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

AUG 2 - 1954

224 New Customhouse
Denver 2, Colorado

July 30, 1954

Mr. Earnest Vanderhoff
General Delivery
Cisco, Utah

Re: DMEA Docket 2549

Dear Mr. Vanderhoff:

Reference is made to your application for exploration assistance on the Kyanite No. 1 mine, Albany County, Wyoming, Docket No. DMEA 2549.

Laboratory tests on the samples of kyanite obtained from the Kyanite No. 1 claim indicate that the material does not meet stockpile specifications.

In order to qualify under the Defense Minerals Exploration program, kyanite must meet the Government stockpile specifications. Therefore, we regret that we must deny your application for exploration assistance.

We regret that the laboratory tests could not be completed sooner, and thank you for bringing this deposit to our attention.

Very truly yours,

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

JFS:es

cc: Chairman, Oper. Comm.
Docket
Traver
Koschmann
Chron.

E. N. Hansbrough
for A. H. Koschmann
DMEA Field Team, Region IV

FILE COPY
SURNAME
Houk
Selfridge
Hedges
Thayer

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

JUL 22 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
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 (GCS)

Approved:

J. H. Hedges (JHH)
Member, Bureau of Mines

T. P. Thayer (JHH)
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

R.C.L.

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

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Bureau of Mines Administration
DEC 12 1954

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

By Richard Havens[1]

INTRODUCTION

At the request of DMEA, 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, Earnest 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 500 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 DMEA 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/

		Separation using minus 4-mesh material				Separation using minus 60-mesh material			
				P.C.E.				P.C.E.	
Sample	Kyanite in head sample percent 2/	Plus 2.95, percent	Kyanite, percent	Cone	Approx. °C	Plus 2.95, percent	Kyanite, percent	Cone	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	23.7	---- 4/	36-	1804	19.2	93.8	37-1/2	1827
K-4	15.5	26.2	63.4	<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 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 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 micaeous 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 micaeous 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 Vanderhoot-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

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

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Please advise us how to proceed.

W H King
W. H. King

Enclosures

JFS:cwm

cc: Docket
Administrator, DMEA
AHKoschmann
WMTraver
Chron.

any with attachments to
N. B.

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 #549

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
DMEA DOCKET 2549

By Richard Havens[1]

INTRODUCTION

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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
MORRIS, 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 IMEA-2549-Kyanite, Earnest Vanderhoff, Albany County, Wyoming

Dear Bruce:

The small sample of plus 3-mesh kyanite concentrate you obtained from IMEA 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 1880°C. Commercial, domestic kyanite concentrates are advertised as having PCE values of cone 36-37, about 1810-1880°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 500 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 DMEA 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-3 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 head sample percent 2/	Separation using minus 4-mesh material: Plus 2.95, percent	Separation using minus 4-mesh material: Kyanite, percent	Separation using minus 4-mesh material: P.C.E. Cone	Separation using minus 4-mesh material: P.C.E. Approx. °C	Separation using minus 60-mesh material: Plus 2.95, percent	Separation using minus 60-mesh material: Kyanite, percent	Separation using minus 60-mesh material: P.C.E. Cone	Separation using minus 60-mesh material: 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	23.7	—— 4/	36-	1804	19.2	93.8	37-1/2	1827
K-4	15.5	26.2	63.4	<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 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 steelmaking 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	59.1	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	.0	.7	.0	.0
Quartz	58.8	32.5	5.9	48.6	22.3	3.8
Opaque	.0	.0	.0	69.0	.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 8-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.

APPENDIX II

COPY

Report

Docket DMEA-2549 Kyanite
Earnest Vanderhoot-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

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.

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

Philip W. Guild
Member, Geological Survey

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
SOUTHEASTERN REGION
REGION VII
HAMILTON BANK BUILDING

OFFICE OF
REGIONAL DIRECTOR

POST OFFICE BOX 1909
KNOXVILLE, TENNESSEE

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 20 1954

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

Paul T. Allsman
Regional Director, Region VII

FILE COPY
Surname:
Houk
Selfridge
Hedges
Guild

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

JUN 17 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:

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

Sincerely yours,

6-17-54

George C. Selfridge

(2165)

Chairman, Operating Committee

Approved:

J. H. Hedges (2168)
Member, Bureau of Mines

Philip W. Guild (2165)
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

DOCKET COPY
Surname: Houk

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

600

MAY 10 1954

Mr. Paul T. Allsman
Regional Director, Region VII
U. S. Bureau of Mines
P. O. Box 217
Norris, 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 Norris 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 (for)

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

R.C.S.

