MF-500

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

REFERENCE SLIP

DATE 7/15/54

REFERRED TO:

1. Operating Committee - Johnson
2. Mr. Mittendorf - LGB
3. Mail & Files
4.

FOR:

	Action		Recommendation
	Approval		Record
	Comment		of
	Conference		Referring
	Consideration		to
	Filing		Reply for signature of
	Instructions		
	Investigation		Rewriting
X	Initials	X	Signature
X	Mailing		Suggestions
	Previous correspondence		Your information

REMARKS: attached revenue & resume for typing

Check (X) before the items needing attention.

L. G. Houk
Initials of sender.

GPO 16—63815-1

FILE COPY

Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. King:

Reference is made to your memorandum of July 7, 1954, transmitting results of evaluation of kyanite sample from subject mine.

Since "the samples do not meet national stockpiling specifications" the application obviously should be denied. The processing of this application received May 26, 1952, has been repeatedly delayed in the field. In the future the applicant should procure the samples and submit evidence that the material is acceptable for stockpiling.

The June, 1954, Metallurgical Report No. SLMR 30.1 indicates that the testing was carried out in greater detail than was justified. It is not the desire of DMEA to conduct elaborate metallurgical tests for applicants to determine stockpile acceptability. Appendix II was not received please forward.

Sincerely yours,

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

Member, Geological Survey

LGHouk:ag 7/15/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, 5216
Mr. Houk

Hedges would let
Begin Kins

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
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Denver 2, Colorado

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Earnest Vanderhoff
Kyanite No. 1 Mine
Albany County, Wyoming

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Sincerely yours,

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

Member, Geological Survey

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Docket File
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, 5216
Mr. Houk

Reviewed by
DMEA OPERATING COMMITTEE

(date)

Mr. [illegible] Ring
Executive Officer, DMEA
Field Serv. Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. Ring:

Reference is made to your memorandum of July 7, 1954, transmitting results of evaluation of kyanite sample from subject mine.

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Sincerely yours,

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

Member, Geological Survey

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Mr. Gunsallus, 3071
Mr. Larrabee, 5216
Mr. Houk

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMSA-2549 - Kyanite
Earnest Vanderhoff
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. King:

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Sincerely yours

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

Member, Geological Survey

LGHouk:mg 7/15/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, 5216
Mr. Houk

Mr. [illegible] ing
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. [illegible]A-2509 - Kyanite
Earnest Vanderhoff
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. [illegible]ing:

Reference is made to your memorandum of July 7, 1954, transmitting results of evaluation of kyanite sample from subject mine.

Since "the samples do not meet national stockpiling specifications" the application obviously should be denied. The processing of this application received May 26, 1952, has been repeatedly delayed in the field. In the future the applicant should procure the samples and submit evidence that the material is acceptable for stockpiling.

The June, 1954, Metallurgical Report No. [illegible] 30.1 indicates that the testing was carried out in greater detail than was justified. It is not the desire of DMEA to conduct elaborate metallurgical tests for applicants to determine stockpile acceptability. Appendix II was not received please forward.

Sincerely yours,

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

Member, Geological Survey

JCHouk:ag 7/15/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, 5216
Mr. Houk

Mr. [illegible] King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
624 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. [illegible]-2569 - Kyanite
Harvest Vanderhoff
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. King:

Reference is made to your memorandum of July 7, 1954, transmitting results of evaluation of kyanite sample from subject mine.

Since "the samples do not meet national stockpiling specifications" the application obviously should be denied. The processing of this application received May 26, 1953, has been repeatedly delayed in the field. In the future the applicant should procure the samples and submit evidence that the material is acceptable for stockpiling.

The June, 1954, Metallurgical Report No. [illegible] 30.1 indicates that the testing was carried out in greater detail than was justified. It is not the desire of DMEA to conduct elaborate metallurgical tests for applicants to determine stockpile acceptability. Appendix II was not received please forward.

Sincerely yours,

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

Member, Geological Survey

JCHouk:ag 7/15/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, 5216
Mr. Houk

DMEA-2549
Kyanite
Region IV

EARNEST VANDERHOFF, DENVER, COLORADO. Kyanite No. 1 Mine, 9-9-53
Albany County, Wyoming. # 265.

Letter to the Field with respect to concentration of kyanite samples.

Appendix II was not received prior to closing.

500

Defer
Defer
Hold
Hold
Hold

Revenue

~~Report~~ of DATA 3500

May 5, 1952 - application received for $9500.50 for
full stages of 100' x 9' wide x 15' deep. Trees clear
and build 3000' access road

June 26, 1952 - Received 6 samples. K1-6 for accessibility to long
and for geology - Keyrite bearing lens on the Crabtree
complex 600' long - a few feet to 35' wide
averaging 15' and extended vertically for 100'.

July 11, 1952 - Sent samples to College Park: Determine
mesh size the Keyrite is concentrated

July 15, 1952 To King from O.C.
(1) accessibility tests cost $125.00 each
(2) Do not need information on samples requested
(3) Exploration tests should be made as requested IV
(4) Test crushing, sulphuric acid or green cement.

Aug 7. To OC. from Region IV
(1) Samples representative, possibly owned or leased
(2) Classify milled of delivering accessibility

Aug 8, College Park report - Unleaching at 100-35 mesh
estimated 2 to 2.7 %

Aug 14. (1) Samples forwarded to Norris - determine if
acceptable for electrolytic cell or can be
beneficiated to grade
(2) advise King on testing well bait

Aug 14 - To King from O.C.
(1) Sent C.P. results.
(2) a mutually general problem to be worked out by Region

Oct 14, 1952 To King from Norris
Skinner report samples K1-5 unusable
K-6 possibly pass green strength - None
meet minimum PCE - Keyrite 11-32 %

Oct 21 Skinner to King
Loss of part of samples on shipment
restricted testing

Oct 23 King to Mit
Crossed Skinner report in mail (Disregard)

Dec 8. King to OC.
Region IV geologist recommends 6 trenches and
samples of 6 Tons. - Prefer shipping 10 samples

Dec 24 - King to OC - Report in preparation, propose shipping Ten
" " samples to Navy - Must know cost each determination
for inclusion in report

Jan 2 OC to King Determine grain strength on K6 before starting
project. Preliminary testing cost borne by DMEA.
not by project. → Shipment of Ten samples to
Navy not justified - ship 15# each sample
to Navy -

Dec 17. to Hart
Skinner
Report sent

1/9/53 King to East (with Brown)
Refers to difference on letter Jan 2, 1953
and Skinners letter Oct 14.
Recommends operator submits samples
at his expense

1/29/53 To King from OC.
Test K6 specimen - Complete K1-5
DMEA funds may be used to determine
strategic value - Suggest applicant provide
funds labor, materials, & supplies for sample
procurement & DMEA administration
supervise.

May 15, 53 Tele - Mit to Vandorhoff
Kyanite off list

May 18 King (Field Team) to vandorhoff.
Kyanite off list.

June 3 - Mit to Vandorhoff.
Kyanite on list ? reactivate.

June 10 To Mit from Vandorhoff
Please Reactivate.

June 17 - To Vandorhoff from Mit.
will reactivate.

Aug 18 From field team to Mit.
property sampled late in June.
Concentration costs $300 to $500
Request instructions how to handle charge.

Sept 9 To King from OC.
Concentrate Type KL sample on laboratory scale. (15 pound of concentrates) and ship to Norris. Absorb costs in Sept. or Oct allotment

Sept 9 Field Team to MIT
No reply to Aug 18 memo of cost of testing - " should we notify applicant no funds available for metallurgical testing"

Sept 18 - King to MIT
Cost $300 to test KL sample.
Have exceeded 1st Yr allotment.
? Costs at Norris - how to handle

Sept 23 - DMEA 2923 Budget

Sept 30 - To OC from King
Samples collected & shipped to S.L. - Postponed testing pending advice on Oct. allotment. Will Hold DMEA 2923 in abeyance

Oct 1. To King from OC.
testing procedure (laboratory scale)
DMEA will reimburse for lab materials & supplies. Ballon from 1080

Oct 20 To MIT from King
SL. Cost of tests $300 - Yrs
Norris cost $125 to $175 and multiple $100. Have exceeded 2nd Yr allotment - Please allot $1000 to cover cost of 5 samples

Oct 27 From OC. to King.
Test only K6 & composite of
either 5
Rice of BofM will assure you
payment

Nov 5 From King to OC.
when Rice confirms we will
authorize tests

Nov 17 OC. to King.
Send F.T. report. Make
decision within delegation. - Rice
is absent on return he will be contacted

Nov 24 King to OC.
unable to prepare "Final" report
without results of testing
surface exposure indicates
sporadic. 20% Kyanite.

Dec 2 OC to King
Inferred tonnage insufficient justify
metallurgical testing or our participation
- Make decision
to approve or deny

Jan 11 1954 King to Mat
ore body not delineated by exploration.
trenching may add tonnage.
Cannot make decision until make
field examination (Report on Inspection
Dec 24 1953) Instructed to obtain
sample before field examination (by whom)
(probably Rice) ~~[illegible]~~ alleged
inconsistent statements earlier Jan, 53
Dec 2, 1953 indicates ignorance of facts
ask advise suitability for stockpiling

average for years

Jan 18 Rice to King prepared by NOM.
DMEA will assume B.M.

May 10 Nit to Allowance
awaiting results of testing

May 18 Allowance to Nit
[illegible] from 5/17/54 &
are being analyzed.

June 7 King to Nit
Have DMEA assumed responsibility

June 17 OC to King
Copy of Allowance [illegible] & [illegible]
are being expedited.

~~[illegible]~~

~~[illegible]~~

~~May 5th Shannon to Clearance Report [illegible]~~
~~Sent to MK [illegible]~~

July 7. King to OC.
Transmitting report - Navy -
Testing at Sh. - "[illegible]"
" Please advise [illegible]"
Comments to our Report [illegible]

~~[illegible]~~

Missing reports.
(1) Inconsistency
(2) Many delays 1-27-53 to present.

Resume of DMEA 2549
Region IV Delegation.

May 5, 1952 — application received for $9544.50
Bulldoze 4 trenches & build 3000' access road

Preliminary Sampling

June 26, 1952 - Received 6 samples.
July 11, 1952 — Sent samples to College Park.
Aug 8, 1952 — C.P. reports unbroken at 10-35 mesh.
Aug 14, 1952 — Rejects from C.P. sent to Norris for acceptability tests. Sent King C.P. results.
~~Aug 14.~~
Oct ~~14~~ 21, 1952 — Norris reports samples K1-5 unusable. K-6 probably acceptable. Insufficient material for complete testing.

Period of dispute over sample size.
Dec 8, 52 - King wants to ship 6 Tons to Norris Direct.
Aug 18, 1953 — Property sampled

Period of dispute on payment.
Sept 9, 1953 — Concentrate in Region 4 & ship 15 pounds to Norris. absorb costs in Sept or October allotment
Jan 18, 1954 — Letter from Rice to King - DMEA will reimburse B. of M.

Period of 2nd testing
Jan 18, 1954 — Tests authorized
July 7, 1954 — Results received in Washington.

Comments: - The field team Region IV have been uncooperative ~~in the~~ and unreasonable in handling this docket. Perhaps they not ~~were~~ familiar with the subject of testing Kyanite. There delay over payment of costs of testing

is unexcusable. They refused to accept our recommendations ~~on~~ sample size inactivity or Skinners recommendation indicates their a misunderstanding of their ~~[illegible]~~ responsibilities and authority.

The results of the College Park testing were very discouraging ~~[illegible]~~ as only one sample approached stockpile specifications - at this point the application should have been denied.

