,310	Clean out adit
General Ike	4,000	2 trenches, sink 50-ft. shaft
Thorium Mountain	2,950	2 trenches and repair shaft
	$12,000	

CONCLUSIONS

1. Because of extreme variability and discontinuity of the thorium occurrence, an estimate of ore reserves cannot be made at the present time.

2. Based on sampling data and the present knowledge of the district, any reserves developed would average less than 0.002 percent uranium, less than 0.50 percent total possible rare earth oxides, and less than one percent thorium oxide.

3. The proposed exploration program is principally surface exploration and would not add materially to the present knowledge of the thorium deposits.

RECOMMENDATIONS

1. Denial of the request for Defense Minerals Exploration Administration assistance to explore for uranium and thorium on the seven claims controlled by Knobbe and Sperling is recommended.

2. Since the strategic importance of thorium has not been specified by Defense Minerals Exploration Administration, recommendations for thorium exploration are contingent upon DMEA policy toward thorium.

3. If the development of 0.1 to 1.0 percent reserves of thorium oxide assumes sufficient importance, an exploration program by interested government agencies would be advisable.

TABLE 1

SAMPLE DATA

Claim	Sample No.	%Au	%U	Possible $\%(RE)_2O_3$	Chemical $\%ThO_2$	$\%ThO_2$	Type of Sample*	Width in ft.	Sampled by
Nightingale	XT	0.92					SA		Applicants
	69439	0.36	0.004	0.57	1.28	1.46	HG		DNEA
	LD 33	0.049	0.001			0.274	CV	5.0	USGS
	LD 34	0.14	0.002			0.787	CV		USGS
	LD 35	0.08	0.002			0.445	HG		USGS
Mystery	2-Purple	0.13					SA		Applicants
	69438	0.10	0.001	0.23	0.40	0.564	HG		DNEA
	LD 24	0.006	0.001			0.029	HG		USGS
	LD 25	0.097	0.001			0.547	HG		USGS
Lucky Find	4-4	0.38					SA		Applicants
	69437	0.14	0.002	0.18	0.53	0.787	HG		DNEA
	LD 26	0.006	0.001			0.029	CV	20.0	USGS
	LD 27	0.004	0.001			0.017	CV	7.0	USGS
	LD 28	0.013	0.001			0.065	CV	3.0	USGS
[illegible]mple [illegible]t.	69442	0.17	0.001	0.00	0.82	0.963	HG		DNEA
	HA 23	0.38	0.001		1.98	2.16	HG		USGS
	HR-12	0.034	0.001			0.19	HG		DNEA
	HR-13	0.031	0.001			0.17	HG		DNEA
Sterbuch	4-6-4	0.41					SA		Applicants
	69441	0.18	0.001	0.12	0.81	1.02	HG		DNEA
	HA 25	0.021	0.001		0.03	0.11	CV-Pit#1	3.0	USGS
	HA 26	0.18	0.002		0.84	1.01	CV-Pit#1	1.0	USGS
	HA 27	0.06	0.001		0.03	0.34	CV-Pit#3	0.5	USGS
	HA 28	0.30	0.001		1.39	1.704	HG		USGS
Buterol lue	69439	0.054	0.004	0.35	0.03		HG		DNEA
	HR-10	0.033	0.004			0.16	CV	4.0	DNEA
Thorium Mr.	69440	0.21	0.010	0.38	1.26		HG		DNEA
	HR-11	0.033	0.001			0.18	CV	3.0	DNEA

*—CV - Channel sample across vein
HG - Selected high grade material from dump
SA - High grade specimen selected by applicants

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

Engineering Report

By C. M. Harper
Mining Engineer
Bureau of Mines

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

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DMEA 2537
(URANIUM - THORIUM)

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

ENGINEERING REPORT

By

C. M. Harrer

INTRODUCTION

L. C. Knobbe, of Spearville, Kans., and Ernest Sparling, of Rosita, Colo., have applied for a Defense Minerals Exploration Administration loan of $12,000.00 to explore seven unpatented mining claims for uranium and thorium by trenching, rehabilitating underground workings, and sinking one shaft to a depth of about 50 feet. The project has been estimated to require 360 working days for completion. The applicants have asked for 2 years' time to complete the project.

The Wet Mountains thorium district, of which the applicants' claims are a part, has been under study by the Geological Survey in cooperation with the Atomic Energy Commission since its discovery during reconnaissance for uranium in 1950. Investigations in progress include detailed geologic mapping of the district.

An examination of surface exposures on the applicants' properties for the Defense Minerals Exploration Administration was completed by T. H. Kuhn, of the Geological Survey, on July 8 and 9, 1952.

A final examination of the properties was completed by the Defense Minerals Exploration Administration examining team and R. A. Christman and A. M. Heyman, Trace Elements Section, Geological Survey,

from January 26 through 28, 1953.

ACKNOWLEDGMENTS

R. A. Christman and A. M. Heyman, of the Geological Survey, made the results of their field work on uranium and thorium investigations in the Wet Mountains, Colo., and their manuscript--Trace Elements Investigations Report 250--available. The above work was for the Atomic Energy Commission. All analyses mentioned as taken by the Geological Survey are from the above source.

E. Sparling accompanied the examining team on January 27 and described the work intended with Government assistance.

All quantitative radiometric and chemical analyses of samples included in this report were made by the Denver laboratory, Trace Elements Section, Geological Survey.

LOCATION, TOPOGRAPHY, AND PHYSICAL FEATURES

Thorium occurs in an incompletely defined area about 20 miles long and 6 miles wide, extending north of Rosita, Colo., in parts of Custer and Fremont Counties. It is known as the Wet Mountains thorium district. Within part of this area, just east of Silver Cliff, Colo., and bounded by parts of Colorado State Highways 96, 143, and 277 (fig. 1), L. C. Knobbe and E. Sparling control seven unpatented mining claims, scattered over a northwest-trending area, starting with the Nightengale claim, about 1.4 miles east of Querida, to the Thorium Mountain claim, about 6 miles north of Querida. Altitudes range between 8,000 and 9,000 feet. All the claims are in Tps. 21 and 22 S., R.71W., in the Hardscrabble Mining District,

Custer County, Colo. The properties are within 1 mile of jeep and truck trails. The terrain is rough and slopes are scantily forested. There is no water on the properties. The nearest town of consequence is Westcliffe, 8 miles west of Querida, Colo.

HISTORY AND PRODUCTION

The Wet Mountains thorium district was discovered during 1950 by members of the Geological Survey during reconnaissance investigations for uranium on behalf of the Atomic Energy Commission. Investigations and detailed geologic mapping are still in progress. One particularly favorable thorium occurrence, known as the Haputa Ranch lode, according to Trace Elements Report 250, has been explored by diamond drilling to a depth of 400 feet. There has been no production of either uranium, thorium, or rare earth oxides from this area. The subject claims were located during 1951-1952.

OWNERSHIP AND EXTENT

The applicants, as partners, have located the following seven unpatented, standard mining claims in the Hardscrabble Mining District, in Custer County, Colo., as uranium-thorium prospects.

Name of Claim	Kind	Date Recorded	Location
Nightengale lode	Unpatented	No date (1951)	Sec.22,T.22S.,R.71W.
Mystery lode	"	May 4, 1951	Sec.35,T.21S.,R.71W.
Lucky Find lode	"	May 8, 1951	Sec.33,T.21S.,R.71W.
Atomic Mountain lode	"	Aug.25,1951	Sec.27,T.21S.R.71W.
Starbuck lode	"	Aug.9, 1951	Sec.28,T.21S.,R71W.
General Ike lode	"	Aug.27,1952	Sec.21,T.21S.,R71W.
Thorium Mountain lode	"	April 16,1952	Sec.21,T.21S.,R.71W.

Encroachments: Part of the patented Little Maud claim extends into the Atomic Mountain claim and limits exploration on both the Little

Maud and Atomic Mountain veins.

The easternmost corner of the Mystery claim may or may not conflict with a patented homestead. It would not, however, conflict with proposed exploration.

DESCRIPTION OF THE DEPOSITS

General

Thorium minerals, with small amounts of uranium, and rare earth oxides occur in barite-sulfide veins along northwest-trending shear zones in pre-Cambrian granite, gneiss, and schist. Because of the generally fine-grained texture and masking by iron oxides, the thorium- and rare earth-bearing minerals are seldom recognized without the use of radiometric detection instruments, such as the Geiger counter or scintillometer. Significant concentrations of thorium now exposed on the surface of the mining claims under consideration appear small and spotty in their present state of development.

A clue to possible subterranean extensions is furnished in the results of diamond drilling on the Haputa Ranch by the Atomic Energy Commission where thorium mineralization was shown to extend to depths of over 400 feet.

Information available on the uranium-thorium-rare earth oxides content of mineralized shear structures on the claims and the Wet Mountains thorium district in general is limited to inconclusive surface sampling and investigations not yet completed by the Geological Survey for the Atomic Energy Commission.

Radioactivity was noted in spots along the shear structures on all the claims under consideration. On the basis of sampling data incorporated in the discussion of the individual claims and ore reserves, the uranium content of the veins examined and the district in general is less than 0.01 percent. The rare earth oxides, on the same basis, are less than 1 percent. The highest ThO_2 values from selected samples was less than 2 percent.

References on the subject uranium-thorium-rare earths district and claims under consideration are included in the following sources of information:

Cross, Whitman, Geology of Silver Cliff and the Rosita Hills, Colo.: 17th Annual Report, U. S. Geol. Survey, pp. 269-403, 1896.

Emmons, S. F., The Mines of Custer County, Colo.: 17th Annual Report, U. S. Geol. Survey, pp. 411-472, 1896.

Dellwig, L. F., Preliminary Summary Report of the Wet Mountains Thorium Area, Custer and Fremont Counties, Colo.: U. S. Geol. Survey Trace Elements Memorandum Report 287, 1951.

Christman, R. A., Hayman, A. M., Dellwig, L. F., and Gott, G. G., Thorium Investigations 1950-1952, Wet Mountains, Colo.: U. S. Geol. Survey Trace Elements Investigations Report 250, December, 1952.

Individual Claims

(Locations shown from Querida or Ilse, fig. 1)

The Nightingale claim, about 1.4 miles east of Querida, encloses a poorly defined, vertical shear zone striking N. 45° W. Three shallow prospect pits expose the vein. Galena, chalcopyrite, and pyrite are present in minute quantity. The rock at the largest discovery pit is altered, stained black granite. The vein is concealed by about 3 feet

of soil. The discovery pit was sampled by the geologist member of the examining team and the Geological Survey, with the following results:

Sampling data on the Nightengale claim

Sample	Type	Source	Location	Width, feet	Percent eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
NR-2	Character	DMEA	Dump	-	0.26	0.004	1.46	1.85	1.28	0.57
ID-33	Channel	USGS	Bottom of discovery pit about 8 feet deep	5.0	0.049	0.001	0.274	-	-	-

Scintillometer reconnaissance by the Geological Survey established a maximum count of 25 times background at the discovery shaft, with an average of 15 times background. A reading of 7 times background was obtained 110 feet to the southeast through 6 inches of snow and an unknown depth of soil. The hidden shear zone can be traced for about 110 feet with a scintillometer.

The Mystery claim, about 3.2 miles southwest of Ilse, encloses a poorly exposed 2-foot quartz vein of unknown length that cuts injection gneiss. The vein strikes N. 15° W. and dips 60° southwest. One discovery shaft about 20 feet deep and one shallow pit expose the vein. The vein is almost completely concealed by about 3 feet of soil. Barite, sphalerite, galena, and chalcopyrite are present in small quantities as stringers and isolated blebs in a gangue of vuggy quartz. Some thorium-bearing material occurs along the hanging wall of a small quartz

lens. The discovery shaft dump was sampled by the geologist member of the examining team and the Geological Survey, with the following results:

Sampling data on the Wytary claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	eThO2	+ThO2	ThO2	(RE)2O3
KR-5	Character	DMEA	Dump	-	0.10	0.001	0.564	0.63	0.40	0.23
LD-24	Character	USGS	Dump	-	0.006	0.001	0.029	-	-	-
LD-25	Character	USGS	Dump	-	0.097	0.001	0.547	-	-	-

A scintillometer reconnaissance by the Geological Survey established a maximum of 10 times background count at the discovery shaft dump, and the covered area 140 feet to the southeast read 4 to 5 times background count.

The Lucky Find claim, about 4 miles north of Querida, encloses a vertical shear zone, 2 to 7 feet wide, in injection gneiss. The shear zone can be traced for about 1,500 feet, with an average strike of N. 70° W. and an almost vertical dip. The vein is exposed in the discovery shaft, 15 feet deep, and three shallow pits. Overburden is about 2 feet thick. The vein in the shear zone pinches and swells to thicknesses ranging between 1 and 2 feet. Principal vein minerals are red and brown barite, and quartz.

One character sample (KR-4) was taken of dump rock at the central pit by the geologist member of the examing team. Three channel samples

of the vein were taken by the Geological Survey. Two samples are components across the 7-foot vein exposed in the discovery shaft. Sample components consisted of 1.8 feet of reddish brown barite (sample LD-26) and 5.2 feet of mixed vein material (sample LD-27). In addition, a 3-foot channel sample (LD-28) was taken across the vein width in a pit about 400 feet to the east of the discovery shaft. Results of sampling follow:

Sampling data on the Lucky Find claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$+ThO_2$	ThO_2	$(RE)_2O_3$
ZR-4	Character	DMEA	Dump	-	0.14	0.002	0.787	0.73	0.55	0.18
LD-26	Channel	USGS	Barite component of vein in discovery shaft	1.8	0.006	0.001	0.029	-	-	
LD-27	Channel	USGS	Remainder of vein, component with LD-26	5.2	0.004	0.001	0.017	-	-	
LD-28	Channel	USGS	Vein 400 feet east of discovery shaft	3.0	0.013	0.001	0.068	-	-	

Scintillometer reconnaissance by the Geological Survey established readings of 3 times background at the discovery shaft and erratic values of 2 to 40 times background count in an open trench about 250 feet to the east. Readings of 2 to 8 times background count were recorded for about 275 feet farther east. The latter values were mainly negative.

The Atomic Mountain claim, about 5 miles northwest of Querida, encloses two veins, one of which is known as the Atomic Mountain vein. It strikes N. 50° W. and dips 80° to 85° southwest and is in layered granite and injection gneiss. The vein is exposed in one rock-cut, a presently inaccessible shaft, and several shallow pits. The vein is masked by 1 to 3 feet of soil and loose rock. The radioactive material appears to be 1 to 6 inches thick and of indeterminate length, containing quartz, barite, limonite, and siderite. Radioactivity is low to moderate.