FILE COPY
SURNAME:

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

600

JAN 1 8 1954

Houk
Gedrage
Kelman
Rhodes
Wallace

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

R.C.B. 1-18-54

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. O. Mittendorf, Administrator, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. 2549-Earnest Vanderhoff

Reference is made to the letter dated December 2, 1953 from the Chairman, Operating Committee, regarding docket No. 2549, 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 2, 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 2, 1953 which is as follows: "...the preliminary sampling and testing at Norris, Tennessee, have indicated that none of the material meets the stockpile specifications."

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

FILE COPY
SURNAME:

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

600

Houk
Larrabee
Selfridge
Edwards
Matthews

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 Vanderhoff
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 50,000 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 none of the material meets the stockpile 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 (JHB)

Chairman, Operating Committee

Approved:

J. H. Hedges (JHB)
Member, Bureau of Mines

D. M. Larrabee (JHB)
Member, Geological Survey

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

R.C.G. 12-2-53

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
NOV 27 1953

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

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

FILE COPY
SURNAME:

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

600

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
Earnest Vanderhoff
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

R.C.G. 11-11-53

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
W. H. King

FILE COPY
SURNAME:

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

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 Vanderhoff
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. Mittenderf, 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 C. 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. Rice 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

R.C.G. 10-27-53

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.

FILE COPY
SURNAME:

Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION 600
WASHINGTON 25, D. C.

October 9, 1953

Memorandum N.S. in R.R.

To: Mr. Frank E. Johnson

From: Laurence G. Houk

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

DMEA-2549 - Kyanite
Ernest Vanderhoff
Property: Albany County, Wyoming
Amount requested: $9,544.50

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-2923 - Kyanite
Bartlett, Leet, and Tassi
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

FILE COPY
SURNAME:

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

600

Houk
Chamberlin
Selfridge
K. Johnson

OCT - 1 1953

Mr. M. 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 (GCS)

Chairman, Operating Committee

Approved:

J. H. Hedges (GCS)

Member, Bureau of Mines

A. R. Kinkel, Jr. (GCS)

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

R.C.S. 10-1-53

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

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

-500

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

REFERENCE SLIP

DATE 9/16/53

REFERRED TO:

1. ~~Code 600 Room 4637~~
2. Mr Hank
3.
4.

FOR:

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

REMARKS: See [illegible]

Check (X) before the items needing attention.

ROBERT E. ADAMS

Initials of sender.

GPO 16—63815-1

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

FILE COPY
SURNAME:

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

600

SEP 9 - 1953

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

Subject: Docket No. DMFA-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

R.C.G.
9-9-53

00

UN[redacted]TES

DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION

REFERENCE SLIP

DATE 8/25/53

REFERRED TO:

1. Code 600
2.
3.
4. 12

FOR:

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

REMARKS:

Check (X) before the items needing attention.

ROBERT E. ADAMS

Initials of sender.

GPO 16—63815-1

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

RECEIVED
AUG 2 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

W. H. King

FILE COPY
SURNAME: 5/B

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

JUN 17 1953

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 Osdick, 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 (fw)

Administrator

6-17-53

COMittendorf/fw
6/17/53

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

RECEIVED
JUN 15 1953

Cisco Utah
June 10-1953

C.O. Mittendorf
Administrator D.M.E.A.
Washington 25, D.C.
Dear Mr. Mittendorf
Re: Docket Number DMEA
2549, (Yamile)
I desire subject
application to Be Reactivated.
did advise Executive
officer at Bureau of
Mines 224, New Custom-
house Building Denver 2
Colo. I desired Subject
application to Be Reactivated
Please Continue Proce-
ssing My application
Over, Thank you
Address

Earnest Vanderhoff
Phone-Pearl 5122-234-80 Knox Ct.
Denver Colorado.

Or. Cisco Utah, Gen. Del.