It might be well to point out here that on october 21. Skinner ~~[illegible]~~ sent King ~~the copy~~ the results of the testing at Norris. Norris sent copy to Non Metallic Division on December 17 after a telephone request. On Jan 9, 1953 King forwarded a copy of ~~the~~ the report to this office. Skinners letter to King indicates a copy for "Washington DMEA. but our records do not show its receipt.

on the sample size our wishes on the matter should have been sufficient to avoid this delay. Kynett was removed from best during this period.

The time required for the second ~~[illegible]~~ testing is much too long for efficient operation of the DMEA. The second evaluation tests results conducted at Norris have never been received ~~at~~ by Washington DMEA. No payment should be made until the results are received. Attorneys letter of May 18 that the samples were

lost may be partially true but Skinner's letter of March 5 to Clemmer indicates that sample MK 3 had been received a week previously.

The Salt Lake City B of M. report of June 1954 indicates unlocking at mines 20 mesh. Why ~~report failure to have~~ the Kyanite crushed to pass 20 mesh before testing in heavy media. It was also evident that the preliminary primary crushing was inadequate when the reject float and the primary minus 8 mesh material contained about 1/2 the Kyanite.

~~Appendix I has not been located~~.

635

JUL 22 1954

Mr. [illegible] King
Executive Officer, [illegible]
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. [illegible]-2549 - Kyanite
Harmont Vanderhoff
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. King:

Reference is made to your memorandum of July 7, 1954, transmitting results of evaluation of kyanite sample from subject mine.

Since "the samples do not meet national stockpiling specifications" the application obviously should be denied. Please prepare denial letter to the Operator as this application amount falls within your authority. In the future, applications for kyanite projects should contain evidence indicating that this material meets strategic specifications.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

T. P. Thayer

Member, Geological Survey

LGHouk:ag 7/21/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, 5216
Mr. Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

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Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
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Sincerely yours,

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

(Signed Charles H. Guild)
Member, Geological Survey

Not sent

Hedges accordant copy

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

224 New Customhouse
Denver 2, Colorado

July 7, 1954.

Memorandum

To: Chairman of the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA-2549 (Kyanite), Earnest Vanderhoff, Albany County, Wyoming.

Enclosed are the original and four copies of the metallurgical report on a sample of kyanite from the Kyanite No. 1 claim, Albany County, Wyoming. Attached to this report is a report by the Supervising Ceramic Engineer, Industrial Minerals Branch, Metallurgical Division, Region VII, which gives the results of the grain-strength and refractory tests. You will note that the samples submitted do not meet national stockpiling specifications although they compare favorably with domestic kyanite now on the market.

The report states that any kyanite materials submitted from a new source for stockpiling must pass refractory brick tests. Such tests require about 500 pounds of material and would cost about $2,000.00.

Please advise us how to proceed.

W H King
W. H. King

Enclosures

FOR OFFICIAL USE ONLY

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
SALT LAKE EXPERIMENT STATION
J. Bruce Clemmer, Chief

MINERALS BENEFICIATION BRANCH
C. H. Schack, Supervising Metallurgist

METALLURGICAL REPORT NO. SLMR-30.1

EVALUATION OF KYANITE FROM VANDERHOFF DEPOSIT
ALBANY COUNTY, WYOMING
DMEA DOCKET 2549

By

Richard Havens

June 1954

1600 East First South
Salt Lake City, Utah

FOR OFFICIAL USE ONLY

EVALUATION OF KYANITE FROM VANDERHOFF DEPOSIT ALBANY COUNTY, WYOMING IMRA DOCKET 2549

By Richard Havensa/

INTRODUCTION

At the request of IMRA, the Salt Lake Experiment Station prepared several batches of kyanite concentrate from samples from the Kyanite No. 1 Claim of Ernest Vanderhoff in Albany County, Wyoming. The several grades of concentrate were subsequently submitted to the Industrial Minerals Branch, Region VII, Norris, Tennessee for evaluation tests to determine whether the kyanite concentrates met current stockpile specifications. This report describes the methods employed in preparing the concentrate samples and gives the pertinent data obtained from the evaluation tests.

ORE SAMPLES

Four samples were submitted for testing. As chemical analysis is not definitive for determining the percent of kyanite, the ores were studied by microscopic methods. This work revealed the samples contained from 20 to 40 percent kyanite as bladed crystals up to 1/2-inch in length. About half the kyanite, however, was present as crystals which were minus 20 mesh in size. Relatively coarse biotite was the principal gangue constituent. Minor amounts of hornblende, ferromagnesian minerals, feldspar, and quartz also were present in the samples.

ORE CONCENTRATION

It was originally requested that at least 15 pounds of clean kyanite be prepared from each of the samples by heavy media methods. These instructions were subsequently modified. The No. MK-3 sample, the highest grade of the four submitted, was selected for testing as being the easiest from which to make 15 pounds of concentrate for grain strength, fusion temperatures, and other evaluation studies.

The initial test made on the No. 3 sample involved sink-float fractionation. The entire sample was crushed to minus 1/2-inch and screened on 3, 6, and 8 mesh. The sized fractions were separated in a ferrosilicon heavy medium having a specific gravity of 3.02. The sink fractions were combined as a single concentrate and the float fractions as a single reject product.

1/ Metallurgist, Salt Lake Experiment Station, Metallurgical Division, Region IV, U. S. Bureau of Mines.

Microscopic examination showed that the concentrate contained about 85 percent kyanite and about 15 percent of impurities, chiefly biotite, interlocked with the kyanite. The reject float product and primary minus 8-mesh material contained about half of the kyanite in the ore as grains locked with biotite.

Because the concentrate made by sink-float fractionation was contaminated by considerable gangue, a small portion was sent to the Industrial Minerals Branch for preliminary evaluation. A letter report from K. G. Skinner and dated March 5, 1954 (Appendix I) stated that the concentrate failed to meet stockpile specifications. On receipt of this information, further concentration tests were made on the sink-float concentrate, the float product, and primary minus 8-mesh fraction to determine whether additional impurities could be rejected to produce an essentially clean kyanite.

Attrition grinding, magnetic separation, tabling, and flotation were tried separately and in combinations. In the interest of simplicity and clarity, detailed descriptions of the numerous tests and procedures used for up-grading the kyanite concentrate will not be given. Briefly, seven kyanite concentrates of different grades were made for further study by the Industrial Minerals Branch. The concentrates are described as follows:

Sample 1 was made by crushing the sink concentrate to 10 mesh and rejecting additional impurities by magnetic separation, tabling, and flotation.

Sample 2 was prepared from the sink concentrate by magnetic separation, tabling, and flotation, after crushing to 20 mesh.

Samples 3, 4, and 5 are different grades of concentrate made from the float fraction after recrushing to 20 mesh and retreating by magnetic, flotation, and tabling methods.

Sample 6 is a concentrate made after recrushing the original minus 8-mesh fraction to 20 mesh and retreating by magnetic, flotation, and tabling methods.

Sample 7 is a plus 10-mesh sink concentrate that has been further concentrated by attrition grinding and screening to reject additional mica.

GRAIN STRENGTH AND FUSION TESTS

Appendix II is a copy of the report submitted by T. A. Klinefelter on the results of the evaluation tests made by the Industrial Minerals Branch on the seven concentrate samples.

The evaluation tests demonstrated that none of the concentrates would meet present stockpile specifications. Six of the concentrates contained excessive fines and none of the samples had a sufficiently high fusion point or grain strength after fusion. In commenting on the quality of the kyanite, Mr. Klinefelter stated that concentrate samples 1, 2, and 3 compared favorably with domestic kyanite now on the market.

SUMMARY AND CONCLUSION

Laboratory concentration tests made on a sample of kyanite from Ernest Vanderhoff's Kyanite No. 1 Claim, Albany County, Wyoming, showed that it would be impossible to prepare kyanite concentrates meeting National Stockpile Specifications as regards grain size, grain strength, and fusion temperature. The ceramic tests, however, showed that the concentrate compared favorably with domestic kyanite now being used by industry. If the field examination indicated that the Vanderhoff deposit was of substantial size, further mineral dressing studies are warranted to develop an effective method for recovering the kyanite as a salable product.

COPY

APPENDIX I

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
ELECTROTECHNICAL LABORATORY
NORRIS, TENNESSEE
Region VII

P. O. Box 217
March 5, 1954

Mr. J. Bruce Clemmer, Chief
Metallurgical Division
Region IV
U. S. Bureau of Mines
1600 East First South Street
Salt Lake City 1, Utah

Subject: Docket DMEA-2549-Kyanite, Harmest Vanderhoff, Albany County, Wyoming

Dear Bruce:

The small sample of plus 3-mesh kyanite concentrate you obtained from DMEA sample MK-3 from the Kyanite No. 1 Claim, Albany County, Wyoming, was received last week. The sample was quartered and one quarter was calcined to indicate both grain strength and for use in determining the refractoriness.

The calcined material was white and coated with "splotches" of dark glassy material caused by melting of the gangue material. The grain was stronger than anticipated but this might have been caused by the glassy material. Even though the calcined grains were relatively strong, the refractoriness as indicated by a pyrometric cone equivalent test was too low, being cone 35-1/2 (about 1800°C). The minimum permitted for Federal Stockpiling is cone 37, about 1820°C. Commercial, domestic kyanite concentrates are advertised as having PCE values of cone 36-37, about 1810-1820°C.

Grain size is important and relatively coarse material is required for making brick. Fine-grained, even minus 100-mesh, concentrates, are used by refractory manufacturers to produce plastic "refractories" and ramming mixes. A large proportion of the domestic concentrates is used for this purpose. Fine material is also used in making relatively thin-walled products such as kiln furniture and pyrometer tubes.

Your question regarding chemical requirements is difficult to answer because of the diversified purchase requirements

of different manufacturers. The enclosed copy (somewhat "beat-up") of the General Services Specification P-27 will give you some information regarding both the chemical and physical properties required for stockpiling purposes. Individual companies will probably have specifications different than these. Please note that any kyanite material submitted from a new source for stockpiling must pass refractory brick tests (section 4a of P-27). Such tests require about 300 pounds of material and would cost about $2,000.

I have not received any copies of the correspondence between Messrs. W. E. Rice and W. H. King regarding testing kyanite from Vanderhoff's property. The last correspondence I have seen regarding this was a copy of a January 2, 1953, letter from Frank E. Johnson to W. H. King.

As we no longer have a BMRA contract for testing kyanites, I presume that arrangements to do so would be made by the Regional Directors of Regions IV and VII.

I am also enclosing a copy of a report giving the results of our preliminary testing of Vanderhoff's material.

Sincerely yours,

s/ Ken

K. G. Skinner
Supervising Ceramic Engineer
Industrial Minerals Branch
Metallurgical Division
Region VII

Enclosures: 2

Evaluation tests of six samples from the Kyanite No. 1 Mine, Albany County, Wyoming[1]

At the request of the Defense Minerals Exploration Administration, six samples of kyanite-containing material from the Kyanite No. 1 Mine, Albany County, Wyoming[1], were tested for their possible strategic value. Petrographic examinations indicated the kyanite contents ranged from about 11 to 32 percent.

Tests and Results

The as-received samples were dried at 110°C for 24 hours, cooled, and then crushed to pass 4-mesh. The minus 4-mesh samples were used for subsequent testing.

Float-and-sink concentration tests were made using s-tetrabromoethane (specific gravity 2.95) and a centrifuge. The sink 2.95 material was considered as the concentrate and examined petrographically. The P.C.E. tests, somewhat similar to fusions, were made on the plus 2.95 materials.