A character sample of radioactive material from the discovery shaft dump was taken by both the geologist member of the examining team and the Geological Survey—samples KR-9 and RA-23, respectively. In addition, sample KR-12 was taken from a rock-cut about 50 feet southeast of the discovery shaft. The results are tabulated as follows:

Sampling data on the Atomic Mountain vein

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-9	Character	DMEA	Discovery shaft dump	-	0.17	0.001	0.963	0.82	0.82	0.00
KR-12	Character	DMEA	Rock-cut 50 feet northwest of discovery shaft	-	0.034	0.001	0.19	-	-	-
RA-23	Character	USGS	Discovery shaft dump	-	0.38	0.001	2.16	-	1.93	-

Scintillometer reconnaissance by the Geological Survey established a value of 20 times background at the discovery shaft dump; this, however, was over a very small area.

The second vein mentioned is the extension of the Little Maud vein beyond the southeast end line of the patented claim of the same name and on to the Atomic Mountain claim. The shear zone can be traced from the southeast end line of the Little Maud claim to the northwest by shallow pits. It is covered by from 0 to 5 feet of soil and loose rock. It is well exposed in an untimbered shaft near the southeast end line of the Little Maud claim to a depth of 20 feet. The vein strikes N. 27° W. and dips vertically. It is about 6 feet wide, consisting of iron-stained vuggy quartz, with some barite. Partly developed quartz crystals are common.

Owing to inaccessibility, one character sample (KR-13) of radioactive material from the shaft dump was taken by the geologist member of the examining team.

Sampling data on the Little Maud vein on the Atomic Mountain claim

Sample	Type	Source	Location	Width, feet	Percent *U	U	*ThO_2	$(RE)_2O_3$ +ThO_2	ThO_2	$(RE)_2O_3$
KR-13	Character	DMEA	Shaft dump, Little Maud vein, southeast end line	-	0.031	0.001	0.17	-	-	

Scintillometer reconnaissance by the Geological Survey gave a reading of 15 times background on the Little Maud shaft dump. The slope below

the Little Maud, where trenching is proposed, reads 4 times background count for 100 feet southeast of the shaft.

The Starbuck claim, about 5.2 miles north of Querida, encloses a vertical shear zone which strikes N. 35° W. and cuts granite gneiss, biotite schist, and amphibolite. The vein is exposed along a steep slope by eight prospect pits and an inaccessible adit and included winze. The shear zone has been traced for about 1,000 feet. It is covered by 1 to 3 feet of soil and loose rock. The thorium-bearing zone ranges in width from 4 inches to 3 feet. The vein consists of quartz and barite, with considerable limonite and hematite. Although the entire shear zone is weakly radioactive, concentration of thorium was found only at the discovery pit and on the adit dump.

A character sample (KR-8) of radioactive material in the discovery pit was taken by the geologist member of the examining team. Two channel samples (RA-25 and RA-26) were taken by the Geological Survey across portions of the vein exposed in the discovery cut. A character sample (RA-28) of radioactive material from the adit dump was also taken. In addition, a channel sample (RA-27) was taken across a radioactive vein exposure in a prospect pit northwest of the adit portal.

The results of sampling are tabulated as follows:

Sampling data on the Starbuck claim

Sample	Type	Source	Location	Width, feet	Percent eU	U	eThO2	$(RE)_2O_3$ +ThO_2	ThO_2	$(RE)_2O_3$
RR-6	Character	DMEA	Discovery pit, top of hill	-	0.18	0.001	1.02	0.93	0.81	0.12
RA-25	Channel	USGS	Discovery pit, top of hill	3.0	0.021	0.001	0.11	-	0.03	-
RA-26	Channel	USGS	Discovery pit, top of hill	1.0	0.18	0.002	1.01	-	0.84	-
RA-27	Channel	USGS	Pit northwest of adit	0.5	0.060	0.001	0.34	-	0.03	-
RA-28	Character	USGS	Adit dump	-	0.30	0.001	1.704	-	1.59	-

Scintillometer reconnaissance by the Geological Survey gave the highest reading at the southeasternmost pit as 6 times background and 5 times background at the adit. The other pits were generally low and intervening areas appear negative.

The General Lee claim, about 4.8 miles west of Ilse, encloses two shear structures, in granite, which junction about 50 feet east of the discovery shaft and center line of the claim. The main vein strikes about N. 60° W. and dips 80° to the north and is approximately the center line of the claim. The vein is exposed in two shafts and one pit at about 200-foot intervals, and to a depth of 10 feet. It is about 2 feet wide. Soil and loose rock cover the vein to thicknesses

of 1 to 3 feet. The vein consists of altered granite, barite, quartz, and a small amount of galena. It is weakly radioactive. No uranium, thorium, or rare earth oxides could be determined visually.

The second vein mentioned is poorly exposed in two very small pits and can be traced partly by its reddish color and partly by radioactivity. It, also, is a quartz-barite vein in granite and strikes N. 30° W.

Two samples were taken by the geologist member of the examining team. Sample KR-6 included high-grade material selected by the applicants from the dump at the discovery shaft. Sample KR-10 was across 4 feet of vein exposed in a pit about 50 feet northwest of the discovery shaft.

Sampling data on the General Ike claim

Sample	Type	Source	Location	Width, feet	eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-6*	Char-acter	DMEA	Discovery shaft dump	-	0.094	0.004	-	0.38	0.03	0.35
KR-10	Chan-nel	DMEA	Vein in pit 50 feet north-west of discovery shaft	4.0	0.033	0.004	0.16	-	-	-

*This sample also assayed 1.08 percent lead.

Scintillometer reconnaissance by the Geological Survey gave a reading of 25 times background on the discovery dump and readings of 2 times

background irregularly scattered along 500 feet of the shear zone. Radioactivity other than in the main pit was weak and spotty, with some negative values.

The Thorium Mountain claim, about 5 miles west of Ilse, is just west of the General Ike claim and is on the same shear structure. The vein is in reddish, iron-stained granite and strikes N. 60° W. It has a vertical dip and a width of about 1 foot. The vein consists of altered granite, quartz, barite, and a small amount of galena, and is radioactive. No uranium, thorium, or rare earth oxides could be identified. The vein is traceable for about 1,000 feet through a 60-foot discovery shaft, now inaccessible, and five shallow pits. Soil and loose rock cover the vein to depths of 1 to 3 feet.

Two samples were taken by the geologist member of the examining team. Sample KR-7 included high-grade material selected by the applicants from the dump at the discovery shaft. Sample KR-11 is a channel sample across 1.3 feet of vein width exposed in a 10-foot pit just west of the discovery shaft and at a depth of 6 feet below the surface.

Results of sampling are as follows:

Sampling data on the Thorium Mountain claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-7	Character	DMEA	Discovery dump	-	0.21	0.010	-	1.64	1.26	0.38
KR-11	Channel	DMEA	Vein exposed in pit 10 feet deep, just west of discovery shaft	1.2	0.033	0.001	0.19	-	-	-

Scintillometer reconnaissance by the Geological Survey indicated that the amount of radioactivity on this claim compares favorably with that found on the surface at the largest ore body discovered at Haputa ranch. At Thorium Mountain the discovery dump reads 10 times background over a shear zone length of 200 feet. The 2 times background count extends over a length of 500 feet. This claim appears most promising of the group.

MINEABLE ORE RESERVES

The results of sampling on the individual claims under consideration, as shown in the section "Description of Deposits", represents the best values obtainable at the present time.

On the basis of the sampling data, the uranium content of the veins examined is less than 0.01 percent, and the possibility of developing reserves of strategic importance is very poor.

The rare earths content is considerably less than 1 percent and the possibility of developing reserves of strategic importance is extremely doubtful.

Thorium reserves which could be developed would probably average less than 1 percent ThO_2.

There is no basis on which to estimate ore reserves.

PRESENT STATUS

Exploration and Development

Many prospect pits, surface exposures, short adits, and shallow shafts were made while prospecting for gold, silver, lead, and barite.

The older underground workings are now inaccessible. Except for a few shallow trenches and pits on the claims, no exploration work has been carried on in the search for uranium, thorium, or rare earth oxides.

Mining and Milling Equipment

There are no mining or milling facilities on the property and none are contemplated at this time.

PROJECT PROPOSALS

L. C. Knobbe and E. Sparling propose to explore their scattered claims with fourteen rock trenches, using a gasoline-operated jackhammer, across and along favorable radioactive zones at an estimated cost of $5,803.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 160 days at $24.00 per day	$3,840.00
Operating materials and supplies	
Explosives	486.00
Other (drill steel, bits, fuel, lubricants, tools, etcetera)	750.00
Equipment purchased	
1 Jackhammer drill, complete	610.00
Repairs to equipment	67.00
Sampling and analyses	50.00
Total cost of trenching	$5,803.00

In addition, they propose to rehabilitate the Starbuck adit for radiometric examination at a cost of $1,210.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 40 days at $24.00 per day	$ 960.00
Operating materials and supplies	
Timber, tools, and miscellaneous supplies	250.00
Total cost of rehabilitating the Starbuck adit	$1,210.00

A 60-foot shaft, 4- by 8-foot cross section, on the Thorium Mountain claim would be rehabilitated for examination at a cost of $1,210.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 40 days at $24.00 per day	$ 960.00
Operating materials and supplies	
Stulls, sheeting, ladders, windlass, rope, etcetera	250.00
Total cost of rehabilitating the Thorium Mountain shaft	$1,210.00

Finally, a 4- by 8-foot shaft would be sunk 50 feet on the General Ike claim at a cost of $75.54 to $91.54 per foot, depending on whether a gasoline jackhammer is used or a 105-cubic-foot compressor and 30-pound pneumatic drill are rented.

Details of Proposed Exploration Work

On the Nightengale claim, the discovery shaft and location stake are at its center. Three rock trenches are proposed, 8 to 10 feet deep. Overburden is about 3 feet deep. One trench would be across the vein at the location stake. A second would be 70 feet to the southeast at a radioactive high. A third trench is proposed at or between the above, but along the strike of the vein, as warranted by field evidence.

On the Mystery claim, the discovery shaft and location stake are at its center. Two rock trenches are proposed, 8 to 10 feet deep. Overburden is about 3 feet deep. The trenches would be about 100 and 150 feet southeast of the discovery stake at radioactive highs.

On the Lucky Find claim, the discovery shaft and location stake are 600 feet and 900 feet, respectively, from the northwest and southeast end lines. Three rock trenches are proposed, 8 to 10 feet deep, on radioactive highs. Overburden is about 2 feet thick. Two trenches, one along and one across the strike of the shear zone, would be located about 250 feet southeast of the location stake. A third trench would be dug to the southeast or northwest, depending on the results in the first two.

On the Atomic Mountain claim, the discovery shaft and location stake are 700 feet and 800 feet, respectively from the southeast and northwest end lines. Two rock trenches, 8 to 10 feet deep, are proposed on radioactive highs. Overburden is 1 to 3 feet deep. One trench would be on the Atomic Mountain shear zone, about 50 feet southeast of the location stake. The other would be on the Little Maud vein extension, about 200 feet northeast of the location stake.

On the Starbuck claim, the discovery pit and location stake are 100 feet and 1,400 feet, respectively, from the southeast and northwest end lines. Eight prospect pits and an adit trace the weakly radioactive shear zone for a strike length of 1,000 feet. Overburden is 1 to 3 feet deep. Strong radioactivity was noted only in the discovery pit and in samples from the adit dump. The only work proposed

is to rehabilitate the adit for radiometric examination. This may include unwatering of a shallow winze.

On the General Ike claim, the discovery pit and location stake are at its center. Two rock trenches and a 50-foot exploration shaft are proposed. The trenches would be about 10 feet deep. The shaft would be about 50 feet deep. Overburden is 1 to 3 feet deep. The trenches would be across the shear structure at radioactive highs, 50 and 200 feet S.30°E. of the location stake. The shaft would be sunk on the vein at the center of the claim.

On the Thorium Mountain claim, the discovery shaft and location stake are 400 feet and 1,100 feet, respectively, from the west and east end lines. Two rock trenches are proposed, 8 to 10 feet deep, and one shaft, about 60 feet deep, would be rehabilitated for examination. Overburden is 1 to 3 feet deep. One trench would be across the shear structure, about 100 feet west of the location stake. The other is tentatively located about 500 feet east on a radioactive high. The shaft is on the vein at the center of the claim.

CONCLUSIONS

On the basis of sampling data, present knowledge of the district, and evaluation of exploratory drilling at the Haputa ranch, any reserves developed would approximate less than 0.01 percent uranium, less than 1 percent rare earths, and less than 1 percent thorium oxide.

No estimate of reserves, other than their quality, is possible at this time due to lack of information.

Most of the area covered by the proposed loan will be mapped by the Geological Survey during the 1953 field season in conjunction with

continuing studies of the Wet Mountains thorium district for the Atomic Energy Commission.

The claims do not justify further exploration at this time since radioactivity and significant concentrations of thorium now appear small and spotty as exposed on the surface and outlined by scintillometer reconnaissance. Sampling data also indicates that any reserves developed would be of submarginal quality.

There is no known established Government policy which defines the status of this type and quality of uranium-thorium-rare earths occurrence.

Should development of thorium-rare earth reserves of the above-mentioned quality assume sufficient importance, an exploration program by interested Governmental agencies may be advisable after completion and consideration of the present studies by the Geological Survey, probably not before 1954.

The proposed program is principally surface exploration and, by itself, would not add materially to data necessary to estimate ore reserves. It would have to be integrated with a diamond drilling program outlined on the results of the study of extensive surface exposures and sampling.

A program for thorium similar to that established for uranium would be necessary to promote sustained interest in regional development.

RECOMMENDATIONS

It is recommended that the application of L. C. Knobbe and E. Sparling for a Defense Minerals Exploration Administration loan of

$12,000.00 to explore their seven unpatented mining claims for uranium-thorium-rare earths be denied.

Should development of reserves containing less than 0.01 percent uranium, less than 1 percent rare earths, and less than 1 percent thorium oxide assume sufficient strategic importance, an exploration program by interested Governmental agencies would be advisable after a review of investigations now being made of the Wet Mountains thorium district by these agencies.

4/21/53 gla

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

224 New Customhouse
Denver 2, Colorado

April 17, 1953.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
APR 20 1953

Memorandum

To: Secretary to the Operating Committee, Defense Minerals Exploration Administration.

From: Field Team, Region IV

Subject: Final Report, DMEA Docket 2537 (Uranium and Thorium), L. C. Knobbe and Ernest Sparling, Thorium Mountain Claims, Custer County, Colorado.

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

The A.E.C. information on this area consists of U. S. Geological Survey, Trace Elements Investigations Report 250, "Thorium Investigations 1950-1952, Wet Mountains, Colorado". The manuscript of this report was made available to the field examiners.

Since the DMEA policy in regard to thorium is not known to this office, it is recommended that this report be given your consideration and that you take appropriate action.