Say are you the Mittendorf that was assayer at the Coyote Mine, Mr. Carpenter was in charge, It joined the Kelly Mine, Brady Lease on the East, I Worked there, If you are, do you remember the time we went out in the Slate Range, got samples off surface, Lead, sand carbonates, That Old Man cussed us out because we didnt spent more time there, you told him if it was what you thought it was, his property would be Leased or Sold in 40 days I think it was, I am

(over)

Still prospecting. This last year I have been working Carnotite, Vanadium, Yellow Cat district, Grand Co. Utah about 25 mi N.E. of Moab. Was out to Osdick, Now Red Mnt. Post Office Calif. 4 years ago this summer, Seen Pete Osdick, Jim Nosser, Donald Kerr, Slim Riffle at the Duff Bar. I hear from Pete, he says he is going to bring the Camp back. he is sinking a shaft. East South of Old Coyote property hope he does, he is quite Old Now. If you know of any one interested in the Pegmatites a Prospector, or other Minerals give them my address. I wish you the best of Luck, Write me sometime. Earnest Vanderhoff.

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

W. P. MARSHALL, PRESIDENT

FX-1201

SYMBOLS
DL=Day Letter
NL=Night Letter
LT=Int'l Letter Telegram
VLT=Int'l Victory Ltr.

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

K.GJA098 DH DM Omen 2549

WASHINGTON DC JUNE 4

C O MITTENDORF, ADMINISTRATOR DEFENSE MINERALS

DEPARTMENT OF INTERIOR WASHDC

A COPY OF YOUR TELEGRAM JUNE 3 TO EARNEST VANDERHOFF 234 SOUTH KNOX COURT DENVER COLO, WHICH WAS FORWARDED TO GENERAL DELIVERY CISCO UTAH, HAS BEEN MAILED. OUR OFFICE AT CISCO UTAH IS CLOSED UNTIL MONDAY

WESTERN UNION NA 87100 EXT 263

Department of the Interior
Defense Minerals Administration
JUN 1953

1953 JUN 4 PM 7 34
DLY

Houk
Ext 2971

FILE COPY
SURNAME:

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

Department of the Interior
Defense Minerals Exploration
Administration

Hoch

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

June 3, 1953

Day Letter

Mr. Earnest Vanderhoff
234 South Essex Court
Denver, Colorado

Recurtel 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

224 New Customhouse
Denver 2, Colorado

May 18, 1953

Mr. Ernest Vanderhoff
General Delivery
Cisco, Utah

Re: Docket No. 2549 (Kyanite)

Dear Mr. Vanderhoff:

This is to inform you that effective April 15, 1953, the commitment of funds allocated to the Defense Minerals Exploration Administration for exploration assistance under the Defense Production Act was restricted to certain specified metals and minerals still in short supply. Kyanite was not specified, and consequently was automatically removed from the list of metals or minerals eligible for exploration assistance.

We regret to advise you that, since your application relates to kyanite, and was pending on the date of the restrictive order, we are without authority or funds to enter into a contract for exploration and your application is accordingly denied. This action is taken without prejudice to the merits of the proposed project.

The staff of the Defense Minerals Exploration Administration wishes to express its appreciation for your interest in the exploration program and for your cooperation during the period your application has been under consideration.

Sincerely yours,

W. H. King

W. H. King
Field Team, Region IV

MAY 22 1953

HMC:es

for A. E. Koschmann
Field Team, Region IV

cc: Subject
Chron.
Mittendorf
Wilson
Koschmann (2)

Houk
Ext 2971

FILE COPY
SURNAME:

Department of the Interior
Defense Minerals Exploration
Administration

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

1413923.970 Working Fund,
Interior, Defense Minerals Exploration
Administration

Houk

Night Letter

~~April~~ MAY 15, 1953

Mr. Earnest 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

5-15-53

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
SOUTHEASTERN REGION
REGION VII

OFFICE OF
REGIONAL DIRECTOR

P. O. BOX 217
NORRIS, TENNESSEE

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
DEC 19 1952

December 17, 1952

DMEA-2549

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

Kenneth G. Skinner
Chief, Ceramic Branch

Enclosures (2)

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
DEC 15 1952

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 ten 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 EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
DEC 2 3 1952

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 EXPLORATION 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

Region IV
docket

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

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 27 1952

224 New Customhouse
Denver 2, Colorado

October 24, 1952

Region IV docket

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 Vanderhoff. Please disregard our memorandum of October 23, 1952 regarding these tests.