The float fractions were examined petrographically but no grain count was made except for the screen-sized fractions of the minus 4-mesh K-2 and K-5 samples.

Minus 4-mesh head samples.- Megascopic examination showed that all the samples contained relatively coarse crystalline material, therefore separation tests were made using the minus 4-mesh samples. Petrographic examinations were not made of samples K-2 and K-3.

Results.- None of the minus 4-mesh concentrates passed the minimum requirement[2] of cone 37 (about 1820°C). See table 1.

Minus 60-mesh head samples.- Minus 4-mesh material was stage-crushed to pass 60-mesh. This finer material was concentrated and tested similarly to the minus 4-mesh material. However, there was one difference. The plus 2.95 fraction sample K-6 was still contaminated, therefore an additional separation was made using a 3.17 specific gravity media. The kyanite content of the concentrate by this treatment was raised from 88 to 98 percent (table 1).

1/ Samples submitted by DMEA and identified as Docket No. DMEA-2549-Kyanite.

2/ National Stockpile Material Purchase Specifications, "Kyanite, Mullite, and Mullite-type Refractories," P-27, 23 August 1951.

Table 1. - Recoveries, kyanite contents, and P.C.E. values of specific gravity (plus 2.95) concentrates of samples from Kyanite No. 1 Mine, Albany County, Wyoming 1/

Sample	Kyanite in hand sample percent 2/	Separation using minus 4-mesh material: Plus 2.95, percent	Kyanite, percent	P.C.E. Cone	P.C.E. Approx. °C	Separation using minus 60-mesh material: Plus 2.95, percent	Kyanite, percent	P.C.E. Cone	P.C.E. Approx. °C
K-1	15.3	17.9	51.7	<30 3/	<1650	16.6	92.3	36	1810
K-2	11.4	11.3	---- 4/	<32	<1700	12.0	95.0	37-1/2	1827
K-3	18.0	25.7	---- 4/	36-	1804	19.2	93.8	37-1/2	1827
K-4	15.5	26.2	65.4	<36 5/	<1810	15.8	98.0	38	1835
K-5	32.2	42.1	70.7	34-1/2	1772	33.8	95.2	38	1835
K-6	31.2	34.7	87.0	36-	1804	35.5	88.0	-- 4/	---- 4/
						31.8 6/	98.0 6/	38 6/	1835 6/

1/ - DMEA docket No. DMEA-2549-Kyanite
2/ - Calculated. Small amounts of fibrous material, which appeared to be sillimanite, were included with the kyanite.
3/ - Insufficient material separated to make additional determinations.
4/ - Not determined.
5/ - The appearance of the test cones indicated a possible P.C.E. value of about cone 32-32-1/2.
6/ - Plus 3.17 specific gravity material.

NOTE: The minus 2.95 specific gravity fractions had less than 0.5 percent kyanite.

Results.- All of the concentrates, except K-1, had P.C.E. values greater than cone 37. The P.C.E. value for K-1 was cone 36 (about 1616°C).

Minus 4-mesh screen-sized fraction head samples.- Petrographic examinations of the minus 4-mesh and the minus 60-mesh materials indicated most of the kyanite might be freed without crushing to pass 60-mesh. Therefore two samples, K-2 and K-5, were sized to obtain three fractions, namely, minus 4- plus 14-mesh, minus 14- plus 100-mesh, and minus 100-mesh. Float-and-sink tests were made of each screen fraction, and then examined petrographically. No P.C.E. tests were made because of insufficient material.

Results.- The data in table 2 indicate stage-crushing to about minus 14- plus 100-mesh, or preferably to minus 14- plus 60-mesh might give a raw material which could be concentrated to pass the P-27 specifications.

These data are only indicative and stage-crushing tests should be made using sufficient amount of samples to determine the P.C.E. value of the concentrate.

P.C.E. vs kyanite content.- Figure 1 illustrates two factors; (1) effect of kyanite content of the concentrate, and (2) the effect of fineness of grind upon obtaining a high-grade concentrate.

The curve shows that for these particular samples with similar gangue minerals, the concentrates (plus 2.95 material) must contain more than 92 percent kyanite to meet the minimum P.C.E. requirement of cone 37.

Special Tests

Hardness of calcined grain.- One of the tests required by the P-27 for stockpiling mullite, or mullite-forming materials, is to determine the grain strength. This test is made on calcined material and is, basically, comparative with satisfactory materials. The relative strengths of plus 2.95 fractions after calcining rapidly in any oxy-acetylene furnace to 1650°C are given in table 3.

Results.- Although the hardness of sample K-6 appeared to be satisfactory, the material would not meet the P-27 specifications for P.C.E. value.

Cleaner concentrates than those used in this preliminary test might produce satisfactory grain. However, domestic kyanites produce a weak grain on calcination, and it is doubtful whether the Wyoming samples submitted are different in this respect. This characteristic should be determined on sufficiently large samples for proper evaluation.

Table 2. - Mineralogical compositions and mineral distributions of two kyanite samples crushed to pass 4-mesh.

Sample	K-2			K-5		
Head sample, percent						
Kyanite	14.3			24.3		
Quartz	46.6			20.0		
Opaque	trace			.2		
Other1/	39.1			55.5		
Screen fraction						
Mesh	-4 +14	-14 +100	-100	-4 +14	-14 +100	-100
Percent	60.7	32.9	6.4	63.8	32.7	3.5
Specific gravity fraction, percent						
+2.95	14.4	6.6	11.8	35.8	22.9	17.0
-2.95	85.6	93.4	88.2	64.2	77.1	83.0
Plus 2.95 fraction, percent						
Kyanite	77.4	91.3	86.7	73.4	90.8	91.6
Quartz	13.2	4.6	6.2	20.8	3.5	6.4
Opaque	.2	.5	1.9	.2	trace	.2
Other1/	9.2	3.6	5.2	5.6	5.7	1.8
Minus 2.95 fraction, percent						
Kyanite	8.3	1.8	1.5	.4	trace	.0
Quartz	52.7	42.4	49.2	23.7	17.7	26.1
Mica2/	18.2	31.7	32.6	49.8	75.0	64.2
Opaque	trace	.0	trace	.4	trace	.8
Other	20.8	24.1	16.7	25.7	7.3	8.9
Mineral distribution, percent						
Plus 2.95 fraction						
Kyanite	47.5	13.9	4.6	69.1	28.0	2.2
Quartz	2.5	.2	.1	23.8	1.3	.2
Opaque	50.0	25.0	25.0	21.7	.0	.0
Other1/	2.0	.2	.1	2.3	.8	.0
Minus 2.95 fraction						
Kyanite	30.2	3.2	.6	.7	.0	.0
Quartz	58.8	32.5	5.9	48.6	22.3	3.8
Opaque	.0	.0	.0	69.6	.0	8.7
Other1/	51.8	38.8	7.1	55.8	37.4	3.8

1/ - Includes micaceous material.
2/ - Includes all mica-like material.

Table 3. - Possible usability of calcined (1650°C) kyanite for refractory grog. Based upon hardness of grain. Minus 4-mesh, plus 2.95 specific gravity fraction.

Sample	Usability
K-1	Friable, unusable.
K-2	Unsatisfactory although there were a few grains hard enough for grog.
K-3	Slightly harder than previous sample, but still too friable.
K-4	Grains appeared hard and large enough, although somewhat glassy.
K-5	Similar to previous sample.
K-6	Grains were similar to imported, calcined kyanite, but there was some laminar splitting. This material might pass specifications regarding grain hardness or soundness.

NOTE: None of these materials met the minimum PCE requirement (cone 37, about 1820°C).

Exfoliation tests.- Preliminary tests using a few grains indicated the micaceous material exfoliated upon heating and might offer a rather easy means of separating the kyanite from the gangue minerals.

A composite sample was obtained by blending equal weights of samples K-1 through K-6. This sample was split into five samples which were used in the exfoliation tests. One sample was placed in a furnace at 1000°C for two minutes and then withdrawn. This was repeated with other samples at 100° intervals through 1400°C. The cooled, exfoliated samples were examined megascopically, then float-and-sink tests were made. The results of these tests are given in table 4.

Results.- The data in table 4 indicate exfoliation of the micaceous material did not improve the concentrate obtained by float-and-sink tests. In fact, the recovery was slightly less than calculated for the six samples.

Table 4. - Results of exfoliation tests of minus 4-mesh composite sample to remove micaceous material from kyanite.

Furnace temperature, °C	Megascopic evaluation of exfoliation separation	Plus 2.95 fraction after exfoliation, percent
Room	5	30.7 1/
1000	3	17.4
1100	2	21.4
1200	2	17.8
1300	4	19.4
1400	1	19.5

1/ Value before exfoliation is given for comparison purposes. As previously indicated from Table 1, this material probably contains less than 65 percent kyanite.

COPY

APPENDIX II

Report

Docket DMEA-2549 Kyanite
Earnest Vandarhoot-Albany Co., Wyoming
As Received - Screen Analysis

Sample No.	Percent thru 16 mesh
1	87.1
2	100.0
3	100.0
4	100.0
5	100.0
6	100.0
7	1.4

National stockpile specifications for "fine material" require that less than 60.0% pass 16 mesh. Excluding No. 7, all samples tested fail to meet requirements for grain size. However, one domestic kyanite now on the market is sized to 100% thru 35 mesh with 30% thru 100 mesh.

Calcine

Sample No.	Calcined Grain at 1650°C
1	Kyanite partially bonded with gray glass. Unbonded blades are friable.
2	Kyanite partially bonded with gray glass. Unbonded blades appear friable.
3	Kyanite partially bonded with gray glass. Unbonded blades appear friable.
4	Almost completely fused to glass.
5	Completely fused to glass.

6 Kyanite partially bonded with glass. Unbonded blades appear friable.

7 White kyanite with patches of dark glass. Kyanite blades friable between the finger nails.

Pyrometric Cone Equivalent

Sample No.	P.C.E. Cone	App. Temperatures °C
1	36 - 37	1810- 1820
2	36 - 37	1810 - 1820
3	36 - 37	1810 - 1820
4	28	1615
5	18 - 19	1490 - 1520
6	35 - 36	1785 - 1810
7	33 - 34	1745 - 1760

Note: Where two numbers for PCE are given, this means that the material has a fusion temperature higher than the first but lower than the second.

Stockpile specifications for type C kyanite require a minimum P.C.E. of cone 37, about 1820°C.

The forementioned domestic kyanite claims a P.C.E. of cone 36-37.

By hand-picking what appeared to be nearly pure kyanite blades from sample No. 7 we were able to get a P.C.E. value of cone 37+.

Results of the test work indicate that samples No. 1, No. 2, and No. 3 compare favorably with domestic kyanites now on the market. However, they would fail stockpile specifications covering grain size, grain strength, and pyrometric cone equivalent.

M. E. Tyrrell

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549
Kyanite
Earnest Vanderhoff
Albany County, Wyoming

Dear Mr. King:

Transmitted herewith is copy of letter from Mr. Paul T. Allaman, Regional Director, Region VII, dated May 18, 1954, as requested in your memorandum of June 7, 1954.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

Philip W. Guild

Member, Geological Survey

Enclosure

LGHouk:gad 6/14/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

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

224 New Customhouse
Denver 2, Colorado

June 7, 1954.

Memorandum

To: C. O. Mittendorf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA-2549 (Kyanite), Earnest Vanderhoff, Agent, Kyanite No. 1 Mine, Albany County, Wyoming.

Reference is made to your letter dated May 10, 1954 to the Regional Director, Region VII, U. S. Bureau of Mines, regarding the grain strength tests which were to be made in the Norris Electrochemical Laboratory.