W. H. King
W. H. King

A. H. Koschmann
A. H. Koschmann

Enclosures

4/20/53

Withhold action until we see if Thorium is placed on the list

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Mining Division
Region IV

April 17, 1953.

Memorandum

To: Field Team, Region IV

From: Chief, Mining Division, Region IV

Subject: Final Report, DMEA Docket 2537 (Uranium and Thorium), L. C. Knobbe and Ernest Sparling, Thorium Mountain Claims, Custer County, Colorado.

Enclosed are ten copies of the final engineering report on the subject docket.

The applicants proposed to explore the property by trenching and sampling seven unpatented claims at an estimated cost of $12,000.00.

Since DMEA policy is not known on thorium it is recommended that the final report be sent to the Operating Committee for their consideration and appropriate action.

W. H. King
W. H. King

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Region IV

Building 20, Room 137
Denver Federal Center
Denver 14, Colorado
March 16, 1953

Memorandum

To: Executive Officer, Field Team, Region IV

From: Chief, Mineral Resources Branch, Mining Division, Region IV

Subject: DMEA 2537, L. C. Knebbe and Ernest Sparling (Uranium-thorium), Custer County, Colorado

Please find enclosed the original and ten copies of the "Summary, Conclusions, and Recommendations", by C. M. Harrer, Bureau of Mines, and T. N. Kuhn, Geological Survey, and of Harrer's engineering report on the subject docket.

Harrer concludes the claims do not justify exploration with DMEA assistance and recommends denial of the loan pending establishment of Government policy with regard to uranium-thorium-rare earths deposits of the tenor of those existing on Knebbe and Sparling's claim. He expects the Survey will continue field work in the 1953 and succeeding seasons.

I concur with the conclusions and recommendations.

W. M. Traver

W. M. Traver

enclosures

WMT/eb

cc 10
DMEA 2537
Chron

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.
200 New Customhouse
Denver 2, Colorado

April 10, 1953

Memorandum

To: DMEA Field Team, Region IV

From: A. H. Koschmann

Subject: DMEA Docket 2537, Nightengale, Mystery, Lucky Find, Atomic Mountain, Starbuck, General Ike, Thorium Mountain Claims, Hardscrabble Mining District, Custer County, Colorado.

Attached are 10 copies of the geological report by Truman H. Kuhn covering DMEA Docket 2537, Hardscrabble Mining District, Custer County, Colorado.

The applicant has proposed to explore by trenching for uranium and thorium on seven unpatented claims at an estimated cost of $12,000. Samples collected from the mineralized shear zones indicate that any reserves developed would average less than 0.002 percent uranium, less than 0.50 percent total rare earth oxides, and less than one percent thorium oxide. Since the strategic importance of thorium has not been specified by DMEA, recommendation for thorium exploration must be contingent on DMEA policy, and only if the development of 0.1 to 1.0 percent thorium oxide is significant. The grade of uranium and rare earths is too low grade to warrant exploration.

I concur in Kuhn's conclusions and recommendations.

A. H. Koschmann
A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (10)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMEA 2537, L. C. Knobbe and Ernest Sparling

Custer County, Colorado

Uranium-Thorium

Truman H. Kuhn, Geologist
Geological Survey

C. M. Harrer, Mining Engineer
Bureau of Mines

March 10, 1953

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

Summary, Conclusions, and Recommendations

By Truman H. Kuhn
Geologist
Geological Survey

and

C. M. Harrer
Mining Engineer
Bureau of Mines

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

By Truman H. Kuhn and C. M. Harrer

L. C. Knobbe, of Spearville, Kans., and E. Sparling, of Rosita, Colo., have applied for Defense Minerals Exploration Administration assistance to explore on seven unpatented mining claims for uranium and thorium. The cost of the proposed exploration program is estimated by the applicants to be $12,000.00. Trenching, rehabilitating underground workings, and sinking one shaft to a depth of 50 feet are proposed and the applicants request 2 years to complete the work.

The applicants' mining claims are in an area known as the "Wet Mountains Thorium District" which, since its discovery during reconnaissance for uranium in 1950, has been under investigation by the Geological Survey for the Atomic Energy Commission. Investigations and detailed geologic mapping of the district are still in progress.

The claims are in Tps. 21 and 22 S., R. 71 W., Hardscrabble Mining District, Custer County, Colo., at altitudes between 8,000 and 9,000 feet. The nearest town of importance is Westcliffe, Colo.

Thorium and rare earth minerals and very minor amounts of uranium occur in northwesterly trending shear zones cutting pre-Cambrian amphibolite, granite gneiss, gabbro, migmatite, granite, and pegmatite. The radioactive material, which occurs as fracture filling, as coating on fractures, and

as replacement bodies, is restricted to the shear zones. Some shears appear to extend for considerable distances, but the thorium concentration within any one zone has very irregular distribution. Thorite has been tentatively identified as the principal radioactive mineral. Closely associated with the thorite are rare earth minerals, quartz, barite, limonite, hematite, and less common fluorite, galena, chalcopyrite, and pyrite. Much of the radioactive material has the general appearance of reddish-brown or dark reddish limonite and is difficult to recognize in the field except by the use of a Geiger counter and scintillometer.

On the basis of sampling data, present knowledge of the district,[1/] and evaluation of exploratory drilling at the Haputa ranch, any reserves developed would average less than 0.002 percent uranium, less than 0.5 percent total rare earth oxides, and less than 1.0 percent thorium oxide. No estimate other than the approximate grade of the reserves is possible at the present time.

The proposed program is principally surface exploration and would not add materially to the present knowledge of the thorium deposits.

Further exploration on the claims is not justified at this time.

Sampling and Geiger counter - scintillometer reconnaissance indicate that uranium is present in very minor amounts and that concentrations of thorium-bearing minerals are small and very spotty.

Since the strategic importance and quality of acceptable thorium reserves have not been defined by either the Defense Minerals Exploration

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1/ Christman, R. A., Heyman, A. M., Dellwig, L. F., and Gott, G. G., Thorium Investigations 1950-1952, Wet Mountains, Colorado: U. S. Geol. Survey Trace Elements Investigations Report 250, 1953.

Administration or the Atomic Energy Commission, recommendations for thorium exploration are contingent upon the establishment of future policy.

Denial of the request for Defense Minerals Exploration Administration assistance to explore for uranium and thorium on the seven claims controlled by Knobbe and Sparling is recommended.

If the development of 0.1 to 1.0 percent reserves of thorium oxide assumes sufficient importance, an exploration program by interested Government agencies would be advisable. A program similar to that established for uranium may be necessary to promote sustained interest in thorium in the Wet Mountains district.

NIGHTENGALE, MYSTERY, LUCKY FIND, ATOMIC MOUNTAIN, STARBUCK, GENERAL IKE, THORIUM MOUNTAIN CLAIMS

HARDSCRABBLE MINING DISTRICT

CUSTER COUNTY, COLORADO

DMEA DOCKET 2537

Geologic Report

By Truman H. Kuhn
U. S. Geological Survey

NIGHTENGALE, MYSTERY, LUCKY FIND, ATOMIC MOUNTAIN,
STARBUCK, GENERAL IKE, THORIUM MOUNTAIN CLAIMS
CUSTER COUNTY, COLORADO

INTRODUCTION

In a revised application, L. C. Knobbe (Spearville, Kansas) and Ernest Sparling (Rosita, Colorado) have applied to Defense Minerals Exploration Administration for Government assistance to explore for uranium and thorium on seven unpatented lode claims in the Hardscrabble Mining District, Custer County, Colorado. The cost of the proposed exploration program is estimated by the applicants to be $12,000.

The seven unpatented claims are located as follows:

Claim	Location		
Nightengale lode	Sec. 22	T. 22 S.	R. 71 W.
Mystery lode	35	21	71
Lucky Find lode	33	21	71
Atomic Mountain lode	27	21	71
Starbuck lode	28	21	71
General Ike lode	21	21	71
Thorium Mountain lode (Atomic Valley lode)	21	21	71

The claims, which are at an altitude of 8,000 to 9,000 feet, lie within a northwesterly trending area which is approximately 6 miles long and 2 miles wide, and about 9 miles east of Westcliffe, Colorado. Poor, unimproved roads lead to within easy walking distance of each claim, but because the exploration pits are small and difficult to find, a guide is necessary to find the exposed mineralized zones. The location map (fig. 2) gives the relative approximate location of each claim.

Except for several shallow trenches and pits, no exploration work for uranium and thorium has been done on the claims. In the past, there was

some exploration for gold, silver, barite, and lead, but these older drifts, crosscuts, and shafts are now inaccessible.

All claims were visited on July 8, 1952, accompanied by L. C. Knobbe and Ernest Sparling, and several were revisited on July 9, 1952, in company with Quentin D. Singewald, R. A. Christman, and A. M. Heyman of the U. S. Geological Survey. On January 27, 1953, the new claims included in the revised application were visited accompanied by C. M. Harrer of the U. S. Bureau of Mines, R. A. Christman and A. M. Heyman of the U. S. Geological Survey, and Ernest Sparling.

GEOLOGY

The geology of the thorium-bearing area in the general Westcliffe-Wet Mountains area currently is being studied in detail by the Geological Survey under the supervision of Quentin D. Singewald. Preliminary results of previous investigations are discussed by R. A. Christman, A. M. Heyman, L. F. Dellwig, and G. G. Gott in U. S. Geological Survey Trace Elements Investigations Report 250, "Thorium Investigations, 1950-52, Wet Mountains, Colorado."

Some thorium and rare earth minerals and very minor amounts of uranim occur in shear zones cutting dikes and irregular masses of pre-Cambrian amphibolite, granite gneiss, gabbro, migmatite, granite, and pegmatite. Mineralized exposures range from single, small, isolated, knife-edge fractures up to zones 5 feet in width. In the wider zones thorium mineralization more commonly is limited to one or more narrow lenses within the zone.

The radioactive material, which occurs as fracture filling, as coating on fracture walls, and as replacement bodies in sheared rock, is restricted to the shear zones. The zones appear to extend for considerable distances,

but the thorium concentration within any one zone has very irregular distribution. The shear zones strike N. 10°-75° W., although most of the mineralized shears trend approximately N. 50° W. The shears are steeply dipping.

The localization of thorium deposits in the shear zones shows no obvious relation to structural features or to types of country rock.

Thorite has been tentatively identified as the principal radioactive mineral. Closely associated with the thorite are rare earth minerals, quartz, barite, limonite, hematite, and less commonly, fluorite, galena, chalcopyrite, and pyrite. Much of the radioactive material has the general appearance of reddish-brown or dark reddish limonite and is difficult to recognize in the field except by the use of a Geiger counter. Rare earth oxides are associated with the thorium but the exact form and amount is not known. No uranium minerals have been identified.

INDIVIDUAL CLAIMS

In the revised application, the applicants list an "Atomic Valley lode claim." The location notice posted on this claim was examined in the presence of one of the applicants, Ernest Sparling, and it was determined that the claim was erroneously named in the application. The name of the claim, as shown on the location notice, is Thorium Mountain, and in this report it is correctly referred to as the Thorium Mountain lode claim.

A scintillometer reconnaissance of each of the radioactive zones on the seven claims was made by R. A. Christman of the U. S. Geological Survey, and the results of his survey are given with the description of the individual claims.

Nightengale Claim: A 6-foot, vertical shear zone, striking N. 45° W., is exposed for a length of 100 feet by three shallow prospect pits on the Nightengale claim. The radioactive material appears to be confined to coatings on fracture surfaces and the highest reading, 10 on the 2.0 scale of a Nuclear Geiger-Mueller counter, was obtained on approximately 1 square foot of a vertical fracture surface exposed on one side of the deepest pit.

According to Christman, scintillometer readings at the dump near the deepest pit read a maximum of 25 times background, with an average of 15 times background. A reading of 7 times background was obtained 110 feet to the south of the dump through 6 inches of snow and an unknown amount of cover.

Mystery Claim: A fractured and broken zone, a maximum of 2 feet in width, is exposed in a 20-foot shaft on the Mystery claim. The zone, which strikes N. 15° W., and dips 60° W., cuts across the structure of the enclosing gneiss. Some thorium-bearing material occurs along the hanging wall of a small quartz lens within the shear zone.

The scintillometer reading over the dump was 10 times background and a covered area 140 feet south of the dump read 4 to 5 times background.

Lucky Find Claim: Thorium mineralization on the Lucky Find claim is in a vertical shear zone, 2 to 7 feet in width, that has a known length of about 1,500 feet. The zone has an average strike of N. 70° W. A thorium-bearing, barite, and quartz vein within the shear zone, ranges up to 3 feet in width. Slickensides are common in the shear zone and are coated with thorite. The mineralized zone has been explored by one shallow shaft and several small pits and trenches.

Christman, in his scintillometer reconnaissance survey, obtained a maximum reading of 40 times background over a small portion of an open trench and 8 times background over the dump of the southernmost pit. For a distance

of 140 feet over the more highly mineralized portion of the zone, spotty readings (mostly background with several small areas of 5 times background) were obtained.

Atomic Mountain Claim: A series of small fractures, forming a zone as much as 4 feet wide, are exposed in an old, inaccessible shaft, 2 adits, and several pits and trenches on the Atomic Mountain claim. The zone strikes N. 50° W., and dips 80°-85° S. The radioactive material apparently is confined to a lens ranging from 1 to 24 inches in width. Quartz, barite, and limonite have been deposited with the radioactive material. The maximum reading obtained with a Nuclear Geiger-Mueller counter was 15 on the 2.0 scale.

Several hundred feet to the northeast of the Atomic Mountain shaft, the extension of the Little Maud vein onto the Atomic Mountain claim was explored by a now inaccessible shaft. The Little Maud vein, which strikes N. 30° W., and dips 80° S., is in a fractured and brecciated zone approximately 4 feet wide. Quartz occurs with the thorium-bearing material in the vein. Both the Atomic Mountain and Little Maud shafts are near the end line of the older Little Maud claim.

Material on the dump of the Atomic Mountain shaft gave scintillometer readings of 20 times background and on the Little Maud dump the readings were 15 times background. On the slope below the Little Maud shaft, readings were 4 times background for 100 feet from the shaft with a maximum reading of 6 times background.

Starbuck Claim: On the Starbuck claim a thorium-bearing zone has been explored by several shallow pits and trenches. One crosscut, now inaccessible, was driven to the vein and an unknown amount of drifting was done along the vein in search for gold (fig. 1).

The shear zone appears to be at least 1000 feet in length, but because of overburden, the outcrop cannot be traced continuously over that distance. Width of the zone ranges from 4 inches of radioactive material in Pit No. 5, to a coating on the fracture surface in Pit No. 4, and up to 3 feet of radioactive material in Pit No. 1. At Pit No. 1, the 3-foot zone strikes N. 30° W., and dips 80° N., and contains in addition to the radioactive material, quartz, barite, hematite, and limonite. The thorium-bearing minerals occur in pods or small, discontinuous lenses within the shear zone. Large specimens of barite were observed on the dump at the crosscut.