W. H. King

W. H. King

FILE COPY
SURNAME:

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

Hush
Selfridge.

BW.

Mr. W. 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

JAN 2 7 1953

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 of 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.

J.C. 1/27/53

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 (GCS)

Chairman, Operating Committee

Approved:

J. H. Hedges (JHH)

Member, Bureau of Mines

T. P. Thayer (JHH)

Member, Geological Survey

LGHouk:gad 1/26/53

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

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

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

W. H. King

Enclosures

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

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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

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS 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
Albany County, Wyoming

Jan 2, 1953

Dear Mr. King:

Reference is made to the subject application for exploration assistance on the Kyanite No. 1 Claim, Albany County, Wyoming, and to the report of Kenneth G. Skinner on evaluation of six samples of kyanite submitted for evaluation tests.

It is noted at the bottom of page 2, next to the last sentence in Mr. Skinner's report, "However, domestic kyanites produce 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 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.

Reference is made to your letter of December 24, 1952;

the charges for preliminary ceramic testing of the concentrates may be borne by the DMEA 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,

Chairman, Operating Committee

Approved:

_____
Member, Bureau of Mines

_____
Member, Geological Survey

22A 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, Barnest 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 ten 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

JJ

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, Executive Officer
DMEA Field Team, Region IV

Mining Division
Data Bank
OCT 31 1952
BUREAU OF MINES
Denver, Colorado

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 concentrate 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", R-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	93.8	37½	1827
K-4	15.5	26.2	63.4	<36 5/	<1810	15.8	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.