We are anxious to learn if you have received a reply to this letter.

W. H. King

C
O
P
Y

May 18, 1954

Mr. C. O. Mittendorf, Administrator
Defense Minerals Exploration Adm.
Washington 25, D. C.

Re: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff, Agent
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. Mittendorf:

This is to advise you that the kyanite samples had not been received from Salt Lake City up to April 20, when inquiry disclosed that they had not been properly addressed. They have now been traced and found at Lake City (5/17/54) and are being analyzed as requested.

Mr. Klinefelter has been asked to expedite the results.

Sincerely yours,

Paul T. Allsman
Regional Director, Region VII

May 18, 1954

Mr. C. O. Mittendorf, Administrator
Defense Minerals Exploration Adm.
Washington 25, D. C.

Re: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff, Agent
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. Mittendorf:

This is to advise you that the kyanite samples had not been received from Salt Lake City up to April 20, when inquiry disclosed that they had not been properly addressed. They have now been traced and found at Lake City (5/17/54) and are being analyzed as requested.

Mr. Klinefelter has been asked to expedite the results.

Sincerely yours,

Paul T. Allsman
Regional Director, Region VII

600

May [illegible] 1954

Mr. Paul T. Allsman
Regional Director, Region VII
U. S. Bureau of Mines
P. O. Box 217
Morris, Tennessee

Re: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff, Agent
Kyanite No. 1 Mine
Albany County, Wyoming

Attention: Mr. Kenneth Skinner

Dear Mr. Allsman:

Reference is made to the concentrates of kyanite shipped from Salt Lake City Bureau of Mines to Morris Electrochemical Laboratory for evaluation in February, 1954.

This office is awaiting the results of the grain strength testing and would be pleased to learn when they will be available.

Sincerely yours,

C. O. Mittendorf

Administrator

LGHouk:gad 5/6/54
Copy to: Admr. R. File
Docket File
Field Team, Region IV
Operating Committee
Mr. Gunsallus, 3071
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

600

JAN 18 1954

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to your memorandum of January 11, 1954, to Mr. C. O. Mittendorf, requesting funds for metallurgical testing of kyanite samples.

Please proceed with the metallurgical testing on the type No. 6 kyanite only. By sink-float obtain at least 15 pounds of concentrates. Ship the 15 pounds of sink material to Norris, Tennessee. The Norris Laboratory should test this for grain strength only, no chemical tests being necessary at this time.

You should bill DMEA for the cost of labor, materials, supplies and shipping charges for making the above-outlined test. The laboratory procedure used and results obtained should be supplied the Washington DMEA Office with a copy to the Norris, Tennessee, laboratory.

Upon completion of the tests and submission of the report you may bill DMEA on Standard Government Form 1080 for the appropriate costs. I assure you that the tests will be paid for on a reimbursable basis by DMEA Washington.

Sincerely yours,

W. E. RICE

W. E. Rice
Chief, Administrative Division

LGHouk:gad 1/18/54
Copy to: Mr. Rice, 4621
Admr. R. File
Mr. Gunsallus, 3522
Mails & Files, Bu. Mines
Docket File, DMEA
Mr. Larrabee, G-232 GSA Bldg.
Operating Committee, DMEA
Mr. Houk

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

224 New Customhouse
Denver 2, Colorado

January 11, 1954

Memorandum

To: C. J. Mittendorf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. 2949-Earnest Vanderhoff

Reference is made to the letter dated December 8, 1953 from the Chairman, Operating Committee, regarding docket No. 2949, Earnest Vanderhoff.

Our letter of November 24, 1953 stated that surface exposures indicate the presence of 50,000 tons of kyanite-bearing schist containing 20% kyanite. This is a preliminary estimate of kyanite in sight. A small amount of trenching or bulldozing might expose a larger tonnage. The ore body is not delimited by the present exposures. The size of the target has not been determined. The statement in the letter dated December 8, 1953 that the geologic target apparently is not of sufficient size to justify Government participation in the project, is not justified.

The letter also states: "...it is within your delegation of authority to approve or deny the subject application, we are asking you to make a decision in this matter." We cannot make a decision until we make a complete field examination. We were instructed to obtain samples for metallurgical testing before making a field examination. These samples are now in our Salt Lake Laboratory awaiting allocation of the funds for this work. In a letter dated January 2, 1953, the Chairman, Operating Committee stated: "The question of whether the kyanite from this deposit can be successfully concentrated to stockpile specifications has been answered only in part." This is contrary to a statement from the letter dated December 8, 1953 which is as follows: "...the preliminary sampling and testing at Morris, Tennessee, have indicated that none of the material meets the stockpile specifications." /No

Please advise us if it is now conclusively determined that the kyanite is not suitable for the stockpile. If it is not suitable, we can notify the applicant accordingly. If the results of the tests are not conclusive, please arrange for funds for the metallurgical testing. When the metallurgical tests are complete, we can arrange for a field examination if it is warranted.

W. H. King
W. H. King

DEC 2 - 1953

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vandenhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to our letter of November 17, 1953, requesting a field team examination report on the subject property and an estimate of the tonnage of kyanite bearing material represented by Sample No. 6. We also requested an evaluation of the project's merits from the information on hand in Denver.

Your reply of November 24, 1953, does not furnish sufficient information for proper evaluation at this office. However, if only 30,000 tons of kyanite bearing schist containing 20% kyanite is indicated for all six types of kyanite, it would not appear worthwhile to proceed with the metallurgical testing. Since this application is less than $25,000, and it is within your delegation of authority to approve or deny the subject application, we are asking you to make a decision in the matter. You know, of course, that kyanite has been removed from the list of minerals eligible for exploration assistance and that the preliminary sampling and testing at Norris, Tennessee, have indicated that most of the material meets the STRUNZ specifications. It appears that metallurgical testing is not necessary to arrive at a conclusion since the geologic target apparently is not of sufficient size to justify Government participation in the project.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges
Member, Bureau of Mines

D. M. Larrabee
Member, Geological Survey

LGHouk:gad 12/1/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gensallus, 3522
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

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

Defense Minerals Administration
RECEIVED
NOV 27 1953

224 New Customhouse
Denver 2, Colorado

November 24, 1953

Memorandum

To: Chairman, Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket DMEA 2549 (Kyanite), Earnest Vanderhoff, Albany County, Wyoming

Reference is made to your letter dated November 17, 1953, regarding a final report on Docket DMEA 2549.

We are unable to prepare a final report until we receive the results of the metallurgical tests; however, it is estimated from surface exposures that approximately 50,000 tons of kyanite bearing schist containing 20 percent kyanite is indicated.

W. H. King

W. H. King

900

NOV 17 1953

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Harvest Vandenhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to your memorandum of August 18, 1953, stating the subject kyanite deposit was sampled late in June.

Please supply this office with a field team examination report on the subject property. The field team report should include a statement of the areal extent of the type of material represented by Sample No. 6 and an estimate of the tonnage. From the information on hand in Denver is it not possible to reach a decision, within your delegation of authority, on this project's merit?

Mr. W. E. Rice of the Bureau of Mines is absent from his office. As soon as he returns we will contact him regarding payment for the metallurgical tests. In the meantime, please expedite transmittal of field team report.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges
Member, Bureau of Mines

A. R. Kinkel, Jr.
Member, Geological Survey

LGHouk:gad 11/16/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3522
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

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

224 New Customhouse
Denver 2, Colorado

November 5, 1953.

Memorandum

To: Chairman of the Operating Committee

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA-2549 (Kyanite), Earnest Vanderhoff, Albany County, Wyoming.

This will acknowledge your letter dated October 27, 1953 in which you state that Mr. W. E. Rice of the Bureau of Mines will assure us that the metallurgical tests on the kyanite sample will be paid for on a reimbursable basis. As soon as we receive confirmation from Mr. Rice we will authorize the metallurgical tests.

W. H. King

Reg IV

600

OCT 27 1953

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vandenhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to the memorandum of October 20, 1953, from the Regional Director of Region IV, Mr. J. H. East to Mr. C. O. Mittendorf, regarding payment for laboratory tests of kyanite samples on the subject application.

Preliminary testing at Norris, Tennessee, has indicated that samples one to five do not possess the proper grain strength. Please note Table 3 of the report of December 17, 1952, from Mr. Kenneth G. Skinner, Chief of the Ceramics Branch, Region VII, to Mr. Lawrence G. Houk. You will note that only K-6 material might possibly pass specifications for grain hardness or soundness.

It is not our desire to test all six types of material. It is suggested that the K-6 type material be tested separately and a composite made of the other five types. The Norris Laboratory should test for grain strength only, no chemical tests being necessary at this time. Mr. W. E. Ries of the Bureau of Mines will assure you that the tests will be paid for on a reimbursable basis.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

T. P. Thayer

Member, Geological Survey

LGHouk:gad 10/23/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3522
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

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

224 New Customhouse
Denver 2, Colorado

October 20, 1953

Memorandum

To: C. O. Mittendorf, Administrator, DMEA

From: Regional Director, Region IV

Subject: DMEA 2549 (Kyanite), Earnest Vanderhoff, Albany County, Wyo.

Reference is made to a letter dated October 1, 1953 from the Chairman of the Operating Committee, regarding the procedure to be followed for the laboratory testing of kyanite samples.

It is estimated it will cost $300.00 to $400.00 to make the necessary sink-float concentrate. The Bureau of Mines laboratory at Norris, Tennessee, estimates the cost of chemical analyses and grain-strength tests at $125.00 to $175.00 for one test -- multiple samples would be $100.00 each.

Our present commitments under DMEA program will require our spending in excess of our allotment for the second quarter of the fiscal year and we expect to cut our expenses to come within the allotment before the end of the second quarter. If in your opinion it is desirable to invest this amount of money before the application is investigated please allocate additional $1000.00 to Region IV to cover expenses of 5 samples.

J. H. East, Jr.

J. H. East, Jr.

October 9, 1953

Memorandum

To: Mr. Frank M. Johnson

From: Lawrence G. Houk

Subject: Time necessary to complete action on commodities restricted by the April 15, 1953 memorandum from J. D. M.

DMEA-2549 - Kyanite
Earnest Vanderhoff
Property: Albany County, Wyoming
Amount requested: $2,544.50

On October 1, 1953, Region IV was advised that the DMEA Washington Office would reimburse them for costs of beneficiating kyanite for shipment to Norris, Tennessee, for stockpile tests. It is believed this docket will either have a contract or be denied before the end of the year.

DMEA-4923 - Kyanite
Bartlett, Lost, and Bassi
Property: Albany County, Wyoming
Amount requested: $50,850

Monthly field team report received September 15, 1953 from Region IV advises that an examination will be made at an early date. It is difficult to speculate on the time necessary to complete processing this docket, however, if the field team report is received within the next month this docket will either be given a contract or denied.

DMEA-1769 - Sulphur
Wyoming Gulf Sulphur Corporation
Property: Park County, Wyoming
Amount requested: $40,000

The property was examined June 3 and 4, 1952. On January 26, 1953, Mr. King wrote the Wyoming Gulf Sulphur Corporation that their application for exploration assistance would be placed in the inactive file until Mr. King was notified by the Bureau of Land Management that they have mineral rights to the property involved. Completion date for processing of this application cannot be predicted with any certainty. Letter to Region IV has been prepared today requesting that they forward a field team report to this office.