The highest scintillometer readings obtained on the Starbuck claim were 6 times background at Pit No. 1 and 5 times background near the adit portal.

General Ike Claim: A shear zone, containing radioactive material and some galena, is exposed in three shallow pits and one caved shaft on the General Ike claim. This vein, as seen in the most northwesterly pit, is approximately 4 feet wide, strikes N. 55° W., and dips 80° N. The material on the dump of the main, or southwesterly pit, gave scintillometer readings of 25 times background. Along the shear to the southwest, irregularly scattered scintillometer readings of 2 times background were obtained.

Another shear zone, containing some barite, trends N. 30° W. toward the main pit on the General Ike claim. Scintillometer readings over portions of this zone were 2 to 3 times background.

Thorium Mountain (Atomic Valley) Claim: The Thorium Mountain claim is erroneously named "Atomic Valley" claim in the revised application.

A vertical, thorium-bearing shear zone, striking N. 60° W., and having a width of approximately 3 feet, can be seen near the collar of an inaccessible,

vertical shaft and in several pits on the Thorium Mountain claim. The vein contains barite, galena, and thorium minerals in a host rock of altered, reddish granite. Geiger counter and scintillometer reconnaissance indicate that the red-stained granite, which appears to trend in the same general direction as the barite-galena-thorium vein, is as radioactive as the mineralized material making up the vein.

Because of overburden, the shear zone on the Thorium Mountain claim cannot be traced continuously, but probably the shear is a continuation of the radioactive zone on the adjoining General Ike claim.

Near the Thorium Mountain dump, scinillometer readings over a 200 foot length of the shear were 10 times background. Readings over the red granite were 4 times background.

GRADE

The thorium-bearing material on each of the claims has been sampled by the applicants, by the U. S. G. S. geologists, and by D. M. E. A. geologists and engineers. Eighteen of the 28 samples were selected either by the applicants or after examination with a Geiger counter and represent only the highest grade material. Ten samples are channel cuts which are fairly representative of the exposed veins. Samples taken by the applicants were sent to the U. S. Bureau of Mines laboratories at Salt Lake City, Utah, and Rolla, Missouri. The U. S. G. S. and D. M. E. A. samples were analyzed by the Denver Laboratory of the Trace Elements Section, U. S. G. S. All sample data are given in Table I.

The uranium content in the thorium-bearing shear zones is low. Assays range from 0.001 to 0.010 percent, with an average of less than 0.002 percent uranium.

Seven samples were analyzed for total possible rare earth content. The average for the seven samples was 0.24 percent total rare earth oxide with a range from 0.00 to 0.57 percent.

Because of complexity of analysis, the thorium content is difficult to determine accurately. Twelve chemical analyses range from 0.03 to 1.59 percent thorium oxide and 22 equivalent thorium oxide analyses range from 0.017 to 2.16 percent. For the seven scattered claims, the average chemical thorium oxide analysis is 0.77 percent and the average equivalent thorium oxide content is 0.59 percent.

Sampling and scintillometer reconnaissance indicate that the grade and amount of thorium may be greater on the Thorium Mountain claim than on any of the other claims included in this application.

ORE RESERVES

Because of limited exposures and extreme variability and discontinuity of the grade and size of the uranium and thorium-bearing lenses, a prediction or estimation of ore reserves cannot be made.

PROPOSED WORK

The following exploration work has been proposed by the applicants:

Claim	Cost	Type of Work
Nightengale	$ 1,310	3 trenches
Mystery	580	2 trenches
Lucky Find	1,310	3 trenches
Atomic Mountain	580	2 trenches
Starbuck	1,310	Clean out adit
General Ike	4,860	2 trenches, sink 50-ft. shaft
Thorium Mountain	2,050	2 trenches and repair shaft
	$12,000	

CONCLUSIONS

1. Because of extreme variability and discontinuity of the thorium occurrence, an estimate of ore reserves cannot be made at the present time.

2. Based on sampling data and the present knowledge of the district, any reserves developed would average less than 0.002 percent uranium, less than 0.50 percent total possible rare earth oxides, and less than one percent thorium oxide.

3. The proposed exploration program is principally surface exploration and would not add materially to the present knowledge of the thorium deposits.

RECOMMENDATIONS

1. Denial of the request for Defense Minerals Exploration Administration assistance to explore for uranium and thorium on the seven claims controlled by Knobbe and Sparling is recommended.

2. Since the strategic importance of thorium has not been specified by Defense Minerals Exploration Administration, recommendations for thorium exploration are contingent upon DMEA policy toward thorium.

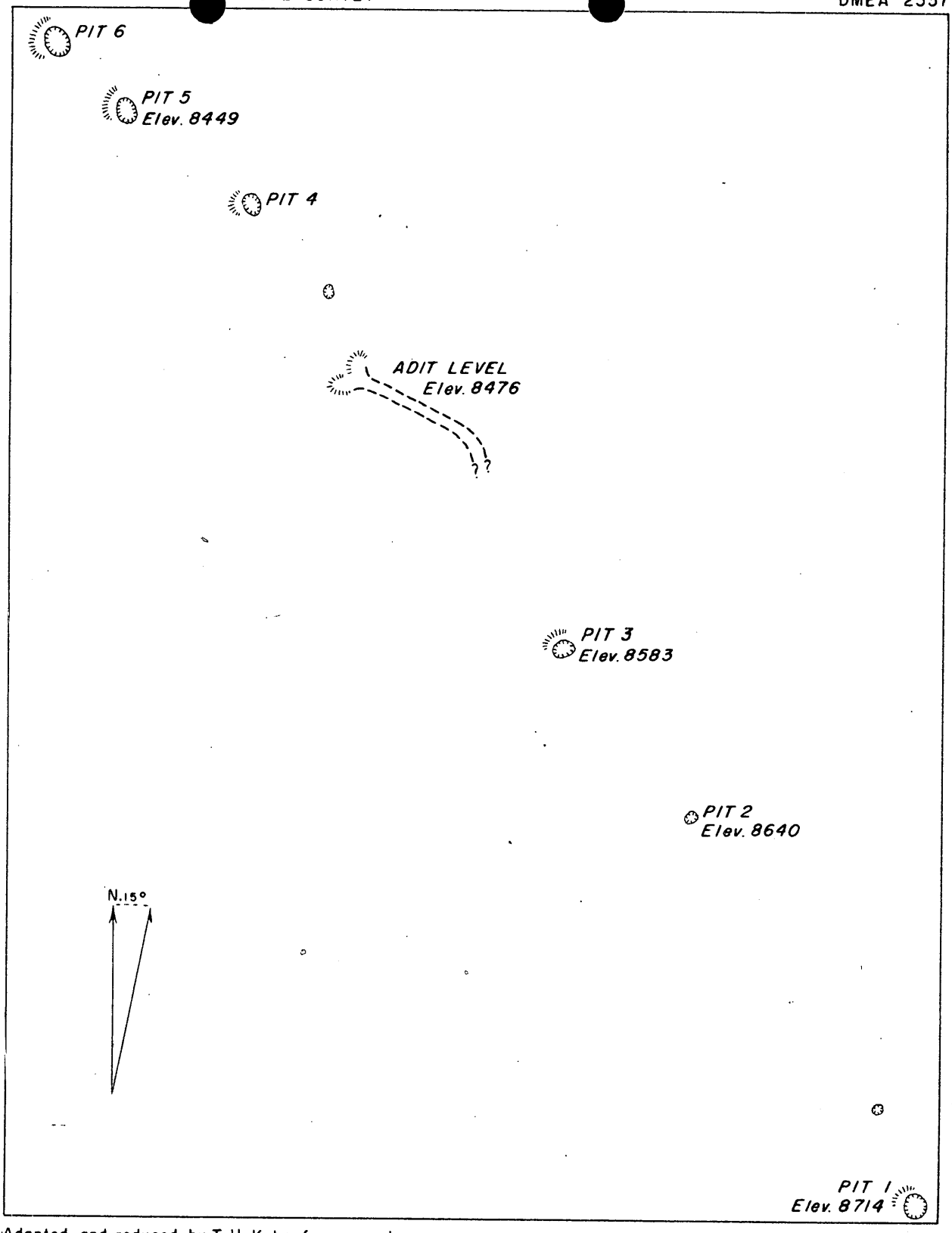
3. If the development of 0.1 to 1.0 percent reserves of thorium oxide assumes sufficient importance, an exploration program by interested government agencies would be advisable.

TABLE I

SAMPLE DATA

Claim	Sample No.	%eU	%U	Possible $\%(RE)_2O_3$	Chemical $\%ThO_2$	$\%eThO_2$	Type of Sample*	Width in ft.	Sampled by
Nighten-gale	2T	0.92					SA		Applicants
	69435	0.26	0.004	0.57	1.28	1.46	HG		DMEA
	LD 33	0.049	0.001			0.274	CV	5.0	USGS
	LD 34	0.14	0.002			0.787	CV		USGS
	LD 35	0.08	0.002			0.445	HG		USGS
Mystery	2-Purple	0.13					SA		Applicants
	69438	0.10	0.001	0.23	0.40	0.564	HG		DMEA
	LD 24	0.006	0.001			0.029	HG		USGS
	LD 25	0.097	0.001			0.547	HG		USGS
Lucky Find	4-S	0.35					SA		Applicants
	69437	0.14	0.002	0.18	0.55	0.787	HG		DMEA
	LD 26	0.006	0.001			0.029	CV	20.0	USGS
	LD 27	0.004	0.001			0.017	CV	7.0	USGS
	LD 28	0.013	0.001			0.068	CV	3.0	USGS
Atomic Mt.	69442	0.17	0.001	0.00	0.82	0.963	HG		DMEA
	RA 23	0.38	0.001		1.98	2.16	HG		USGS
	KR-12	0.034	0.001			0.19	HG		DMEA
	KR-13	0.031	0.001			0.17	HG		DMEA
Starbuck	4-S-N	0.41					SA		Applicants
	69441	0.18	0.001	0.12	0.81	1.02	HG		DMEA
	RA 25	0.021	0.001		0.03	0.11	CV-Pit#1	3.0	USGS
	RA 26	0.18	0.002		0.84	1.01	CV-Pit#1	1.0	USGS
	RA 27	0.06	0.001		0.03	0.34	CV-Pit#5	0.5	USGS
	RA 28	0.30	0.001		1.59	1.704	HG		USGS
General Ike	69439	0.094	0.004	0.35	0.03		HG		DMEA
	KR-10	0.033	0.004			0.16	CV	4.0	DMEA
Thorium Mt.	69440	0.21	0.010	0.38	1.26		HG		DMEA
	KR-11	0.033	0.001			0.18	CV	3.0	DMEA

*--CV - Channel sample across vein
HG - Selected high grade material from dump
SA - High grade specimen selected by applicants



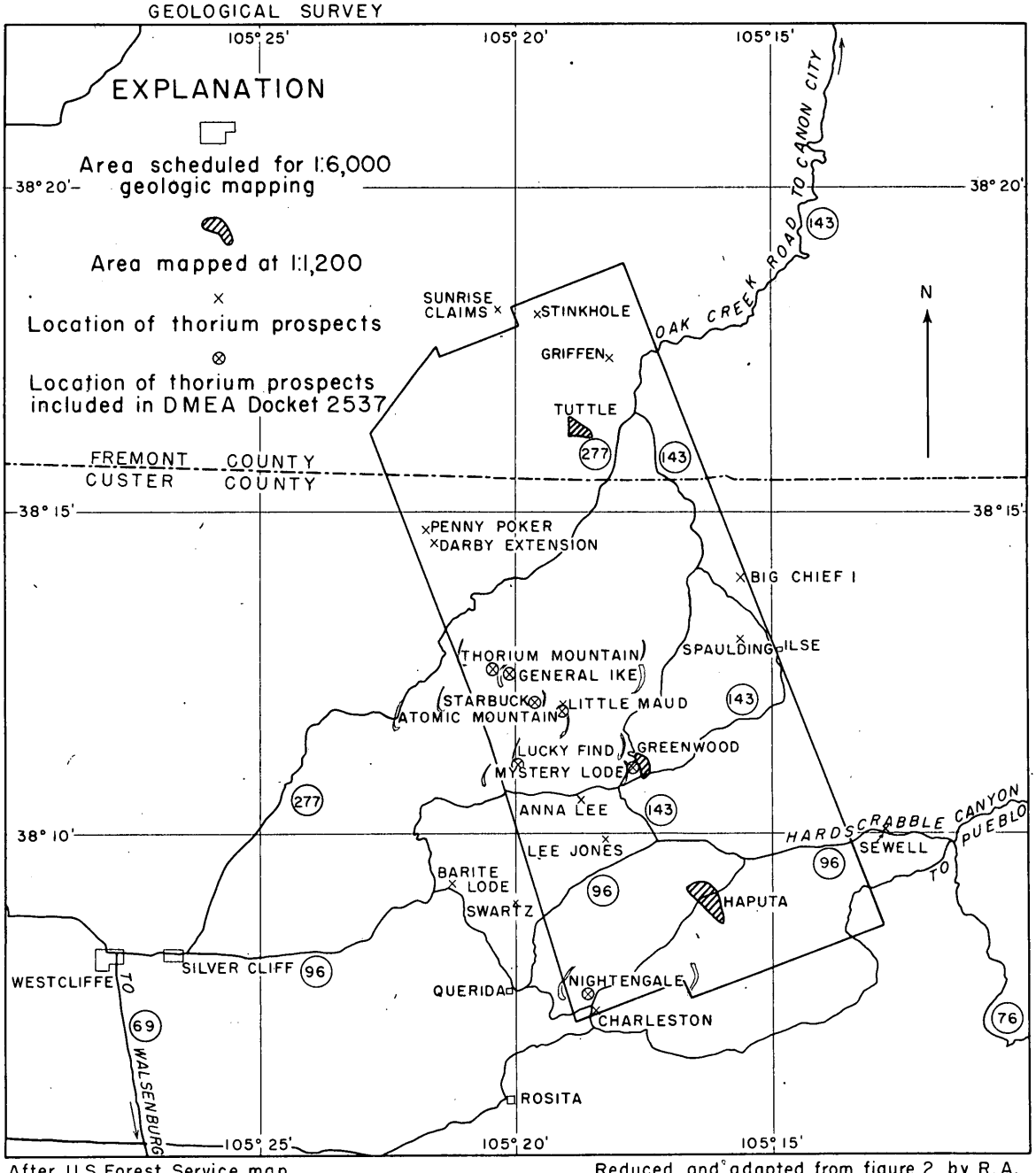
Adapted and reduced by T. H. Kuhn from map by Christman and Heyman, U. S. Geological Survey

September, 1952

FIGURE 1.- PORTION OF STARBUCK CLAIM, CUSTER COUNTY, COLORADO

100 0 100 200 Feet

Datum is assumed



After U.S. Forest Service map

Reduced and adapted from figure 2, by R. A. Christman and A.M. Heyman, in Trace Elements Investigations Report 250, 1952

FIGURE 2,—INDEX OF KNOWN THORIUM AREAS AND PROSPECTS, CUSTER AND FREMONT COUNTIES, COLORADO.