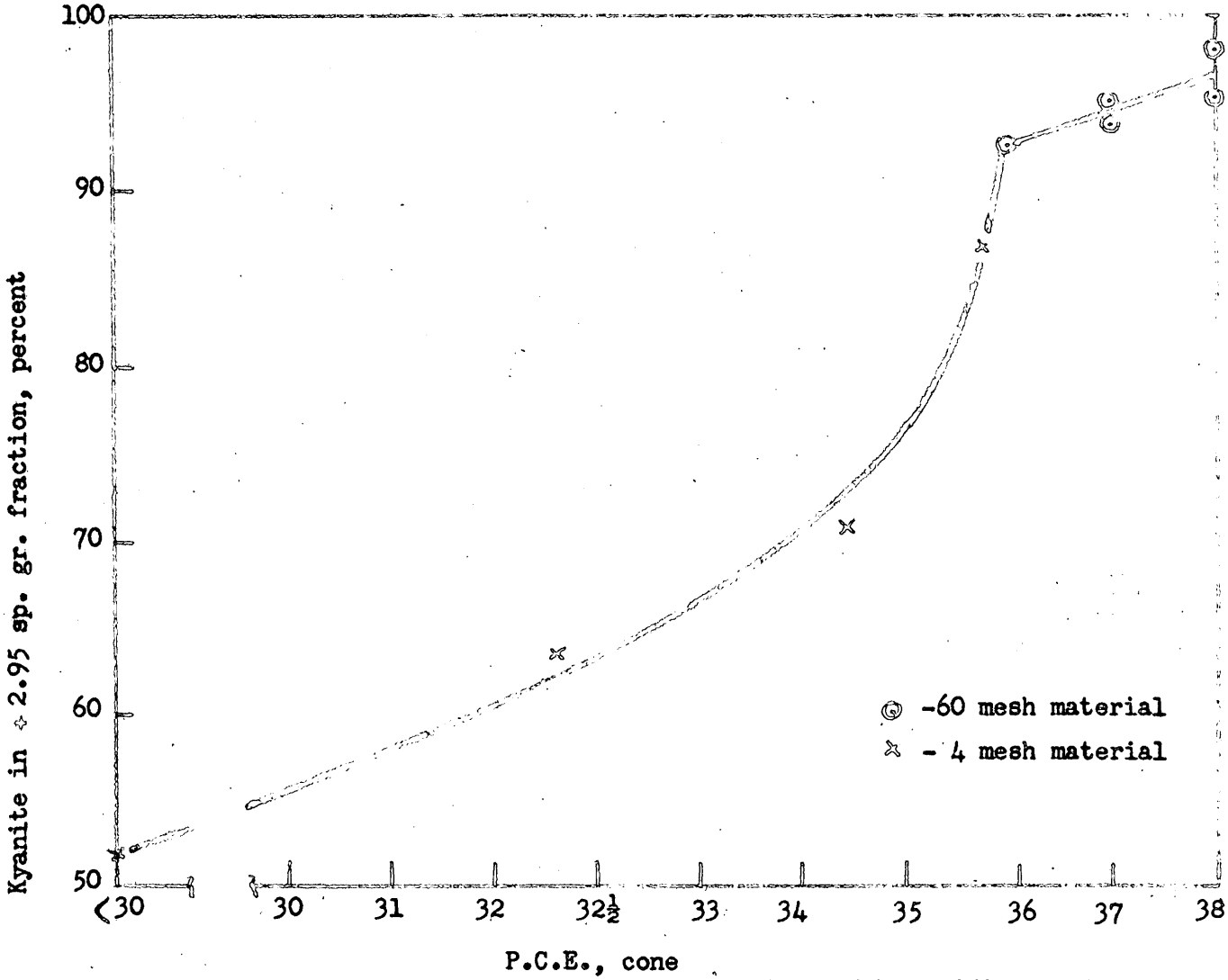

Figure 1.- P.C.E. value vs. kyanite content of plus 2.95 specific gravity fractions of samples from the Kyanite No. 1 Mine, Albany County, Wyoming.

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.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

ELECTROTECHNICAL LABORATORY

P.O. Box 217
Norris, Tennessee

14 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 kyanite, or other mullite-forming minerals.

Dear Mr. King;

Attention: Mr. Truman H. Kuhn

Your request for our methods of determining strategic values of kyanite was forwarded by Mr. C. O. Mittendorf, Acting Administrator, Defense Minerals Administration, Washington, D. C. The methods employed may vary somewhat from sample to sample depending upon the size of sample and the information desired for certain uses or agencies. However, final evaluation of any mullite or mullite-forming material considered for federal stockpiling must pass the National Stockpile Material Purchase Specifications, P-27, 23 August 1951, "Kyanite, Mullite, and Mullite-type Refractories".

This specification gives the criteria for testing mullite and mullite-forming materials, both natural, calcined, and synthetic. These criteria include pyrometric cone equivalent values, somewhat similar to fusions, chemical analysis, screen size, and methods of testing. One important requirement is that any material from a new source must be made into brick and the brick pass certain standard specifications. This latter test requires a minimum of 400 pounds of concentrate or of the material that is to be actually submitted for stockpiling. We prefer to have more than the 400 pounds if available. In some cases, for natural materials this might be as mined, but in general this would apply to concentrates if up-grading was required.

The P-27 specifications are closely followed for samples of materials to be or being stockpiled. However, we do not follow the complete procedure or all the tests required by this specification for exploratory purposes and indicative values for small samples. Our "screening" evaluation procedure follows.

I. The as-received sample, or specimen, is examined megascopically noting such properties as color, apparent hardness, uniformity, and size of material.

II. A representative sample of about 200 grams is taken by usual quartering procedures and stage-crushed to pass 60-mesh. Primary crushing may be necessary to obtain a sample.

III. This minus 60-mesh material is quartered to obtain a 50-gram sample, which is split into two 25-gram samples. These smaller samples are used to make sink-and-float tests using the proper heavy liquid and a centrifuge. The heavy liquid usually used for kyanite is s-tetrabromoethane, density of 2.95.

IV. The mineralogical content of the sink material is determined by petrographic examination. The float material is examined, but accurate determinations are usually not made of this fraction.

If the float 2.95 fraction contains more than one percent kyanite 1/, an additional separation or cleaning operation is made to determine whether the kyanite is free or locked with the gangue minerals. If the sink 2.95 material is badly contaminated, additional specific gravity separations are made using the same and/or other media to obtain as pure a "concentrate" as possible.

If petrographic examinations reveal an appreciable portion of the total kyanite available is still "locked" in the minus 60-mesh material, crushing to a finer size is tried.

V. P.C.E. values are determined for the concentrate (sink 2.95) and in some instances also for the as-received and/or the float materials. In all cases the tests are made using minus 60-mesh material. Of course, if the sample was finer than minus 60-mesh, that would be used. The standard specifications for making test cones require minus 60-mesh material. In some cases finer material such as minus 200-mesh may have a lower P.C.E. because of faster pyrochemical reactivity.