LGHouk:gad 10/9/53

Copy to: Admr. R. File
Docket File
Mr. Houk

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

C
O
P
Y

224 New Customhouse
Denver 2, Colorado

September 30, 1953

Memorandum

To: Chairman, Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA 2923-Kyanite, Bartlett, Leet, and Tassi, Albany County, Wyoming

Reference is made to your letter dated September 23, 1953, requesting the date on which a field examination of the above property will be made.

We have not scheduled an examination because it appears as if ground included in these claims overlaps the ground owned by Earnest Vanderhoff who has DMEA application 2549.

Samples of kyanite have been collected under Docket No. DMEA 2549, and have been sent to the Metallurgical Division in Salt Lake City for testing.

In our memorandum dated September 8, 1953, to the Administrator, DMEA, we asked advice as to how the cost of the tests to be made at Norris, Tennessee, would be charged. We have not received a reply to this memorandum.

In a letter dated September 9, 1953, the Chairman of the Operating Committee stated that the cost of the metallurgical work required on Docket No. DMEA 2549 could be absorbed by our allotment for September or October. We have exceeded our allotment for September and have postponed the metallurgical testing pending advice as to our October allotment.

If the samples obtained from Earnest Vanderhoff's property do not prove to be strategic, it will not be necessary to make a field examination of Docket No. 2923. We, therefore, believe it advisable to hold this docket in abeyance pending results of the metallurgical tests on ore obtained from the Vanderhoff property.

s/s
W. H. King

600

OCT - 1 1953

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
224 New Customhouse Building
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to your memorandum of September 18, 1953, on procedure for payment of laboratory tests on subject application.

The samples of raw kyanite ore of Type No. 6 should be crushed to pass 10 mesh. Preliminary tests at the Bureau of Mines indicate unlocking at 10 mesh. The plus 16 mesh fraction should be subject to heavy media separation and 15 pounds of the sink material concentrate should be shipped to Norris, Tennessee, for testing of grain strength.

You should bill DMEA for the cost of labor, materials, and supplies for making the above-outlined test, and shipping charges to Norris on a reimbursable basis. A report of the laboratory procedure used and results obtained should be supplied this office, together with a copy to the Norris, Tennessee, laboratory.

Upon completion of the tests and submission of the report you may bill DMEA on Standard Government Form 1080 for the appropriate costs.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

A. R. Kinkel, Jr.

Member, Geological Survey

LGHouk:gad 9/28/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3522
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

Orig to docket IV

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

224 New Customhouse
Denver 2, Colorado

September 18, 1953.

Memorandum

To: C. O. Mittendorf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA-2549 (Kyanite), Earnest Vanderhoff, Albany County, Wyoming.

In a letter dated September 9, 1953 the Chairman of the Operating Committee recommended that only Sample No. 6 be concentrated in the laboratory and a concentrate shipped to Norris, Tennessee. The Metallurgical Division estimates that it will cost approximately $300.00 to concentrate this sample.

We do not believe it advisable to charge this work against our September allotment because our other commitments are such that we will exceed our allotment for the first quarter of the fiscal year. We do not have any information regarding the cost of the tests to be made at Norris, Tennessee. Please advise us how this charge will be handled.

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

September 9, 1953

Memorandum

To: C. O. Mittendorf
Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA 2549 (Kyanite), Earnest Vanderhoff, Albany County, Wyoming.

Reference is made to our memorandum dated August 18, 1953 regarding metallurgical tests.

In this memorandum, we requested instructions regarding the handling of the estimated $500 charge for metallurgical testing.

We have not received any reply to this memorandum, and have, therefore, placed the application in our inactive file. Please advise us if we should notify the applicant that his application has been placed in our inactive file because funds are not available for metallurgical testing.

W. H. King
W. H. King

SEP 9 - 1953

Mr. A. V. King
Executive Officer, Drum
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. [illegible]-2549 - Kyanite
Earnest Vanderhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to paragraph three of our letter of January 2, 1953, and paragraphs two and three of our letter of January 27, 1953, on the concentration of samples of kyanite from the subject mine.

In the interest of economy, it might be well to just concentrate type sample No. 6 on a laboratory scale so that approximately 15 pounds of concentrates can be obtained and shipped to Norris, Tennessee, for testing as to grain strength. The cost of this work may then be absorbed by your allotment for September or October.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

A. R. Kinkel, Jr.

Member, Geological Survey

LGHouk:gad 9/8/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Gunsallus, 3522
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

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

RECEIVED
AUG 21 1953

224 New Customhouse
Denver 2, Colorado

August 18, 1953

Memorandum

To: C. O. Mittendorf, Administrator

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA 2549, Kyanite, Earnest Vanderhoff, Albany County, Wyoming

The subject kyanite deposit was sampled late in June, in accordance with Johnson's memo of January 2, 1953. The samples were shipped to our Salt Lake Laboratory for concentration as requested in Johnson's memo.

We have been informed that it will cost DMEA between $300. and $500. to concentrate the samples in accordance with requests from your office. We would appreciate instructions in regard to the handling of this charge. Our monthly report for July indicates that we have slightly over-spent our allotment and the same condition will probably prevail for the month of August.

W. H. King

JUN 17 1953

File Denver-2549

Mr. Earnest Vanderhoff
234 S. Knox Court
Denver, Colorado

Dear Mr. Vanderhoff:

I was pleased to read the personal remarks in your letter of June 10, which referred to the time we were both in the Rand District, when you were working for the Grady Lease and I was with Jay Carpenter at the Coyote Mine.

During that period, which I recall was between 1921 and 1924, I made frequent trips to the Slate Range and Panamint Valley areas to inspect prospects which had been brought to our attention. One of these properties was the Ophir Mine, located in the Slate Range, which was owned by J. A. Otto. John Kelly and his associates, for whom I worked at the Coyote, purchased that lead property from Otto, and we worked it for a number of years with considerable success.

I left the district just ten years ago this month, and have not visited there during the entire period. I had a few minutes' chat with Pete Oedick, in Los Angeles, in November 1951, when he brought me up to date as to what had transpired and gave me the news about all our mutual friends whom you mentioned in your letter.

In accordance with your request, your application docketed as DMEA-2549 will be reactivated by the Nonmetallics Division, here in Washington, and they will be contacting the Regional Office at Denver at an early date.

With kindest personal regards, and wishing you success in your present mining activities, I am

Sincerely yours,

C. O. Mittendorf

Administrator

COMittendorf/fw
6/17/53

cc: Admr Reading File
Mails & Files
Nonmetallics Division
Mr. Mittendorf

Houk
Ext 2971

Department of the Interior
Defense Minerals Exploration
Administration

143343.970 Working Fund,
Interior, Defense Minerals Exploration
Administration

June 3, 1953

Day Letter

Mr. Earnest Vanderhoff
234 South Knox Court
Denver, Colorado

Reurtel May 15 denying your application, Docket number DMEA 2549, this is to advise you that restricted program directive dated April 15 modified on June 1 giving DMEA authority to continue processing your application which was pending prior to date reftel. Kindly advise this office and Executive Officer at Bureau of Mines, 224 New Customhouse Building, Denver 2, Colorado whether or not you desire subject application to be reactivated.

C. O. Mittendorf

C. O. Mittendorf, Administrator
Defense Minerals Exploration Administration

LGHouk:gad 6/3/53

Confirmation copy.

Copy to: Admr. R. File
Docket File
Field Team, Region IV
Mr. Gunsallus, 3522
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

Houk
Ext 2971

Department of the Interior
Defense Minerals Exploration
Administration

14X3923.970 Working Fund,
Interior, Defense Minerals Exploration
Administration

May

Night Letter

April 15, 1953

Mr. Harmont Vanderhoff
234 South Knox Court
Denver, Colorado

RE YOUR EXPLORATION APPLICATION DOCKET NUMBER DMEA 2549, KYANITE. THIS IS TO ADVISE YOU THAT EFFECTIVE APRIL 15, 1953 EXPLORATION FUNDS RESTRICTED TO ASSISTANCE ONLY FOR SPECIFIED MINERALS STILL IN SHORT SUPPLY. KYANITE NO LONGER INCLUDED. CONSEQUENTLY WE DO NOT HAVE AUTHORITY OR FUNDS TO EXECUTE CONTRACT FOR EXPLORATION PROJECT ON YOUR PROPERTY AND YOUR APPLICATION THEREFORE IS DENIED. THIS IS WITHOUT PREJUDICE TO THE MERITS OF YOUR PROPOSED PROJECT. WE REGRET THE NECESSITY OF THIS ACTION AND EXPRESS APPRECIATION FOR YOUR INTEREST IN THE EXPLORATION PROGRAM AND COOPERATION DURING PERIOD YOUR APPLICATION UNDER CONSIDERATION.

C. O. Mittendorf

C. O. MITTENDORF, ADMINISTRATOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

LGHouk:gad 5/15/53

Copy to: Admr. R. File
Docket File
Field Team, Region IV
Mr. Gunsallus, 3522
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

Confirmation Copy

JAN 2 7 1953

600

Mr. A. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Building
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to your memorandum of January 9, 1953, to J. H. East, Jr., on the subject application requesting number of pounds of kyanite concentrates to be shipped to Norris, Tennessee, for grain strength testing.

Please refer to our letter of January 2, 1953, third paragraph, second sentence:

> "The question of grain strength should be determined before any exploration project is recommended. By sink float obtain at least 15 pounds of concentrates of each of the six types, ship this material to Norris, Tennessee, and request them to advise this office if the grain strength of this material is sufficient to qualify for stockpile purchase under P-27. Label concentrates (sink material) with the numbers corresponding to the original six samples of raw material shipped and ask Norris Electrochemical Laboratory to first test #6 for grain strength according to specifications P-27. If #6 passes this test the other five concentrates are to be tested for grain strength, otherwise they should be discarded. If #6 does not pass grain strength test, then the application should be denied. Advise Norris of method of concentrate preparation, as they may wish to regrind to further liberate the kyanite.

Samples 1 - 5 may be made into a composite for grain strength testing.

The grain strength test will be sufficient for our purposes to determine whether the prospect merits exploration assistance. It is not planned to make brick tests of the kyanite as suggested by Kenneth G. Skinner in his letter of October 14, 1952.

Reference to paragraph 1 of page 2, you may spend DMEA funds to determine if the kyanite is strategic.

Your suggestion that the applicant submit samples at his own expense has merit for future cases, however, in this case it is suggested that the applicant provide the funds for labor, material, and supplies to procure the samples under the supervision of a field team representative.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

T. P. Thayer

Member, Geological Survey

LGHook:gmd 1/29/53

Copy to: Admr. R. File
Operating Committee
Docket File
Mr. Hook

224 New Customhouse
Denver 2, Colorado

January 9, 1953

Memorandum

To: J. H. East, Jr., Regional Director

From: W. H. King, Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA 2549, Kyanite No. 1 claim, Earnest Vanderhoff, agent; Albany County, Wyoming

Enclosed is a copy of each of the following:

(1) A letter dated July 15, 1952, from Acting Chairman of the Operating Committee to the Executive Officer, Region IV.

(2) Specifications for Kyanite, P-27.

(3) Letter dated October 14, 1952 from Kenneth G. Skinner, Chief, Ceramics Branch, to the Executive Officer, Region IV.

(4) Evaluation test of Kyanite samples with transmittal letter from Kenneth G. Skinner to the Executive Officer, Region IV.

(5) Letter dated December 8, 1952 from Executive Officer to the Chairman of the Operating Committee.

(6) Letter dated January 2, 1953 from the Chairman of the Operating Committee to the Executive Officer, Region IV.

The letter dated January 2, 1953 from the Chairman of the Operating Committee states "By sink float obtain at least 15 pounds of concentrates of each of the six types, ship this material to Norris, Tennessee,....."