3 0 3 Miles

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

Engineering Report

By C. M. Harrer
Mining Engineer
Bureau of Mines

DMEA 2537

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

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DMEA 2537
(URANIUM - THORIUM)

L. C. KNOBBE AND ERNEST SPARLING
CUSTER COUNTY, COLORADO

ENGINEERING REPORT

By

C. M. Harrer

INTRODUCTION

L. C. Knobbe, of Spearville, Kans., and Ernest Sparling, of Rosita, Colo., have applied for a Defense Minerals Exploration Administration loan of $12,000.00 to explore seven unpatented mining claims for uranium and thorium by trenching, rehabilitating underground workings, and sinking one shaft to a depth of about 50 feet. The project has been estimated to require 360 working days for completion. The applicants have asked for 2 years' time to complete the project.

The Wet Mountains thorium district, of which the applicants' claims are a part, has been under study by the Geological Survey in cooperation with the Atomic Energy Commission since its discovery during reconnaissance for uranium in 1950. Investigations in progress include detailed geologic mapping of the district.

An examination of surface exposures on the applicants' properties for the Defense Minerals Exploration Administration was completed by T. H. Kuhn, of the Geological Survey, on July 8 and 9, 1952.

A final examination of the properties was completed by the Defense Minerals Exploration Administration examining team and R. A. Christman and A. M. Heyman, Trace Elements Section, Geological Survey,

from January 26 through 28, 1953.

ACKNOWLEDGMENTS

R. A. Christman and A. M. Heyman, of the Geological Survey, made the results of their field work on uranium and thorium investigations in the Wet Mountains, Colo., and their manuscript--Trace Elements Investigations Report 250--available. The above work was for the Atomic Energy Commission. All analyses mentioned as taken by the Geological Survey are from the above source.

E. Sparling accompanied the examining team on January 27 and described the work intended with Government assistance.

All quantitative radiometric and chemical analyses of samples included in this report were made by the Denver laboratory, Trace Elements Section, Geological Survey.

LOCATION, TOPOGRAPHY, AND PHYSICAL FEATURES

Thorium occurs in an incompletely defined area about 20 miles long and 6 miles wide, extending north of Rosita, Colo., in parts of Custer and Fremont Counties. It is known as the Wet Mountains thorium district. Within part of this area, just east of Silver Cliff, Colo., and bounded by parts of Colorado State Highways 96, 143, and 277 (fig. 1), L. C. Knobbe and E. Sparling control seven unpatented mining claims, scattered over a northwest-trending area, starting with the Nightengale claim, about 1.4 miles east of Querida, to the Thorium Mountain claim, about 6 miles north of Querida. Altitudes range between 8,000 and 9,000 feet. All the claims are in Tps. 21 and 22 S., R.71W., in the Hardscrabble Mining District,

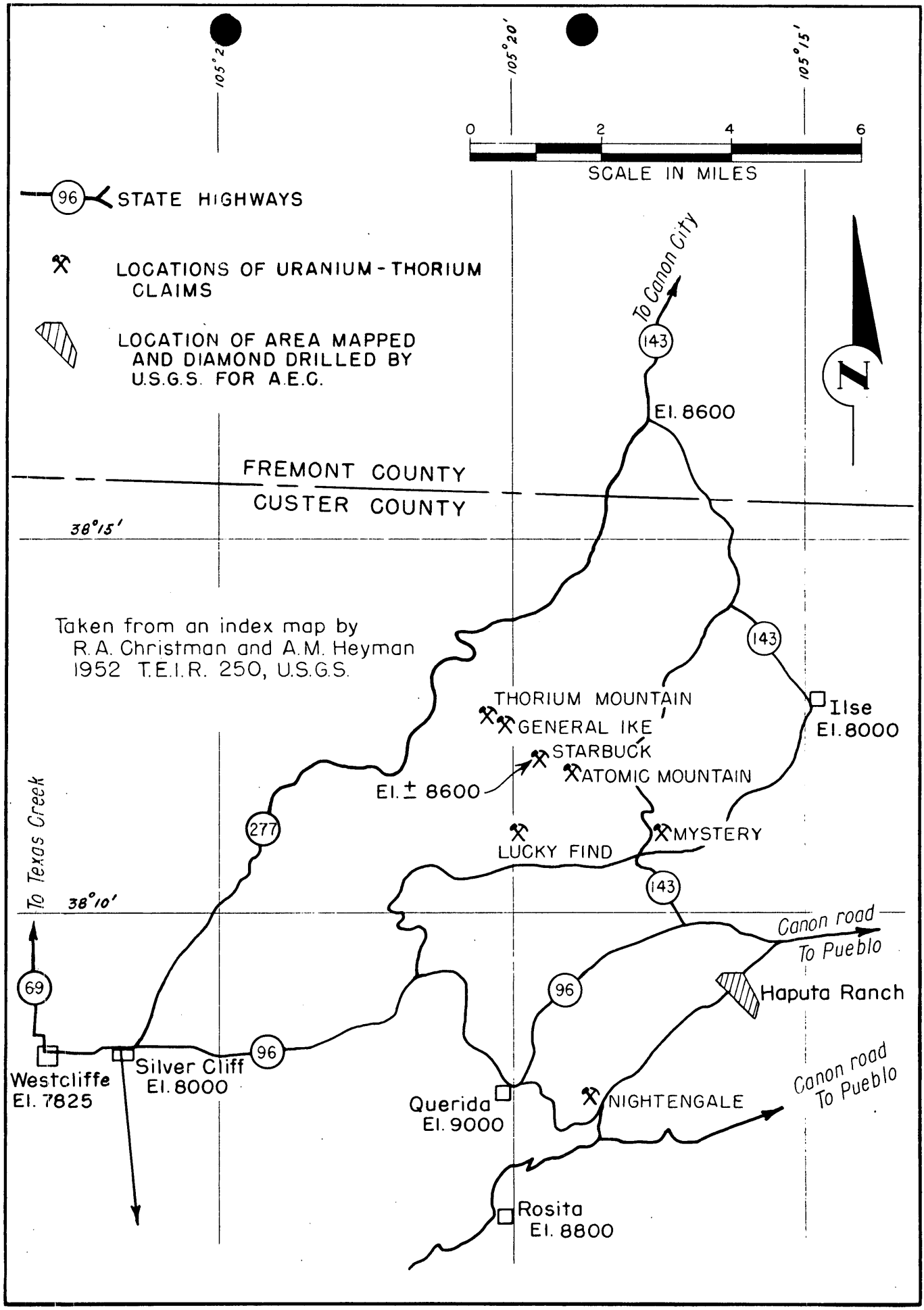

FIGURE 1-LOCATION MAP, L.C. KNOBBE-E. SPARLING, CUSTER COUNTY, COLO. DMEA 2537

Custer County, Colo. The properties are within 1 mile of jeep and truck trails. The terrain is rough and slopes are scantily forested. There is no water on the properties. The nearest town of consequence is Westcliffe, 8 miles west of Querida, Colo.

HISTORY AND PRODUCTION

The Wet Mountains thorium district was discovered during 1950 by members of the Geological Survey during reconnaissance investigations for uranium on behalf of the Atomic Energy Commission. Investigations and detailed geologic mapping are still in progress. One particularly favorable thorium occurrence, known as the Haputa Ranch lode, according to Trace Elements Report 250, has been explored by diamond drilling to a depth of 400 feet. There has been no production of either uranium, thorium, or rare earth oxides from this area. The subject claims were located during 1951-1952.

OWNERSHIP AND EXTENT

The applicants, as partners, have located the following seven unpatented, standard mining claims in the Hardscrabble Mining District, in Custer County, Colo., as uranium-thorium prospects.

Name of Claim	Kind	Date Recorded	Location
Nightengale lode	Unpatented	No date (1951)	Sec.22, T.22S., R.71W.
Mystery lode	"	May 4, 1951	Sec.35, T.21S., R.71W.
Lucky Find lode	"	May 8, 1951	Sec.33, T.21S., R.71W.
Atomic Mountain lode	"	Aug.25, 1951	Sec.27, T.21S. R.71W.
Starbuck lode	"	Aug.9, 1951	Sec.28, T.21S., R71W.
General Ike lode	"	Aug.27, 1952	Sec.21, T.21S., R71W.
Thorium Mountain lode	"	April 16, 1952	Sec.21, T.21S., R.71W.

Encroachments: Part of the patented Little Maud claim extends into the Atomic Mountain claim and limits exploration on both the Little

Maud and Atomic Mountain veins.

The easternmost corner of the Mystery claim may or may not conflict with a patented homestead. It would not, however, conflict with proposed exploration.

DESCRIPTION OF THE DEPOSITS

General

Thorium minerals, with small amounts of uranium, and rare earth oxides occur in barite-sulfide veins along northwest-trending shear zones in pre-Cambrian granite, gneiss, and schist. Because of the generally fine-grained texture and masking by iron oxides, the thorium- and rare earth-bearing minerals are seldom recognized without the use of radiometric detection instruments, such as the Geiger counter or scintillometer. Significant concentrations of thorium now exposed on the surface of the mining claims under consideration appear small and spotty in their present state of development.

A clue to possible subterranean extensions is furnished in the results of diamond drilling on the Haputa Ranch by the Atomic Energy Commission where thorium mineralization was shown to extend to depths of over 400 feet.

Information available on the uranium-thorium-rare earth oxides content of mineralized shear structures on the claims and the Wet Mountains thorium district in general is limited to inconclusive surface sampling and investigations not yet completed by the Geological Survey for the Atomic Energy Commission.

Radioactivity was noted in spots along the shear structures on all the claims under consideration. On the basis of sampling data incorporated in the discussion of the individual claims and ore reserves, the uranium content of the veins examined and the district in general is less than 0.01 percent. The rare earth oxides, on the same basis, are less than 1 percent. The highest ThO_2 values from selected samples was less than 2 percent.

References on the subject uranium-thorium-rare earths district and claims under consideration are included in the following sources of information:

Cross, Whitman, Geology of Silver Cliff and the Rosita Hills, Colo.: 17th Annual Report, U. S. Geol. Survey, pp. 269-403, 1896.

Emmons, S. F., The Mines of Custer County, Colo.: 17th Annual Report, U. S. Geol. Survey, pp. 411-472, 1896.

Dellwig, L. F., Preliminary Summary Report of the Wet Mountains Thorium Area, Custer and Fremont Counties, Colo.: U. S. Geol. Survey Trace Elements Memorandum Report 287, 1951.

Christman, R. A., Heyman, A. M., Dellwig, L. F., and Gott, G. G., Thorium Investigations 1950-1952, Wet Mountains, Colo.: U. S. Geol. Survey Trace Elements Investigations Report 250, December, 1952.

Individual Claims

(Locations shown from Querida or Ilse, fig. 1)

The Nightengale claim, about 1.4 miles east of Querida, encloses a poorly defined, vertical shear zone striking N. 45° W. Three shallow prospect pits expose the vein. Galena, chalcopyrite, and pyrite are present in minute quantity. The rock at the largest discovery pit is altered, stained black granite. The vein is concealed by about 3 feet

of soil. The discovery pit was sampled by the geologist member of the examining team and the Geological Survey, with the following results:

Sampling data on the Nightengale claim

Sample	Type	Source	Location	Width, feet	Percent eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-2	Character	DMEA	Dump	-	0.26	0.004	1.46	1.85	1.28	0.57
LD-33	Channel	USGS	Bottom of discovery pit about 8 feet deep	5.0	0.049	0.001	0.274	-	-	-

Scintillometer reconnaissance by the Geological Survey established a maximum count of 25 times background at the discovery shaft, with an average of 15 times background. A reading of 7 times background was obtained 110 feet to the southeast through 6 inches of snow and an unknown depth of soil. The hidden shear zone can be traced for about 110 feet with a scintillometer.

The Mystery claim, about 3.2 miles southwest of Ilse, encloses a poorly exposed 2-foot quartz vein of unknown length that cuts injection gneiss. The vein strikes N. 15° W. and dips 60° southwest. One discovery shaft about 20 feet deep and one shallow pit expose the vein. The vein is almost completely concealed by about 3 feet of soil. Barite, sphalerite, galena, and chalcopyrite are present in small quantities as stringers and isolated blebs in a gangue of vuggy quartz. Some thorium-bearing material occurs along the hanging wall of a small quartz

lens. The discovery shaft dump was sampled by the geologist member of the examining team and the Geological Survey, with the following results:

Sampling data on the Mystery claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-5	Character	DMEA	Dump	-	0.10	0.001	0.564	0.63	0.40	0.23
LD-24	Character	USGS	Dump	-	0.006	0.001	0.029	-	-	-
LD-25	Character	USGS	Dump	-	0.097	0.001	0.547	-	-	-

A scintillometer reconnaissance by the Geological Survey established a maximum of 10 times background count at the discovery shaft dump, and the covered area 140 feet to the southeast read 4 to 5 times background count.

The Lucky Find claim, about 4 miles north of Querida, encloses a vertical shear zone, 2 to 7 feet wide, in injection gneiss. The shear zone can be traced for about 1,500 feet, with an average strike of N. 70° W. and an almost vertical dip. The vein is exposed in the discovery shaft, 15 feet deep, and three shallow pits. Overburden is about 2 feet thick. The vein in the shear zone pinches and swells to thicknesses ranging between 1 and 2 feet. Principal vein minerals are red and brown barite, and quartz.

One character sample (KR-4) was taken of dump rock at the central pit by the geologist member of the examing team. Three channel samples

of the vein were taken by the Geological Survey. Two samples are components across the 7-foot vein exposed in the discovery shaft. Sample components consisted of 1.8 feet of reddish brown barite (sample LD-26) and 5.2 feet of mixed vein material (sample LD-27). In addition, a 3-foot channel sample (LD-28) was taken across the vein width in a pit about 400 feet to the east of the discovery shaft. Results of sampling follow:

Sampling data on the Lucky Find claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-4	Char-acter	DMEA	Dump	-	0.14	0.002	0.787	0.73	0.55	0.18
LD-26	Chan-nel	USGS	Barite component of vein in dis-covery shaft	1.8	0.006	0.001	0.029	-	-	
LD-27	Chan-nel	USGS	Remainder of vein, component with LD-26	5.2	0.004	0.001	0.017	-	-	
LD-28	Chan-nel	USGS	Vein 400 feet east of discovery shaft	3.0	0.013	0.001	0.068	-	-	

Scintillometer reconnaissance by the Geological Survey established readings of 3 times background at the discovery shaft and erratic values of 2 to 40 times background count in an open trench about 250 feet to the east. Readings of 2 to 8 times background count were recorded for about 275 feet farther east. The latter values were mainly negative.