VI. Conclusions from tests. If the P.C.E. value meets the minimum requirement, cone 37 (about 1820°) for natural or calcined (mullite) material, the sample or concentrate obtained therefrom might be acceptable for stockpile purposes. It must be emphasized again that final evaluations are based upon brick tests.

General Comments. We usually do not make chemical analyses of small samples unless requested to do so by another government agency. Experience has shown that the PCE tests combined with petrographic examinations are satisfactory for "screening" or preliminary evaluation purposes.

At times, if sufficient material is available, we make calcination tests to determine strength of grain.

1/ The term kyanite is used to designate all members of the sillimanite group.

Grain size is important because of the ultimate use of the material in refractories. Fine-grained material is usually undesirable because of manufacturing difficulties. However, finer-grained materials than those being stockpiled are being used in industry for manufacturing such items as thin-walled furnace muffles, thermocouple tubes, etc. Fine-grained concentrates may be nodulized to meet the requirements for the P-27 specifications. One method would be by calcining the material to sufficiently high temperature to coalesce the grains. Such calcined material would probably be mullite (plus silica) rather than kyanite.

Yours very truly,

/s/ Kenneth G. Skinner

Kenneth G. Skinner
Chief, Ceramics Branch.

P-27
23 August 1951
(Supersedes issue of
10 August 1950 —
Kyanite)

NATIONAL STOCKPILE
MATERIAL PURCHASE SPECIFICATIONS

KYANITE, MULLITE, AND MULLITE-TYPE REFRACTORIES

1. DESCRIPTION

These specifications cover: (1) raw materials for the manufacture of mullite-type refractories such as kyanite, sillimanite, topaz, andalusite and similar high aluminum crystalline silicates of a suitable quality, and (2) refractory grade mullite produced from any suitable materials.

2. QUALITY REQUIREMENTS

Each lot of ore or concentrates in the natural or calcined (mullite) condition purchased under these specifications shall conform to one of the analyses listed below for Type A, B, or C. Synthetic mullite shall conform to one of the analyses listed below for Type D or E.

a. Chemical Analysis:

		Weight Percent 1/				
		A	B	C	D	E
Alumina (Al_2O_3)	Minimum	59.00	60.00	59.00	74.00	71.00
Alumina (Al_2O_3)	Maximum	—	—	—	80.00	80.00
Silica (SiO_2)	Maximum	39.00	37.50	38.00	25.00	28.00
Silica (SiO_2)	Minimum	—	—	—	18.00	16.00
Iron Oxide (Fe_2O_3)	Maximum	0.75	1.50	1.25	0.35	1.50
Titania (TiO_2)	Maximum	1.25	2.00	2.00) —	0.25	3.00
CaO + MgO	Maximum	0.20	0.20	0.20)		0.30
Na_2O + K_2O	Maximum	0.20	0.20	0.50	0.50	0.50
Total Flux	Maximum	2.00	3.50	3.50	—	5.00

1/ Ignited at 1000° C for one hour.

b. Pyrometric Cone Equivalent:

Each lot shall have its pyrometric cone equivalent determined by latest revision of A.S.T.M. procedure, C 24-46, Pyrometric Cone Equivalent (P.C.E.) of Refractory Materials, or by alternate methods approved by the Government, and the P.C.E. shall be as follows for the five types:

Type	A	B	C	D	E
Cone No.	37	37	37	38	38

c. Physical Requirements:

(1) Topaz: Topaz shall be delivered in the calcined state only.

(2) Lump material: natural, calcined, and synthetic

Each lot of lump material, as loaded into railroad cars in the United States, shall contain no lumps too large for one man to handle conveniently; not more than 10 percent by weight shall pass a one-half inch screen; not more than 1 percent by weight shall pass a No. 60 U.S. Standard Screen.

(3) Fine material: natural and calcined (not applicable to synthetic Types D and E)

Each lot of ore or concentrates in the natural or calcined (mullite) condition, as loaded into railroad cars in the United States, shall contain not more than 60 percent by weight which shall pass a No. 16 U. S. Standard Screen; not more than 5 percent by weight shall be retained on a one-half screen.