In the letter dated October 14, 1952, Kenneth G. Skinner, Chief, Ceramics Branch, Norris, Tennessee states "This latter test requires a minimum of 400 pounds of concentrate or of the material that is to be actually submitted for stockpiling." Please clarify how many pounds of material should be submitted to the Norris, Tennessee laboratory.

The Chairman of the Operating Committee states,"The charges for preliminary ceramic testing of the concentrates may be borne by the DMEA and need not be included in the project cost."

DMEA Order-1 lists strategic kyanite as one of the materials coming under the provisions of the order. If we do not know whether this kyanite is strategic, how can we spend DMEA funds?

We believe that the operator should submit samples at his own expense. If these samples are determined to be strategic, we may then proceed with the exploration project.

W. H. King

Enclosures

JFS:es

cc: Chron.
Subject

JAN 2 1953

Mr. M. R. King
Executive Officer, DMA
Field Area, Region II
Bureau of Mines
[illegible] Building
Denver 2, Colorado

Subject: Notice of Discovery - Kyanite
Bernard Vanderhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to the subject application for exploration assistance on the kyanite Mr. I Clair, Albany County, Wyoming, and to the report of Kenneth [illegible] Minner on evaluation of six samples of kyanite submitted for evaluation tests.

It is noted on the bottom of page [illegible], next to the last sentence in the Minner's report, "However, domestic kyanites produced a weak grain on calcination, and it is doubtful whether the Wyoming samples are different in this respect."

The question of whether the kyanite from this deposit can be successfully concentrated to stockpile specifications has been answered only in part. The question of grain strength should be determined before any exploration project is recommended. By sink float obtain at least 10 pounds of concentrates of each of the six types, ship this material to Norris, Tennessee, and request them to advise this office if the grain strength of this material is sufficient to qualify for stockpile purchase under [illegible]7. Label concentrates (sink material) with the numbers corresponding to the original six samples of raw material submitted and ask Norris Electrochemical Laboratory to first test so for grain strength according to specifications [illegible]7. If so passes this test the other five concentrates are to be tested for grain strength, otherwise they should be discarded. If so does not pass grain strength test, then the application should be denied. Advise Norris of method of concentrate preparation, as they may wish to regrind to further liberate the kyanite.

Reference is made to your letter of December 4, 195[illegible];

the charges for preliminary ceramic testing of the concentrates may be borne by the DMSA and need not be included in the project cost. The shipment of the ton samples of crude ore to Norris is not justified at this time.

Sincerely yours,

Frank E. Johnson

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

A. R. Kinkel, Jr.

Member, Geological Survey

LGHouk:gad 12/30/52

Copy to: Admr. R. File
Docket File
Operating Committee (2)
Mr. Kenneth Skinner, Norris, Tenn.
Mr. Houk

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

224 New Customhouse
Denver 2, Colorado

December 24, 1952

Mr. George C. Selfridge, Chairman
Operating Committee
Defense Minerals Exploration Administration
Washington 25, D. C.

Subject: DMEA 2549, Kyanite No. 1 claim, Earnest Vanderhoff, agent; Albany County, Wyoming

Dear Mr. Selfridge:

Please refer to our letter of December 8 regarding the subject docket.

The engineer's report regarding this docket is in the course of preparation. He will need the information requested in our letter before he can complete his work. The information of particular interest is in the paragraph quoted below:

> "We would prefer to ship the ton samples of crude ore direct to the laboratory at Norris, if it is possible to do so. The letter also states that the costs of crushing, beneficiating, making chemical analysis and pyrometric cone equivalent are considerable and the expense of having a test for acceptability to the stockpile costs $125.00 per examination. We assume these charges would have to be borne by the project and we would need to know in advance the over-all cost for each sample determination for inclusion in our engineering cost estimates that are now in preparation."

Very truly yours,

W. H. King

W. H. King, Executive Officer
DMEA Field Team, Region IV

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

224 New Customhouse
Denver 2, Colorado

December 8, 1952

Mr. George C. Selfridge, Chairman
Operating Committee
Defense Minerals Exploration Administration
Washington 25, D. C.

Subject: DMEA 2549, Kyanite No. 1 claim, Earnest Vanderhoff, agent; Albany County, Wyoming

Dear Mr. Selfridge:

You are referred to various correspondence regarding the captioned DMEA docket, particularly Kenneth G. Skinner's of October 15, 1952, concerning evaluation of kyanite and your letter of July 15, 1952, on the determination of strategic value of kyanite rock, both addressed to me.

T. H. Kuhn, Region IV geologist, has recommended exploration of the deposit, by excavating six trenches and obtaining representative samples from each trench for testing to determine if the material meets stockpile requirements. A minimum of 400 pounds of concentrate will be required, or, on the basis of Mr. Skinner's letter, total samples weighing not less than one ton each.

Your letter of July 15, 1952, indicates that the gravity concentrating operation to obtain a suitable concentrate should be performed in the regional laboratory. This would require shipment of the large samples to Salt Lake City, Utah, from the deposit in Wyoming with reshipment of the six samples of 400 pounds or more each, to the Electrotechnical Laboratory at Norris, Tennessee.

We would prefer to ship the ton samples of crude ore direct to the laboratory at Norris, if it is possible to do so. The letter also states that the costs of crushing, beneficiating, making chemical analysis and pyrometric cone equivalent are

considerable and the expense of having a test for acceptability to the stockpile costs $125.00 per examination. We assume these charges would have to be borne by the project and we would need to know in advance the over-all cost for each sample determination for inclusion in our engineering cost estimates that are now in preparation.

If and when the exploration project is approved, which is to be primarily for proving acceptability of the material for the National stockpile, we should be instructed regarding procedure with respect to our disposition of the samples and receive shipping instructions if they are to be submitted direct to the Norris, Tennessee, laboratory.

Very truly yours,

W. H. King

W. H. King, Executive Officer
DMEA Field Team, Region IV

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

224 New Customhouse
Denver 2, Colorado

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 27 1952

October 24, 1952

Memorandum

To: C. O. Mittendorf

From: Executive Officer, Field Team, Region IV

Subject: DMEA Docket 2549, Earnest Vanderhoff (Kyanite) Albany County, Wyoming

We have just received a report from Kenneth G. Skinner, Chief, Ceramic Branch, Electrotechnical Laboratory, Norris, Tennessee covering the evaluation of samples from the property of Earnest Vandehoff. Please disregard our memorandum of October 23, 1952 regarding these tests.

W. H. King

W. H. King

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 27 1952

224 New Customhouse
Denver 2, Colorado

October 23, 1952

Memorandum

To: C. O. Mittendorf, Administrator, DMEA

From: W. H. King, Executive Officer, Field Team, Region IV

Subject: Docket No. DMEA 2549 - Earnest Vanderhoff (Kyanite)
Albany County, Wyoming

In a letter dated August 14, 1952, the Chairman of the Operating Committee stated that the six samples collected by Truman H. Kuhn would be shipped to Norris, Tennessee, for evaluation as to strategic quality.

We have not received the results of these tests. Kindly expedite processing these samples so that we may complete our report on Docket No. DMEA 2549.

W. H. King
W. H. King

600

AUG 14 1952

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff, Agent
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. King:

Reference is made to the memorandum of Truman H. Kuhn of August 7, 1952, to the Operating Committee.

Simple evaluation tests were made at the College Park Branch of the Bureau of Mines and the results are contained in the enclosed copy of a letter from the Minerals Technology Division.

In reply to your question of the method of determining the strategic quality of kyanite, this is a metallurgical problem, and a definite procedure should be worked out with the Bureau of Mines Metallurgical Staff of your Region and the Electrotechnical Laboratory of the Bureau of Mines at Norris, Tennessee.

We are asking the Electrotechnical Laboratory of the Bureau of Mines at Norris, Tennessee, to describe their method of determining the strategic quality of kyanite, since they test all the kyanite purchased for stockpiling for Emergency Procurement Service. The six samples shall be shipped to Norris, Tennessee, for evaluation as to strategic quality, and you shall be advised of the results of the testing when the results become available.

Sincerely yours,

(signed) FRANK E. JOHNSON
Chairman, Operating Committee
Defense Minerals Exploration
Administration

Approved:

C. H. Johnson
Member, Bureau of Mines

D. M. Lemmon
Member, Geological Survey

Enclosure

LGHouk:gad 8/12/52

Copy to: Admin. Reading File
Operating Committee (2)
Docket File
Mr. Gumsallus, 3071
Mr. Norton, G-232 GSA Bldg.
Mr. Houk

600

AUG 14 1952

Mr. Hewitt Wilson
Regional Director, Region VII
U. S. Bureau of Mines
P. O. Box 217
Harris, Tennessee

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff, Agent
Kyanite No. I Mine
Albany County, Wyoming

Attention: Mr. Kenneth Skinner

Dear Mr. Wilson:

Transmitted under separate cover are six samples of kyanite received under Docket No. DMEA-2549, Earnest Vanderhoff, Agent, Kyanite No. I Mine, Albany County, Wyoming. Please determine if this material is acceptable for stockpiling or if it can be beneficiated to stockpile grade.

The DMEA Office in Region IV is desirous of learning your method of determining strategic qualities of kyanite. Would you kindly advise them of your method, addressing your reply to Mr. W. H. King, Executive Officer, DMEA Field Team, Region IV, Bureau of Mines, 224 New Customhouse Building, Denver 2, Colorado, for the attention of Mr. Truman H. Kuhn. Please send a copy of your reply to DMEA Washington Office.

Sincerely yours,

C. O. Mittendorf

Acting Administrator
Defense Minerals Exploration
Administration

LGHouk:gad 8/13/52

Copy to: Admin. Reading File
Operating Committee (2)
Docket File
Mr. Gunsallus, 3071
Mr. Morton, G-232 GSA Bldg.
Mr. Houk

JUL 1 8 1952

Mr. W. H. King
Executive Officer, D.M.A.
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMA-2510 - Kyanite
Barnett Vandenhoff, Agent
Kyanite No. 1 Mine
Albany County, Wyoming

Attention Mr. Truman H. Kuhn

Dear Mr. King:

Receipt is acknowledged of your letter of June 20, 1952, and six specimens of kyanite bearing rock, K-1 to K-6, and one specimen of asbestos K-7 for determination of their strategic value.

The sample of asbestos K-7 is not of strategic value. From your letter it appears that the six samples of kyanite bearing material do not represent the average quality of the kyanite that would be mined. Inasmuch as the cost of crushing, beneficiating, making chemical analysis and pyrometric cone equivalent are considerable and the expense of having a test for acceptability to the stockpile costs $125 per examination, specimen samples should not be forwarded for analysis. We are enclosing, for your information and guidance, a copy of the specifications for kyanite, R-27, issued by the Munitions Board August 23, 1951. The gathering of representative samples of the kyanite bearing material should be made at the time of the Field Team examination.

If the six specimens of kyanite bearing rock are indicative of the different types of material to be found, they may justify some simple evaluation tests such as crushing and gravity concentrating and grain counts on the sink of a sink-float test. The sink may then be integrated into a weighted composite and the composite sent to the Electrotechnical Laboratory at Norris, Tennessee, for determination of acceptability for stockpiling. This simple evaluation test should be completed in the Regional Laboratory and made a part of the field examination report.

Mr. W. H. King
Executive Officer, DMEA
Field Team, Region IV
Bureau of Mines
224 New Customhouse Bldg.
Denver 2, Colorado

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff, Agent
Kyanite No. 1 Mine
Albany County, Wyoming

Attention: Mr. Truman H. Kuhn

Dear Mr. King:

Receipt is acknowledged of your letter of June 26, 1952, and six specimens of kyanite bearing rock, K-1 to K-6, and one specimen of asbestos K-7 for determination of their strategic value.