The Atomic Mountain claim, about 5 miles northwest of Querida, encloses two veins, one of which is known as the Atomic Mountain vein. It strikes N. 50° W. and dips 80° to 85° southwest and is in layered granite and injection gneiss. The vein is exposed in one rock-cut, a presently inaccessible shaft, and several shallow pits. The vein is masked by 1 to 3 feet of soil and loose rock. The radioactive material appears to be 1 to 6 inches thick and of indeterminate length, containing quartz, barite, limonite, and siderite. Radioactivity is low to moderate.

A character sample of radioactive material from the discovery shaft dump was taken by both the geologist member of the examining team and the Geological Survey--samples KR-9 and RA-23, respectively. In addition, sample KR-12 was taken from a rock-cut about 50 feet southeast of the discovery shaft. The results are tabulated as follows:

Sampling data on the Atomic Mountain vein

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-9	Character	DMEA	Discovery shaft dump	-	0.17	0.001	0.963	0.82	0.82	0.00
KR-12	Character	DMEA	Rock-cut 50 feet northwest of discovery shaft	-	0.034	0.001	0.19	-	-	-
RA-23	Character	USGS	Discovery shaft dump	-	0.38	0.001	2.16	-	1.98	-

Scintillometer reconnaissance by the Geological Survey established a value of 20 times background at the discovery shaft dump; this, however, was over a very small area.

The second vein mentioned is the extension of the Little Maud vein beyond the southeast end line of the patented claim of the same name and on to the Atomic Mountain claim. The shear zone can be traced from the southeast end line of the Little Maud claim to the northwest by shallow pits. It is covered by from 0 to 5 feet of soil and loose rock. It is well exposed in an untimbered shaft near the southeast end line of the Little Maud claim to a depth of 20 feet. The vein strikes N. 27° W. and dips vertically. It is about 6 feet wide, consisting of iron-stained vuggy quartz, with some barite. Partly developed quartz crystals are common.

Owing to inaccessibility, one character sample (KR-13) of radioactive material from the shaft dump was taken by the geologist member of the examining team.

Sampling data on the Little Maud vein on the Atomic Mountain claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-13	Character	DMEA	Shaft dump, Little Maud vein, southeast end line	-	0.031	0.001	0.17	-	-	

Scintillometer reconnaissance by the Geological Survey gave a reading of 15 times background on the Little Maud shaft dump. The slope below

the Little Maud, where trenching is proposed, reads 4 times background count for 100 feet southeast of the shaft.

The Starbuck claim, about 5.2 miles north of Querida, encloses a vertical shear zone which strikes N. 35° W. and cuts granite gneiss, biotite schist, and amphibolite. The vein is exposed along a steep slope by eight prospect pits and an inaccessible adit and included winze. The shear zone has been traced for about 1,000 feet. It is covered by 1 to 3 feet of soil and loose rock. The thorium-bearing zone ranges in width from 4 inches to 3 feet. The vein consists of quartz and barite, with considerable limonite and hematite. Although the entire shear zone is weakly radioactive, concentration of thorium was found only at the discovery pit and on the adit dump.

A character sample (KR-8) of radioactive material in the discovery pit was taken by the geologist member of the examining team. Two channel samples (RA-25 and RA-26) were taken by the Geological Survey across portions of the vein exposed in the discovery cut. A character sample (RA-28) of radioactive material from the adit dump was also taken. In addition, a channel sample (RA-27) was taken across a radioactive vein exposure in a prospect pit northwest of the adit portal.

The results of sampling are tabulated as follows:

Sampling data on the Starbuck claim

Sample	Type	Source	Location	Width, feet	Percent eU	U	eThO2	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-8	Character	DMEA	Discovery pit, top of hill	-	0.18	0.001	1.02	0.93	0.81	0.12
RA-25	Channel	USGS	Discovery pit, top of hill	3.0	0.021	0.001	0.11	-	0.03	-
RA-26	Channel	USGS	Discovery pit, top of hill	1.0	0.18	0.002	1.01	-	0.84	-
RA-27	Channel	USGS	Pit northwest of adit	0.5	0.060	0.001	0.34	-	0.03	-
RA-28	Character	USGS	Adit dump	-	0.30	0.001	1.704	-	1.59	-

Scintillometer reconnaissance by the Geological Survey gave the highest reading at the southeasternmost pit as 6 times background and 5 times background at the adit. The other pits were generally low and intervening areas appear negative.

The General Ike claim, about 4.8 miles west of Ilse, encloses two shear structures, in granite, which junction about 50 feet east of the discovery shaft and center line of the claim. The main vein strikes about N. 60° W. and dips 80° to the north and is approximately the center line of the claim. The vein is exposed in two shafts and one pit at about 200-foot intervals, and to a depth of 10 feet. It is about 2 feet wide. Soil and loose rock cover the vein to thicknesses

of 1 to 3 feet. The vein consists of altered granite, barite, quartz, and a small amount of galena. It is weakly radioactive. No uranium, thorium, or rare earth oxides could be determined visually.

The second vein mentioned is poorly exposed in two very small pits and can be traced partly by its reddish color and partly by radioactivity. It, also, is a quartz-barite vein in granite and strikes N. 30° W.

Two samples were taken by the geologist member of the examining team. Sample KR-6 included high-grade material selected by the applicants from the dump at the discovery shaft. Sample KR-10 was across 4 feet of vein exposed in a pit about 50 feet northwest of the discovery shaft.

Sampling data on the General Ike claim

Sample	Type	Source	Location	Width, feet	eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-6*	Character	DMEA	Discovery shaft dump	-	0.094	0.004	-	0.38	0.03	0.35
KR-10	Channel	DMEA	Vein in pit 50 feet northwest of discovery shaft	4.0	0.033	0.004	0.16	-	-	-

*This sample also assayed 1.08 percent lead.

Scintillometer reconnaissance by the Geological Survey gave a reading of 25 times background on the discovery dump and readings of 2 times

background irregularly scattered along 500 feet of the shear zone. Radioactivity other than in the main pit was weak and spotty, with some negative values.

The Thorium Mountain claim, about 5 miles west of Ilse, is just west of the General Ike claim and is on the same shear structure. The vein is in reddish, iron-stained granite and strikes N. 60° W. It has a vertical dip and a width of about 1 foot. The vein consists of altered granite, quartz, barite, and a small amount of galena, and is radioactive. No uranium, thorium, or rare earth oxides could be identified. The vein is traceable for about 1,000 feet through a 60-foot discovery shaft, now inaccessible, and five shallow pits. Soil and loose rock cover the vein to depths of 1 to 3 feet.

Two samples were taken by the geologist member of the examining team. Sample KR-7 included high-grade material selected by the applicants from the dump at the discovery shaft. Sample KR-11 is a channel sample across 1.3 feet of vein width exposed in a 10-foot pit just west of the discovery shaft and at a depth of 6 feet below the surface.

Results of sampling are as follows:

Sampling data on the Thorium Mountain claim

Sample	Type	Source	Location	Width, feet	Percent					
					eU	U	$eThO_2$	$(RE)_2O_3$ $+ThO_2$	ThO_2	$(RE)_2O_3$
KR-7	Character	DMEA	Discovery dump	-	0.21	0.010	-	1.64	1.26	0.38
KR-11	Channel	DMEA	Vein exposed in pit 10 feet deep, just west of discovery shaft	1.2	0.033	0.001	0.19	-	-	-

Scintillometer reconnaissance by the Geological Survey indicated that the amount of radioactivity on this claim compares favorably with that found on the surface at the largest ore body discovered at Haputa ranch. At Thorium Mountain the discovery dump reads 10 times background over a shear zone length of 200 feet. The 2 times background count extends over a length of 500 feet. This claim appears most promising of the group.

MINEABLE ORE RESERVES

The results of sampling on the individual claims under consideration, as shown in the section "Description of Deposits", represents the best values obtainable at the present time.

On the basis of the sampling data, the uranium content of the veins examined is less than 0.01 percent, and the possibility of developing reserves of strategic importance is very poor.

The rare earths content is considerably less than 1 percent and the possibility of developing reserves of strategic importance is extremely doubtful.

Thorium reserves which could be developed would probably average less than 1 percent ThO_2.

There is no basis on which to estimate ore reserves.

PRESENT STATUS

Exploration and Development

Many prospect pits, surface exposures, short adits, and shallow shafts were made while prospecting for gold, silver, lead, and barite.

The older underground workings are now inaccessible. Except for a few shallow trenches and pits on the claims, no exploration work has been carried on in the search for uranium, thorium, or rare earth oxides.

Mining and Milling Equipment

There are no mining or milling facilities on the property and none are contemplated at this time.

PROJECT PROPOSALS

L. C. Knobbe and E. Sparling propose to explore their scattered claims with fourteen rock trenches, using a gasoline-operated jackhammer, across and along favorable radioactive zones at an estimated cost of $5,803.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 160 days at $24.00 per day	$3,840.00
Operating materials and supplies	
Explosives	486.00
Other (drill steel, bits, fuel, lubricants, tools, etcetera)	750.00
Equipment purchased	
1 Jackhammer drill, complete	610.00
Repairs to equipment	67.00
Sampling and analyses	50.00
Total cost of trenching	$5,803.00

In addition, they propose to rehabilitate the Starbuck adit for radiometric examination at a cost of $1,210.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 40 days at $24.00 per day	$ 960.00
Operating materials and supplies	
Timber, tools, and miscellaneous supplies	250.00
Total cost of rehabilitating the Starbuck adit	$1,210.00

A 60-foot shaft, 4- by 8-foot cross section, on the Thorium Mountain claim would be rehabilitated for examination at a cost of $1,210.00, as follows:

Labor	
The two partners at $1.50 per hour, 40 hours per week, 40 days at $24.00 per day	$ 960.00
Operating materials and supplies	
Stulls, sheeting, ladders, windlass, rope, etcetera	250.00
Total cost of rehabilitating the Thorium Mountain shaft	$1,210.00

Finally, a 4- by 8-foot shaft would be sunk 50 feet on the General Ike claim at a cost of $75.54 to $91.54 per foot, depending on whether a gasoline jackhammer is used or a 105-cubic-foot compressor and 30-pound pneumatic drill are rented.

Details of Proposed Exploration Work

On the Nightengale claim, the discovery shaft and location stake are at its center. Three rock trenches are proposed, 8 to 10 feet deep. Overburden is about 3 feet deep. One trench would be across the vein at the location stake. A second would be 70 feet to the southeast at a radioactive high. A third trench is proposed at or between the above, but along the strike of the vein, as warranted by field evidence.

On the Mystery claim, the discovery shaft and location stake are at its center. Two rock trenches are proposed, 8 to 10 feet deep. Overburden is about 3 feet deep. The trenches would be about 100 and 150 feet southeast of the discovery stake at radioactive highs.

On the Lucky Find claim, the discovery shaft and location stake are 600 feet and 900 feet, respectively, from the northwest and southeast end lines. Three rock trenches are proposed, 8 to 10 feet deep, on radioactive highs. Overburden is about 2 feet thick. Two trenches, one along and one across the strike of the shear zone, would be located about 250 feet southeast of the location stake. A third trench would be dug to the southeast or northwest, depending on the results in the first two.

On the Atomic Mountain claim, the discovery shaft and location stake are 700 feet and 800 feet, respectively from the southeast and northwest end lines. Two rock trenches, 8 to 10 feet deep, are proposed on radioactive highs. Overburden is 1 to 3 feet deep. One trench would be on the Atomic Mountain shear zone, about 50 feet southeast of the location stake. The other would be on the Little Maud vein extension, about 200 feet northeast of the location stake.

On the Starbuck claim, the discovery pit and location stake are 100 feet and 1,400 feet, respectively, from the southeast and northwest end lines. Eight prospect pits and an adit trace the weakly radioactive shear zone for a strike length of 1,000 feet. Overburden is 1 to 3 feet deep. Strong radioactivity was noted only in the discovery pit and in samples from the adit dump. The only work proposed

is to rehabilitate the adit for radiometric examination. This may include unwatering of a shallow winze.

On the General Ike claim, the discovery pit and location stake are at its center. Two rock trenches and a 50-foot exploration shaft are proposed. The trenches would be about 10 feet deep. The shaft would be about 50 feet deep. Overburden is 1 to 3 feet deep. The trenches would be across the shear structure at radioactive highs, 50 and 200 feet S.30°E. of the location stake. The shaft would be sunk on the vein at the center of the claim.

On the Thorium Mountain claim, the discovery shaft and location stake are 400 feet and 1,100 feet, respectively, from the west and east end lines. Two rock trenches are proposed, 8 to 10 feet deep, and one shaft, about 60 feet deep, would be rehabilitated for examination. Overburden is 1 to 3 feet deep. One trench would be across the shear structure, about 100 feet west of the location stake. The other is tentatively located about 500 feet east on a radioactive high. The shaft is on the vein at the center of the claim.

CONCLUSIONS

On the basis of sampling data, present knowledge of the district, and evaluation of exploratory drilling at the Haputa ranch, any reserves developed would approximate less than 0.01 percent uranium, less than 1 percent rare earths, and less than 1 percent thorium oxide.

No estimate of reserves, other than their quality, is possible at this time due to lack of information.

Most of the area covered by the proposed loan will be mapped by the Geological Survey during the 1953 field season in conjunction with

continuing studies of the Wet Mountains thorium district for the Atomic Energy Commission.

The claims do not justify further exploration at this time since radioactivity and significant concentrations of thorium now appear small and spotty as exposed on the surface and outlined by scintillometer reconnaissance. Sampling data also indicates that any reserves developed would be of submarginal quality.

There is no known established Government policy which defines the status of this type and quality of uranium-thorium-rare earths occurrence.

Should development of thorium-rare earth reserves of the above-mentioned quality assume sufficient importance, an exploration program by interested Governmental agencies may be advisable after completion and consideration of the present studies by the Geological Survey, probably not before 1954.

The proposed program is principally surface exploration and, by itself, would not add materially to data necessary to estimate ore reserves. It would have to be integrated with a diamond drilling program outlined on the results of the study of extensive surface exposures and sampling.

A program for thorium similar to that established for uranium would be necessary to promote sustained interest in regional development.

RECOMMENDATIONS

It is recommended that the application of L. C. Knobbe and E. Sparling for a Defense Minerals Exploration Administration loan of

$12,000.00 to explore their seven unpatented mining claims for uranium-thorium-rare earths be denied.