(4) Crushing characteristics after calcination: (not applicable to synthetic Types D and E)

A sample from each lot after being calcined shall be crushed and screened as required by Inspection Section 3-c-(2), and shall contain not more than 60 percent by weight which shall pass a No. 16 U. S. Standard Screen and not more than 20 percent by weight which shall pass a No. 100 U. S. Standard Screen. The grains of the calcined refractory shall be strong and suitable for the manufacture of refractory brick and special shapes. These refractory products shall pass the tests required by Inspection Section 3-a-(1).

3. PACKAGING AND MARKING

a. Packaging

(1) Natural ore shall be delivered in bulk.

(2) Mullite and fines shall be delivered in bags of any type or size customary with the trade. All bags comprising a lot shall be of the same nominal size.

b. Marking

(1) Positive identification of any lot of material shall be shown on documents accompanying shipment. Such information shall include product name, origin, Government contract number, type of material, and cross reference to bag markings in the case of mullite and fines.

4. INSPECTION

All refractories purchased under these specifications shall be subject to inspection by the Government or its designee.

a. (1) Each refractory material from a new source shall pass a preliminary test consisting of the manufacture of standard 9-inch straight brick. These sample brick shall be tested by a laboratory equipped for and experienced in making preheat and spalling tests in accordance with latest revision of Navy Specification 32B2, Brick, Fire-Clay, Grades A and B, except that during the thermo spalling test the method of the cooling cycles shall be in accordance with latest revision of A.S.T.M. procedure, C 123-47, Panel Spalling Test for Super Duty Fireclay Brick.

(2) At the discretion of the Government or its designee, any shipment of material during the fulfillment of a contract is subject to testing (as determined by examination with petrographic microscope) necessary to assure the maintenance of grade including, in the case of kyanite and allied aluminum silicates, completeness of mullitization.

b. Chemical analysis shall be made by a laboratory experienced in the analyses of high aluminum silicate materials and according to latest revision of A.S.T.M. procedure for Chemical Analysis of Refractory Materials, C 18-45, or by alternate methods approved by the Government or its designee and the contractor. For the purpose of these specifications the A.S.T.M. procedure for Chemical Analysis or Refractory Materials, C 18-45, shall be modified as follows:

(1) Samples for chemical analysis and pyrometric cone equivalent tests shall be magnetically cleaned to remove tramp iron introduced during the crushing operations.

(2) The fine grinding for chemical analysis shall be done with mullite, corundum, boron carbide or other non-contaminating mortars and pestles rather than with an agate mortar.

c. Sampling: A sample of each lot of material delivered under these specifications shall be obtained by the Government or its designee by sampling procedures acceptable to the Government and the contractor. Conformity of raw uncalcined high aluminum silicates or of mullite, both lump and fines, with Quality Requirements Section 2-c-(4) shall be determined by the following procedure:

(1) The sample, in the case of raw uncalcined high aluminum silicates, shall be calcined to a maximum of 1500° ± 10° C and held for two hours at that temperature, then cooled in the furnace.

(2) The calcined samples and/or the as-received samples of mullite shall be dried 12 hours at 120° C and then crushed by the following procedure:

(a) One pass through a jaw crusher with 3/4-inch spacing. Screen through 4-mesh.

(b) Crush the plus-4-mesh material by three successive passes through a laboratory-sized, Sturtevant, spring roll crusher set at 3/8-inch spacing. After each pass, the material is screened to remove the minus-4-mesh fines.

(c) Any remaining plus-4-mesh material is again put through the roll crusher, reset for 1/8-inch spacing. Successive passes, followed by screening, shall be used to crush all the material to pass 4-mesh.

(3) All portions of the crushed sample are to be collected and reduced by sampling methods approved by the Government or its designee and the contractor, to give a sample of approximately 200 grams for screen analysis.

(a) The screen analysis sample is agitated for thirty minutes in a Rotap-type shaker on 16-mesh and 100-mesh U. S. Standard Screens, then weighed to determine the total percentages passing 16-mesh and passing 100-mesh. The plus-16-mesh and the minus-16-plus-100-mesh material is then replaced on the respective screens and agitated for an additional ten minutes. The total percentages passing 16-mesh and 100-mesh shall again be determined. Successive ten-minute periods of screening and agitation shall be continued until the total change in the amount passing either 16-mesh or 100-mesh is less than 1 percent of the total sample weight.