The sample of asbestos K-7 is not of strategic value. From your letter it appears that the six samples of kyanite bearing material do not represent the average quality of the kyanite that would be mined. Inasmuch as the cost of crushing, beneficiating, making chemical analysis and pyrometric cone equivalent are considerable and the expense of having a test for acceptability to the stockpile costs $125 per examination, specimen samples should not be forwarded for analysis. We are enclosing, for your information and guidance, a copy of the specifications for kyanite, P-27, issued by the Munitions Board August 23, 1951. The gathering of representative samples of the kyanite bearing material should be made at the time of the Field Team examination.

If the six specimens of kyanite bearing rock are indicative of the different types of material to be found, they may justify some simple evaluation tests such as crushing and gravity concentrating and grain counts on the sink of a sink-float test. The sink may then be integrated into a weighted composite and the composite sent to the Electrotechnical Laboratory at Norris, Tennessee, for determination of acceptability for stockpiling. This simple evaluation test should be completed in the Regional Laboratory and made a part of the field examination report. [The Spokane Office of the Bureau of Mines is equipped and has the personnel to make complete evaluation of kyanite samples.]

Rewritten

The six samples you have forwarded will be given a simple evaluation test at the College Park Bureau of Mines station but other testing will be held up pending a statement from your office on the representativity of the samples.

Sincerely yours,

George C. Selfridge

ACTING Chairman, Operating Committee
Defense Minerals Exploration
Administration

Approved:

J. H. Hedges

Member, Bureau of Mines

T. P. Thayer

Member, Geological Survey

Enclosure

LGHouk:gad 7/10/62

Copy to: Admin. Reading File
Docket File
Mr. Gunsallus, 3071
Mr. Morton, G-232 GSA Bldg.
Mr. Houk
Operating Committee (2)

Mr. Paul M. Ambrose
Bureau of Mines
Eastern Experiment Station
College Park, Maryland

Subject: Docket No. DMEA-2549 - Kyanite
Earnest Vanderhoff, Agent
Kyanite No. 1 Mine
Albany County, Wyoming

Dear Mr. Ambrose:

Transmitted herewith are six samples of kyanite for evaluation. It is suggested that the determination be made at what mesh size the kyanite is unlocked from the gangue.

We wish to have the pulps returned to this office.

Sincerely yours,

C. O. Mittendorf

Acting Administrator
Defense Minerals Exploration
Administration

Enclosures 6

LGHouk:gad 7/9/52

Copy to: Admin. Reading File
Docket File
Mr. Houk
Mr. Gunsallus, 3071
Mr. Norton, G-232 GSA Bldg.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

SOUTHEASTERN REGION
REGION VII

OFFICE OF
REGIONAL DIRECTOR

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
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P. O. BOX 217
NORRIS, TENNESSEE

December 17, 1952

Air Mail

Mr. Lawrence G. Houk, Chief
Non-Metallic Minerals Division
Defense Minerals Exploration Administration
Washington 25, D.C.

Dear Mr. Houk:

Enclosed are two copies of the report, "Evaluation tests of six samples from the Kyanite No. 1 Mine, Albany County, Wyoming", you requested in our telephone conversation this morning.

Very truly yours,

Kenneth G. Skinner
Chief, Ceramic Branch

Enclosures (2)

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
DEC 19 1952
P. O. Box 217

21 October 1952

Mr. W. H. King, Executive Officer
DMEA Field Team
Region IV
Bureau of Mines
224 New Customhouse Building
Denver 2, Colorado

Subject: Evaluation of samples from Kyanite No. 1, Albany County, Wyoming

Attention: Mr. Truman H. Kuhn

Dear Mr. King:

The enclosed report gives the results of our evaluation tests of six samples from the Kyanite No. 1 Mine, Albany County, Wyoming. On the basis of the samples submitted the material after concentration might meet the stockpile specifications.

The samples were received in poor condition. The individual sample packages were not securely fastened and part of the samples had spilled out of the sacks. In addition the sacks were not packed tightly in the shipping container and during shipping broke. This loss of sample restricted the amount available for testing.

Yours very truly,

Kenneth G. Skinner
Chief, Ceramic Branch
Industrial Minerals Division

cc: Mr. King (2)
DMEA, Washington 25, D. C.
Skinner (2)
Cook
Region
File
Day file

Evaluation tests of six samples from the Kyanite No. 1 Mine, Albany County, Wyoming[1]

At the request of the Defense Minerals Exploration Administration, six samples of kyanite-containing material from the Kyanite No. 1 Mine, Albany County, Wyoming[1], were tested for their possible strategic value. Petrographic examinations indicated the kyanite contents ranged from about 11 to 32 percent.

Tests and Results

The as-received samples were dried at 110°C for 24 hours, cooled, and then crushed to pass 4-mesh. The minus 4-mesh samples were used for subsequent testing.

Float-and-sink concentration tests were made using s-tetrabromoethane (specific gravity 2.95) and a centrifuge. The sink 2.95 material was considered as the concentrate and examined petrographically. The P.C.E. tests, somewhat similar to fusions, were made on the plus 2.95 materials.

The float fractions were examined petrographically but no grain count was made except for the screen-sized fractions of the minus 4-mesh K-2 and K-5 samples.

Minus 4-mesh head samples.- Megascopic examination showed that all the samples contained relatively coarse crystalline material, therefore separation tests were made using the minus 4-mesh samples. Petrographic examinations were not made of samples K-2 and K-3.

Results.- None of the minus 4-mesh concentrates passed the minimum requirements[2] of cone 37 (about 1820°C). See table 1.

Minus 60-mesh head samples.- Minus 4-mesh material was stage-crushed to pass 60-mesh. This finer material was concentrated and tested similarly to the minus 4-mesh material. However, there was one difference. The plus 2.95 fraction sample K-6 was still contaminated, therefore an additional separation was made using a 3.17 specific gravity media. The kyanite content of the concentrate by this treatment was raised from 88 to 98 percent (table 1).

1/ Samples submitted by DMEA and identified as Docket No. DMEA-2549-Kyanite.

2/ National Stockpile Material Purchase Specifications, "Kyanite, Mullite, and Mullite-type Refractories", P-27, 23 August 1951.

Table 1. - Recoveries, kyanite contents, and P.C.E. values of specific gravity (plus 2.95) concentrates of samples from Kyanite No. 1 Mine, Albany County, Wyoming 1/

Sample	Kyanite in head sample percent 2/	Separation using minus 4-mesh material: Plus 2.95, percent	Kyanite, percent	P.C.E. Cone	P.C.E. Approx. °C	Separation using minus 60-mesh material: Plus 2.95 percent	Kyanite, percent	P.C.E. Cone	P.C.E. Approx. °C
K-1	15.3	17.9	51.7	<30 3/	<1650	16.6	92.3	36	1810
K-2	11.4	11.3	---- 4/	<32	<1700	12.0	95.0	37½	1827
K-3	18.0	23.7	---- 4/	36⁻	1804	19.2	93.6	37½	1827
K-4	15.5	26.2	63.4	<36 5/	<1810	15.6	98.0	38	1835
K-5	32.2	42.1	70.7	34½	1772	33.8	95.2	38	1835
K-6	31.2	34.7	87.0	36⁻	1804	35.5	88.0	-- 4/	---- 4/
						31.8 6/	98.0 6/	38 6/	1835 6/

1/ - DMEA docket No. DMEA-2549-Kyanite
2/ - Calculated. Small amounts of fibrous material, which appeared to be sillimanite, were included with the kyanite.
3/ - Insufficient material separated to make additional determinations.
4/ - Not determined.
5/ - The appearance of the test cones indicated a possible P.C.E. value of about cone 32-32½.
6/ - Plus 3.17 specific gravity material.

NOTE: The minus 2.95 specific gravity fractions had less than 0.5 percent kyanite.

Results.- All of the concentrates, except K-1, had P.C.E. values greater than cone 37. The P.C.E. value for K-1 was cone 36 (about 1810°C).

Minus 4-mesh screen-sized fraction head samples.- Petrographic examinations of the minus 4-mesh and the minus 60-mesh materials indicated most of the kyanite might be freed without crushing to pass 60-mesh. Therefore two samples, K-2 and K-5, were sized to obtain three fractions, namely, minus 4- plus 14-mesh, minus 14- plus 100-mesh, and minus 100-mesh. Float-and-sink tests were made of each screen fraction, and then examined petrographically. No P.C.E. tests were made because of insufficient material.

Results.- The data in table 2 indicate stage-crushing to about minus 14- plus 100-mesh, or preferably to minus 14- plus 60-mesh might give a raw material which could be concentrated to pass the P-27 specifications.

These data are only indicative and stage-crushing tests should be made using sufficient amount of samples to determine the P.C.E. value of the concentrate.

P.C.E. vs kyanite content.- Figure 1 illustrates two factors: (1) effect of kyanite content of the concentrate, and (2) the effect of fineness of grind upon obtaining a high-grade concentrate.

The curve shows that for these particular samples with similar gangue minerals, the concentrates (plus 2.95 material) must contain more than 92 percent kyanite to meet the minimum P.C.E. requirement of cone 37.

Special Tests

Hardness of calcined grain.- One of the tests required by the P-27 for stockpiling mullite, or mullite-forming materials, is to determine the grain strength. This test is made on calcined material and is, basically, comparative with satisfactory materials. The relative strengths of plus 2.95 fractions after calcining rapidly in an oxy-acetylene furnace to 1650°C are given in table 3.

Results.- Although the hardness of sample K-6 appeared to be satisfactory, the material would not meet the P-27 specifications for P.C.E. value.

Cleaner concentrates than those used in this preliminary test might produce satisfactory grain. However, domestic kyanites produce a weak grain on calcination, and it is doubtful whether the Wyoming samples submitted are different in this respect. This characteristic should be determined on sufficiently large samples for proper evaluation.

Table 2. - Mineralogical compositions and mineral distributions of two kyanite samples crushed to pass 4-mesh.

Sample	K-2			K-5		
Head sample, percent						
Kyanite	14.3			24.3		
Quartz	46.6			20.0		
Opaque	trace			.2		
Other1/	39.1			55.5		
Screen fraction						
Mesh	-4 + 14	-14 + 100	-100	-4 + 14	-14 + 100	-100
Percent	60.7	32.9	6.4	63.8	32.7	3.5
Specific gravity fraction, percent						
+ 2.95	14.4	6.6	11.8	35.8	22.9	17.0
-2.95	85.6	93.4	88.2	64.2	77.1	83.0
Plus 2.95 fraction, percent						
Kyanite	77.4	91.3	86.7	73.4	90.8	91.6
Quartz	13.2	4.6	6.2	20.8	3.5	6.4
Opaque	.2	.5	1.9	.2	trace	.2
Other1/	9.2	3.6	5.2	5.6	5.7	1.8
Minus 2.95 fraction, percent						
Kyanite	8.3	1.8	1.5	.4	trace	.0
Quartz	52.7	42.4	49.2	23.7	17.7	26.1
Mica2/	18.2	31.7	32.6	49.8	75.0	64.2
Opaque	trace	.0	trace	.4	trace	.8
Other	20.8	24.1	16.7	25.7	7.3	8.9
Mineral distribution, percent						
Plus 2.95 fraction						
Kyanite	47.5	13.9	4.6	69.1	28.0	2.2
Quartz	2.5	.2	.1	23.8	1.3	.2
Opaque	50.0	25.0	25.0	21.7	.0	.0
Other1/	2.0	.2	.1	2.3	.8	.0
Minus 2.95 fraction						
Kyanite	30.2	3.2	.6	.7	.0	.0
Quartz	58.8	32.5	5.9	48.6	22.3	3.8
Opaque	.0	.0	.0	69.6	.0	8.7
Other1/	51.8	38.8	7.1	55.8	37.4	3.8

1/ - Includes micaceous material.