Should development of reserves containing less than 0.01 percent uranium, less than 1 percent rare earths, and less than 1 percent thorium oxide assume sufficient strategic importance, an exploration program by interested Governmental agencies would be advisable after a review of investigations now being made of the Wet Mountains thorium district by these agencies.

EXPLORATION

Subject: DMEA-2537
Re: Exploration Loan
Starbuck Mine
May 19, 1952

Mr. L. C. Knobbe
Spearville
Kansas

My dear Mr. Knobbe:

This will acknowledge receipt of your application dated May 14, 1952 for a loan under the Defense Production Act of 1950.

Your application was assigned Docket Number DMEA-2537 and referred to Mr. W. H. King, Executive Officer, DMEA Field Team, Region IV, Bureau of Mines, 224 New Customhouse Building, Denver 2, Colorado.

Kindly refer to DMEA-2537 in any future correspondence relating to your application.

Sincerely yours,

ROBERT E. ADAMS

Robert E. Adams
Administrative Officer

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMEA [illegible]
Metal or Mineral [illegible]
Date Received 5-19-52
Amount $
Participation (Government %)

Name and address of applicant

Ernest Spurling
Rosita Colo

Date May 14 1952

If you have already filed MF-100, give date filed _____, type of assistance requested _____,

DMA Docket Number (if available) _____

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
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MAY 19 1952

2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

Lee Knobbe Ernest Sperling By _____

(Name of company) (Signature of authorized official)

_____ _____

(Date) (Title)

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—64067-2

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
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MAY 19 1952

Form MF-103

1. (a) General description of claims.
Starbuck, Lucky Find, Mystery Lode, Atomic Mountain Lodes, Hardscrabble Mining District, Custer County, Colorado, Township 21 S Range 71 West.
Nightingale Lode--Township 22 S Range 71 West.
(All recorded in Custer County, Colorado Court House, Westcliffe, Colorad
Atomic Valley Lode-- Township 21 S Range 71 West. Location work now being done.

We are enclosing a map of one claim. The rest are about the same. They are in the granite which runs northeast-southwest. These claims are on cros dykes that run at right angles to the granite.
They are long veins that run several miles without very much faulting. Th most radio-activity is where these veines are filled with spar or a very heavy red rock and clay.
(We are also sending assay slips, taken from these properties. (Pleas return assays and Map.)

(b) We are the owners.

2. (a) Thorium and uranium.

(b) Material radio-active.

3. (a) Trench and cross cut surface and sampling. Also timber portal and clean-out tunnel on Starbuck Lode.
(b) Can start as soon as loan is approved. Project to be finished in two years.

4. Answered in number three.

5. No facilities other than tunnel on Starbuck.

6. Same as number five.

7. (b) Gas driven power drill $550.00 to be purchased.
(c) We furnish gieger counter and hand tools. We will furnish everything except drill, drill steel, bits, powder, fuse, and caps.

8. The two applicants will do proposed work.
Wages to be $1.50 per hour per man.

9.

Gieger counter		$ 87.50
Gas driven power drill		550.00
Powder @ $24.00 per cwt.	cost per month	12.00
Caps and fuse.	" " "	8.00
Assaying	" " "	5.00
Miscelleanous	" " "	25.00
Labor (for two men)	" " "	480.00
Total for two year period.		$11,437.50

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA FOR USE UNDER THE DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2537

Date received 5-19-52

L. A. Knobbe, Greenville Kans

Ernest Sparling
Rosita Colo

Name and address of applicant

Date May 14, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 19 1952

5. Number of years in production _____

   If not in production or operation, estimated date when production will begin _____
6. Experience of operators:
   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation		Life Insurance Carried for Benefit of Applicant	
				Common (e)	Preferred (f)	Amount (g)	Net Cash Surrender Value After Loans (h)
	Total		x x x x x			x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$	$	$		
Preferred stock	$	$	$		

*Indicate period covered.

10. Production:

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.

12. Ore or Mineral Reserves:

(*a*) Describe the ore or mine[illegible] deposit briefly. Accompany the application b[illegible]y available report on the geology and ore reserves.

Form MF-100

1. (a) None.
   (b) Barium.

2. (a) 60 feet of tunnel on Starbuck. Shallow pits on rest of claims.

3. (a) 25 miles south from Canon City, Colorado.
   (b) Hardscrabble.
   (c) Townships 21, 22 S Range 71 West.

4. (A) Not in operation.
   (b) As owner.

5. None.

6. (a) Have mined in this district for 20 years.
   (b) Have owned and operated mines.

7. Some lead, barite, and vermiculite, taken from this district.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
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(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)					
Indicated (probable)					

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power:

State amount of power used, rate per hour, and source thereof.

16. Labor:

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

L.L. Knobbe Ernest Sparling By _____

(Name of company) (Signature of authorized official)

_____ _____

(Date) (Title)

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—63792-1

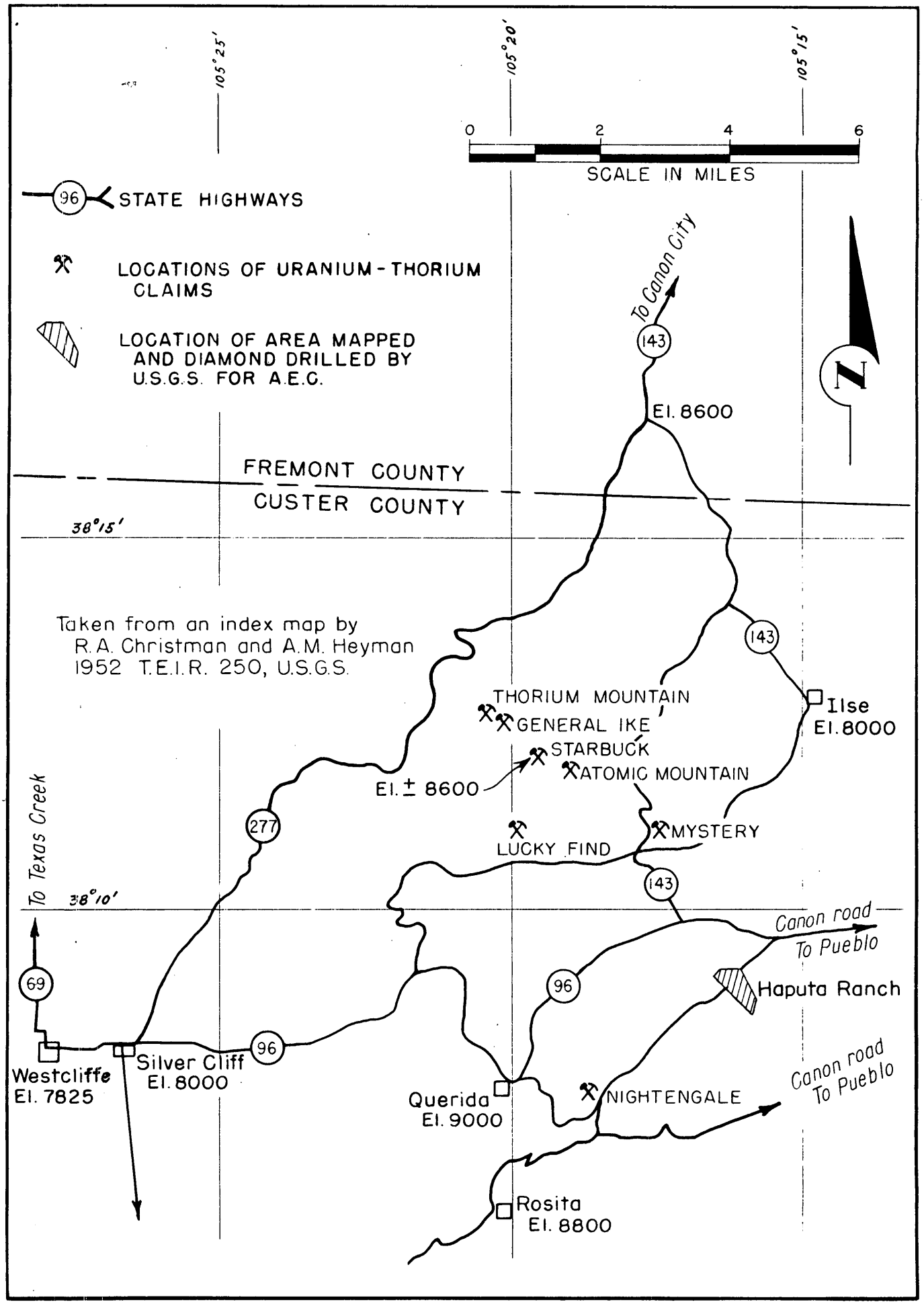
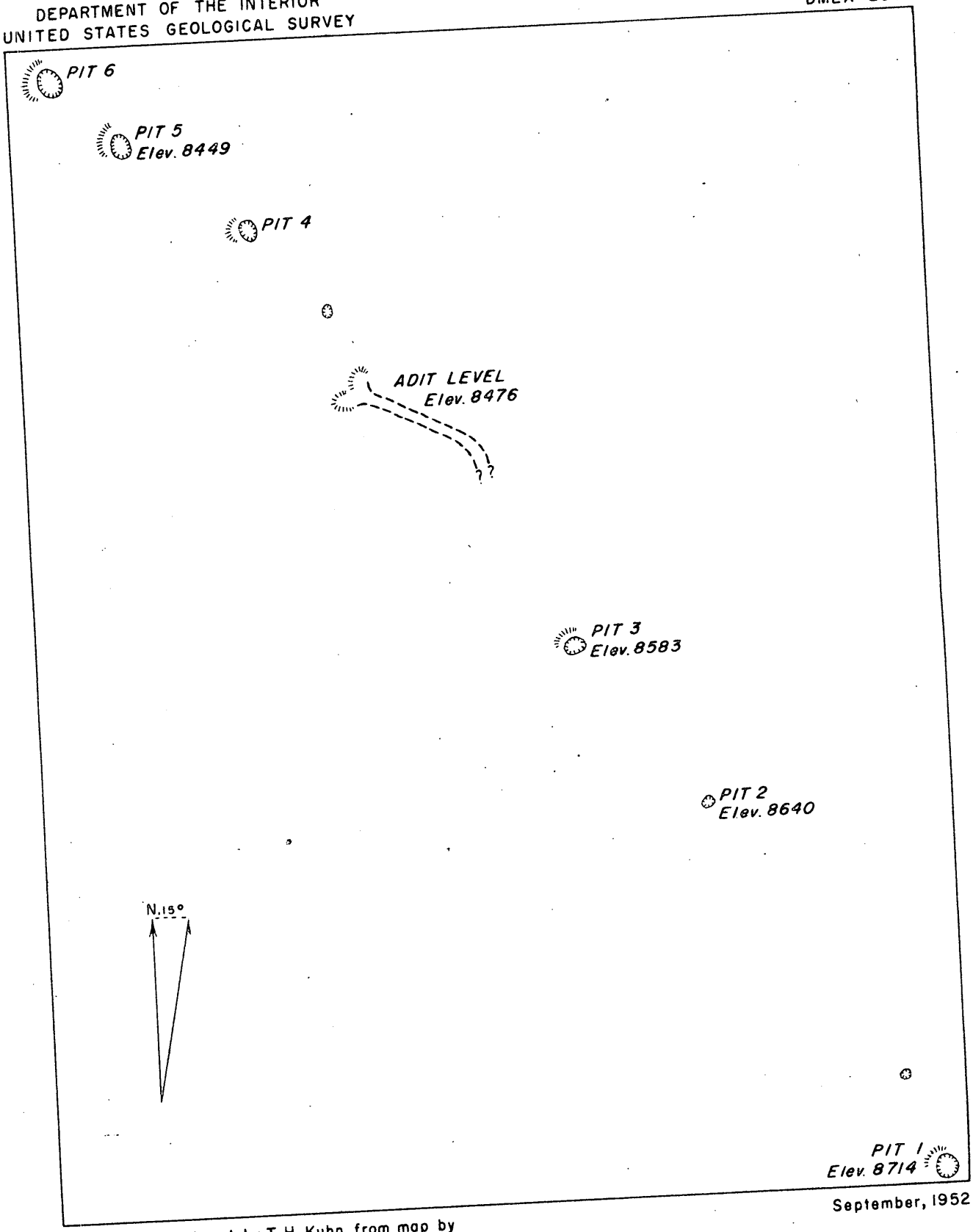


FIGURE 1-LOCATION MAP, L.C. KNOBBE-E. SPARLING, CUSTER COUNTY, COLO. DMEA 2537

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

DMEA 2537



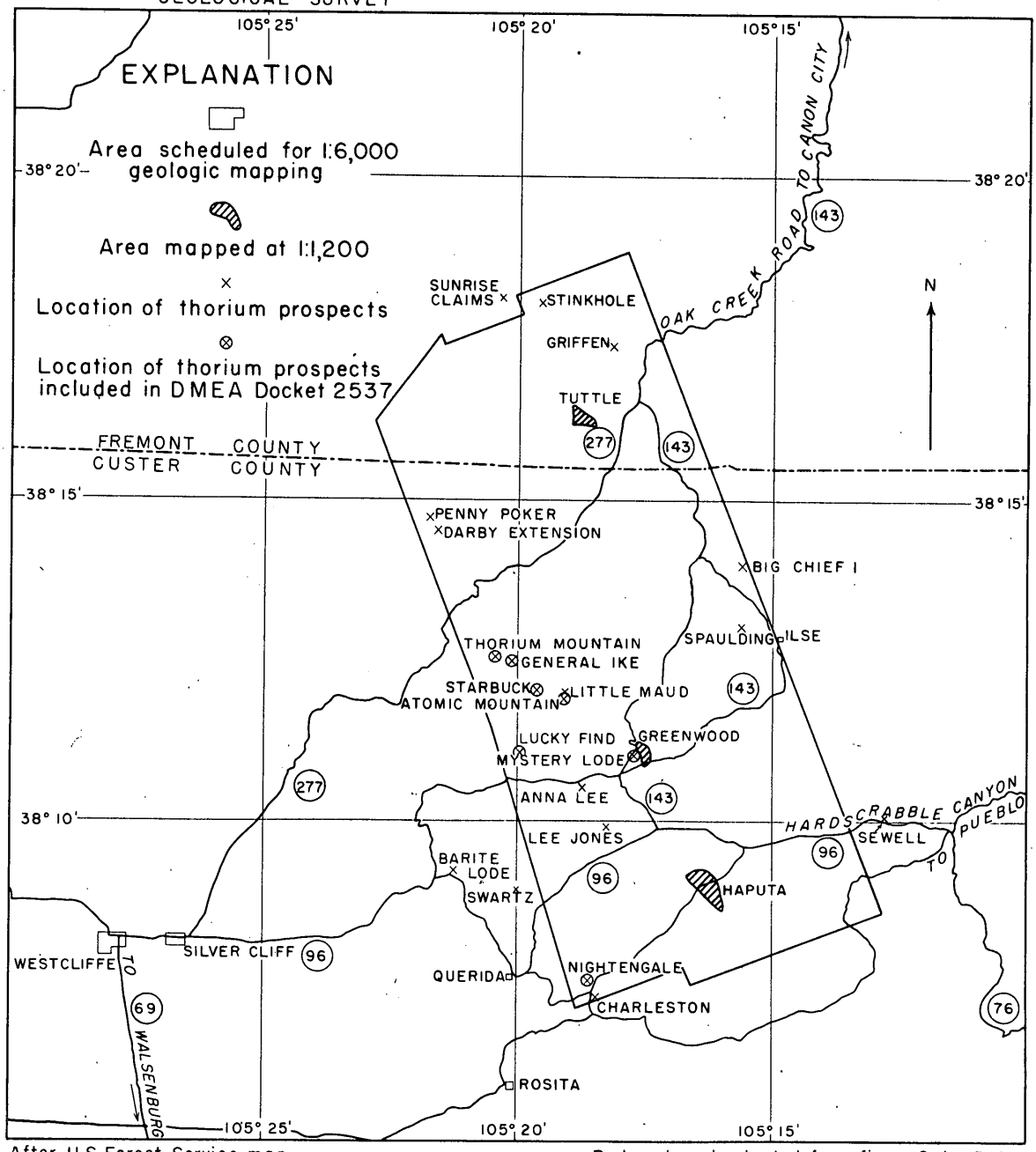
September, 1952

Adapted and reduced by T. H. Kuhn from map by
Christman and Heyman, U. S. Geological Survey

FIGURE 1.- PORTION OF STARBUCK CLAIM, CUSTER COUNTY, COLORADO

100 0 100 200 Feet

Datum is assumed



After U.S. Forest Service map

Reduced and adapted from figure 2, by R.A. Christman and A.M. Heyman, in Trace Elements Investigations Report 250, 1952

FIGURE 2.—INDEX OF KNOWN THORIUM AREAS AND PROSPECTS, CUSTER AND FREMONT COUNTIES, COLORADO.

3 0 3 Miles

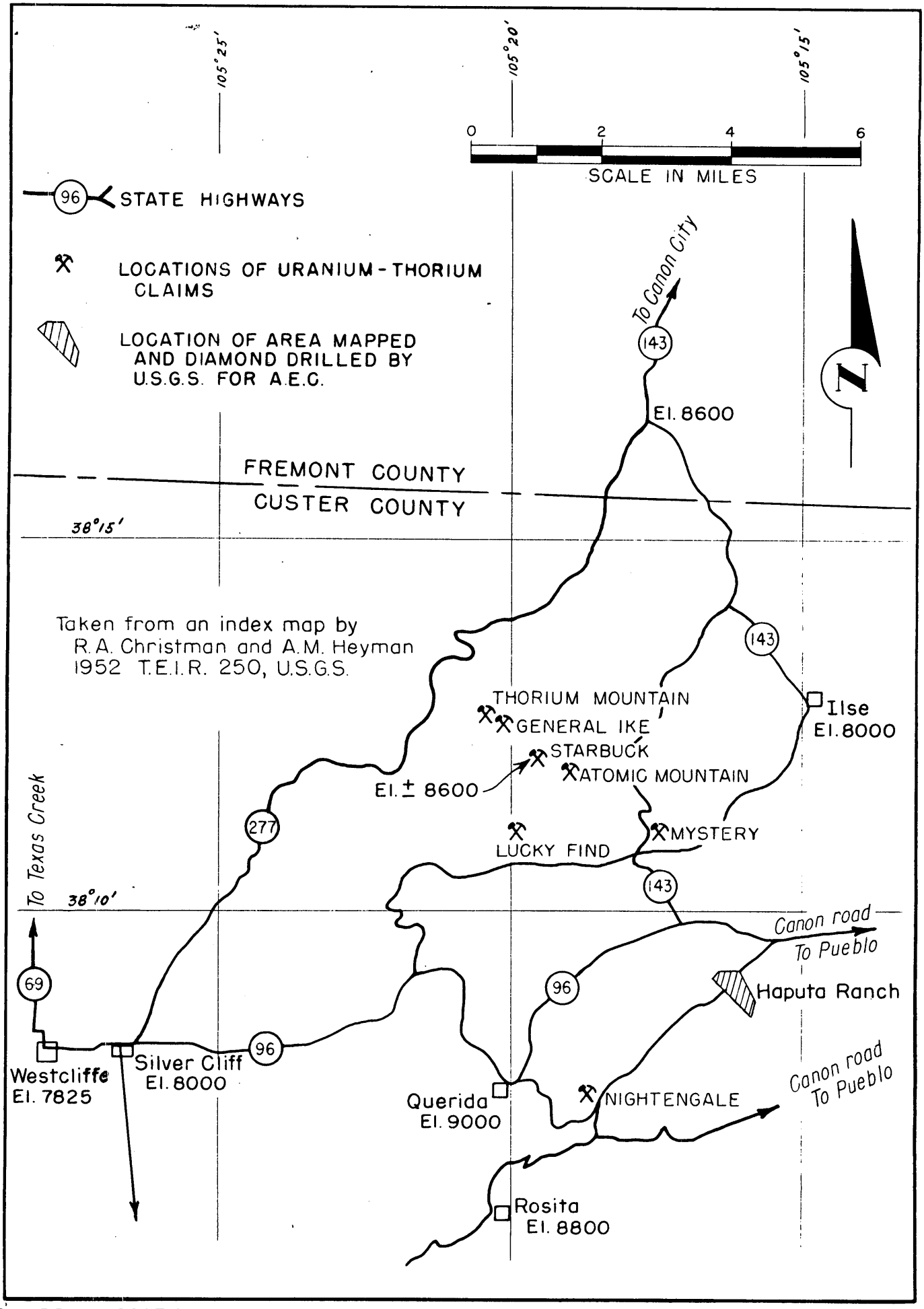
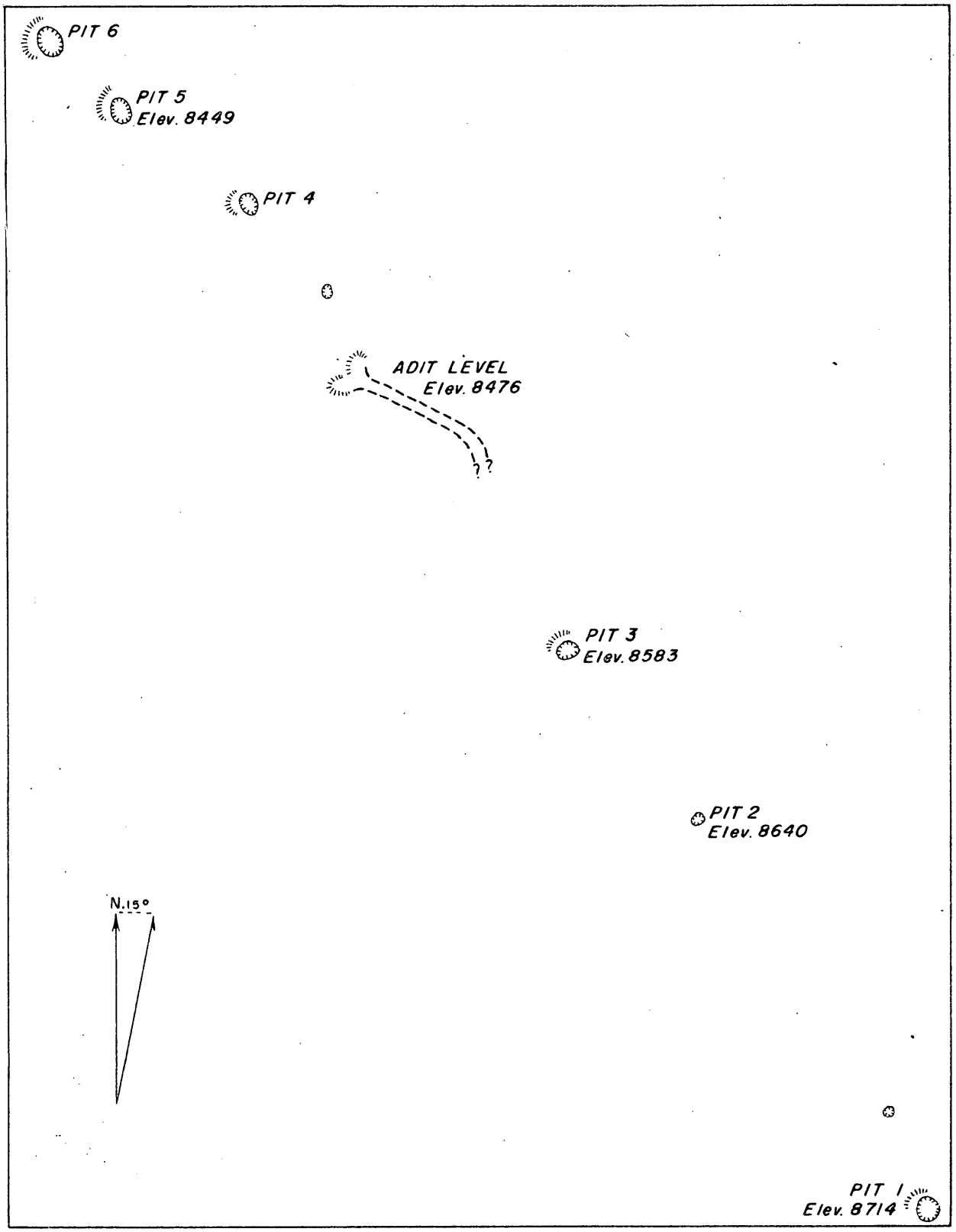


FIGURE 1-LOCATION MAP, L.C. KNOBBE-E. SPARLING, CUSTER COUNTY, COLO. DMEA 2537



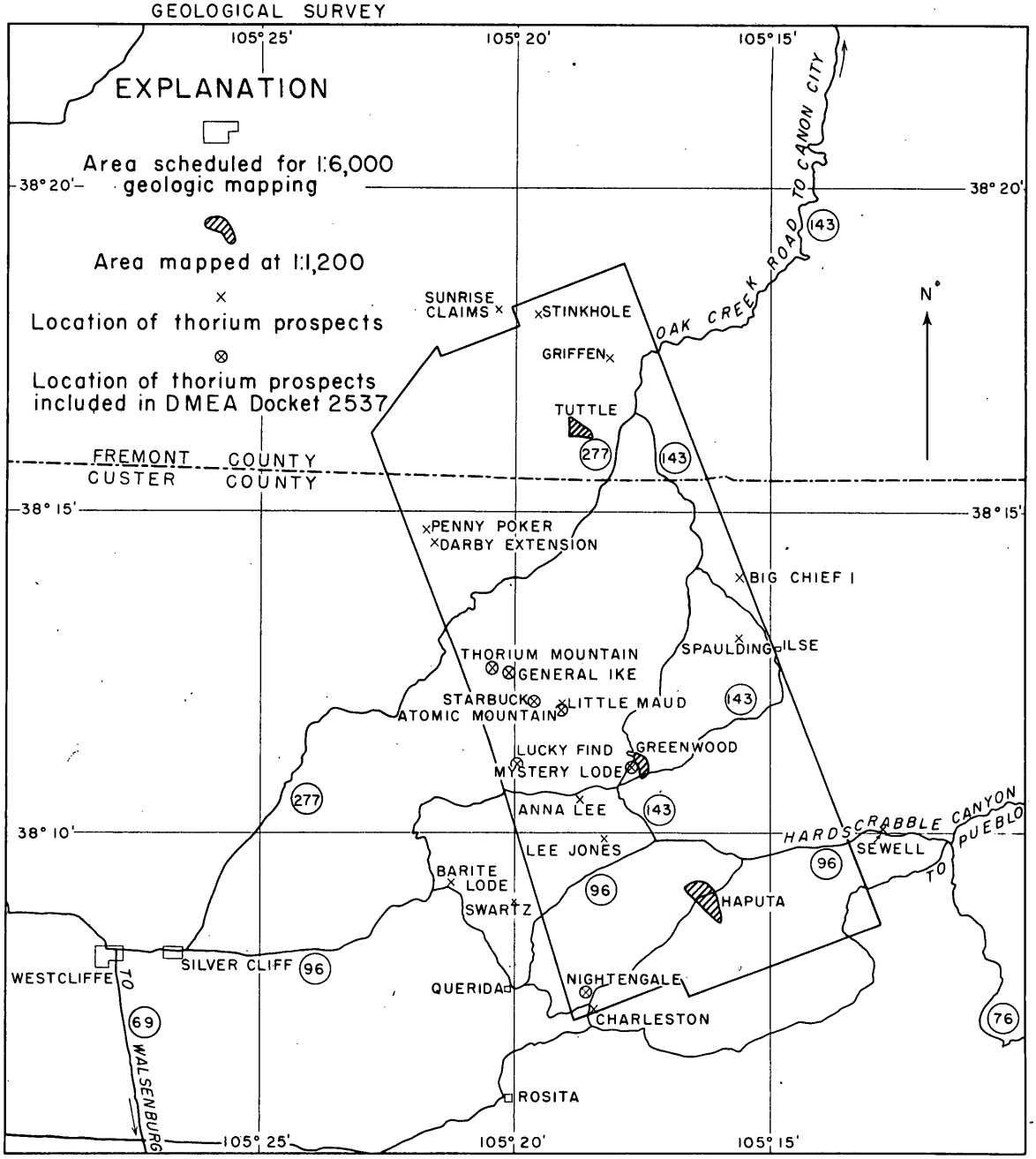
Adapted and reduced by T. H. Kuhn from map by Christman and Heyman, U. S. Geological Survey

September, 1952

FIGURE 1.- PORTION OF STARBUCK CLAIM, CUSTER COUNTY, COLORADO

100 0 100 200 Feet

Datum is assumed



After U.S. Forest Service map

Reduced and adapted from figure 2, by R. A. Christman and A. M. Heyman, in Trace Elements Investigations Report 250, 1952

FIGURE 2.—INDEX OF KNOWN THORIUM AREAS AND PROSPECTS, CUSTER AND FREMONT COUNTIES, COLORADO.

3 0 3 Miles

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

OFFICIAL BUSINESS
U. S. GEOLOGICAL SURVEY
SOUTH 157 HOWARD ST.
SPOKANE 4, WASHINGTON

DMEA-2537

~~Mr. George C. Selfridge, Chairman~~
~~Operating Committee~~
~~Defense Minerals Exploration Administration~~
~~Department of the Interior~~
~~Washington 25, D. C.~~