2/ - Includes all mica-like material.

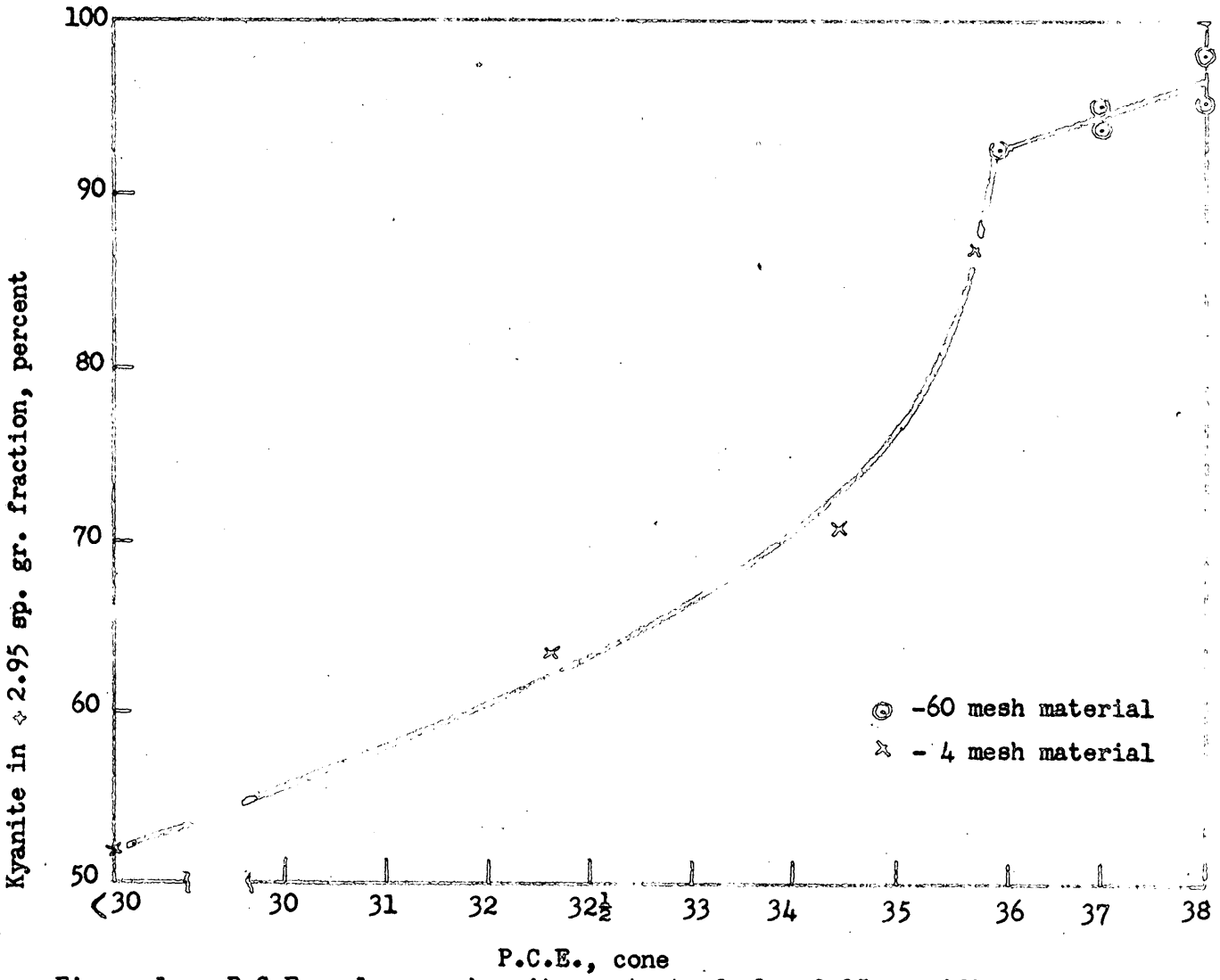

Figure 1.- P.C.E. value vs. kyanite content of plus 2.95 specific gravity fractions of samples from the Kyanite No. 1 Mine, Albany County, Wyoming.

Table 3. - Possible usability of calcined (1650°C) kyanite for refractory grog. Based upon hardness of grain. Minus 4-mesh, plus 2.95 specific gravity fraction.

Sample	Usability
K-1	Friable, unusable.
K-2	Unsatisfactory although there were a few grains hard enough for grog.
K-3	Slightly harder than previous sample, but still too friable.
K-4	Grains appeared hard and large enough, although somewhat glassy.
K-5	Similar to previous sample.
K-6	Grains were similar to imported, calcined kyanite, but there was some laminar splitting. This material might pass specifications regarding grain hardness or soundness.

NOTE: None of these materials met the minimum PCE requirement (cone 37, about 1820°C).

Exfoliation tests.- Preliminary tests using a few grains indicated the micaceous material exfoliated upon heating and might offer a rather easy means of separating the kyanite from the gangue minerals.

A composite sample was obtained by blending equal weights of samples K-1 through K-6. This sample was split into five samples which were used in the exfoliation tests. One sample was placed in a furnace at 1000°C for two minutes and then withdrawn. This was repeated with other samples at 100° intervals through 1400°C. The cooled, exfoliated samples were examined megascopically, then float-and-sink tests were made. The results of these tests are given in table 4.

Results.- The data in table 4 indicate exfoliation of the micaceous material did not improve the concentrate obtained by float-and-sink tests. In fact, the recovery was slightly less than calculated for the six samples.

Table 4. - Results of exfoliation tests of minus 4-mesh composite sample to remove micaceous material from kyanite.

Furnace temperature, °C	Megascopic evaluation of exfoliation separation	Plus 2.95 fraction after exfoliation, percent
Room	5	30.7 1/
1000	3	17.4
1100	2	21.4
1200	2	17.8
1300	4	19.4
1400	1	19.5

1/ Value before exfoliation is given for comparison purposes. As previously indicated from Table 1, this material probably contains less than 65 percent kyanite.

P. O. Box 217

21 October 1952

Mr. W. H. King, Executive Officer
DMEA Field Team
Region IV
Bureau of Mines
22A New Customhouse Building
Denver 2, Colorado

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Attention: Mr. Truman H. Kuhn

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The samples were received in poor condition. The individual sample packages were not securely fastened and part of the samples had spilled out of the sacks. In addition the sacks were not packed tightly in the shipping container and during shipping broke. This loss of sample restricted the amount available for testing.

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The float fractions were examined petrographically but no grain count was made except for the screen-sized fractions of the minus 4-mesh K-2 and K-5 samples.

Minus 4-mesh head samples.- Megascopic examination showed that all the samples contained relatively coarse crystalline material, therefore separation tests were made using the minus 4-mesh samples. Petrographic examinations were not made of samples K-2 and K-3.

Results.- None of the minus 4-mesh concentrates passed the minimum requirements[2] of cone 37 (about 1820°C). See table 1.

Minus 60-mesh head samples.- Minus 4-mesh material was stage-crushed to pass 60-mesh. This finer material was concentrated and tested similarly to the minus 4-mesh material. However, there was one difference. The plus 2.95 fraction sample K-6 was still contaminated, therefore an additional separation was made using a 3.17 specific gravity media. The kyanite content of the concentrate by this treatment was raised from 88 to 98 percent (table 1).

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K-6	31.2	34.7	87.0	36-	1804	35.5	88.0	---4/	----4/
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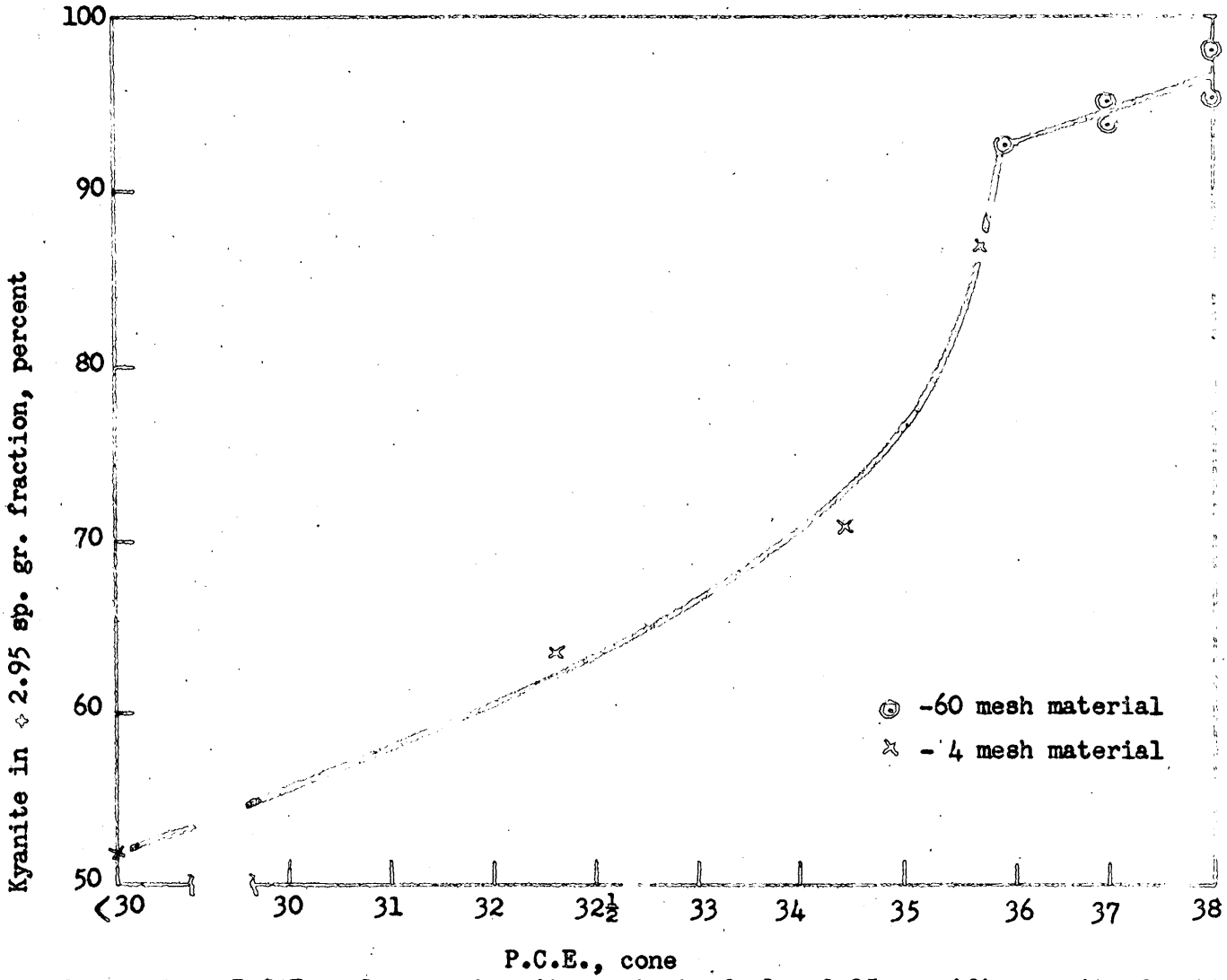

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