(b) The result of the test is reported as the total percentages passing 16-mesh and passing 100-mesh at the time preceding the final ten-minute period of agitation.

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

600

July 15, 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

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 Morris, 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 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,

/s/ George C. Selfridge

Acting Chairman, Operating Committee
Defense Minerals Exploration
Administration

Approved:

/s/ J. H. Hedges

Member, Bureau of Mines

/s/ T. P. Thayer
Member, Geological Survey

Enclosure

FILE COPY
SURNAME:

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

Houk
Vitt

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
Garment 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
(HB)

Chairman, Operating Committee
Defense Minerals Exploration
Administration

F.E.J. 8-14-52

Approved:

C. H. Johnson (HB)
Member, Bureau of Mines

D. M. Lemmon (HB)
Member, Geological Survey

Enclosure

LGHouk:gad 8/12/52

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

FILE COPY
SURNAME:

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

AUG 14 1952

Houk
Houston
F.G. Johnson

Mr. Hewitt Wilson
Regional Director, Region VII
U. S. Bureau of Mines
P. O. Box 217
Morris, 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 (for) JN 8-14-52

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. Norton, G-232 GSA Bldg.
Mr. Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
COLLEGE PARK, MARYLAND

August 8, 1952

Mr. C. O. Mittendorf
Acting Administrator, DMEA
Department of the Interior
Washington 25, D. C.

Dear Mr. Mittendorf:

This is in reply to your letter of July 11, 1952, (re: Docket No. DMEA-2549-Kyanite, Earnest Vanderhoff, Agent, Kyanite No. 1 Mine, Albany County, Wyoming), requesting the evaluation of six samples of kyanite.

These samples are composed essentially of biotite mica, kyanite and quartz.

Sample No.	Size at which kyanite is unlocked from gangue	Estimated % kyanite
1	35 mesh	10
2	35 "	5
3	16 "	9
4	16 "	2
5	10 "	27
6	10 "	8

At your request, the pulps of these samples are being returned herewith.

Very truly yours,

J. G. Conley, for
P. M. AMBROSE, Chief
Minerals Technology Division
Region VIII

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
AUG 11 1952

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION

WASHINGTON 25, D. C.

Building 25, Denver Federal Center
Denver, Colorado

AUG 11 1952

August 7, 1952

Memorandum

To: George C. Selfridge, Acting Chairman, Operating Committee, Defense Minerals Exploration Administration, Washington 25, D. C.

From: Truman H. Kuhn, Geologist, Mineral Deposits Branch, U. S. Geological Survey, Building 25, Denver Federal Center, Denver, Colorado

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

Thank you for your letter of July 15, 1952, in which you acknowledge receipt of 7 specimens and discuss evaluation of strategic kyanite.

As pointed out in my June 26, 1952, letter, this kyanite-bearing lens is relatively large and as can be seen from the samples submitted, several varieties of kyanite-bearing schist are present in the lens. It is probable that the varieties could be mined selectively.

When the Vanderhoff property was examined, the variations were noted and the samples were carefully selected to be representative of the several varieties. A portion of each sample was retained in Denver with the hope that the different varieties would be evaluated separately and that such information could be used by field examiners on subsequent examinations. On a property such as this, where no exploration or development work has been done, it is not possible to thoroughly sample the deposit, and the examiner must select his samples from the limited surface exposures. That was done on this examination and the samples represent as accurately as possible the types of kyanite-bearing rock exposed in this schist lens.

For guidance in this and other possible DMEA kyanite examinations, could you please clarify the method of determining the strategic quality of kyanite? In DMEA Memorandum No. 6, dated May 27, 1952, the Field Team is asked to send samples to Washington for determination and it is indicated that several pieces would be sufficient for the determination. In your letter you state that the simple evaluation test should be completed in the Regional Laboratory and infer that samples in the magnitude of 100 pounds are necessary.

If the kyanite is of no strategic value, I will recommend that this application for a DMEA loan be denied. However, if it is thought that the kyanite is of strategic quality and the relative value of the different varieties are known, a more thorough appraisal will be made. The work proposed by the applicant must be completed before the deposit can be sampled carefully and thoroughly.

A knowledge of the strategic quality of the kyanite is necessary before an appraisal of the proposed preliminary exploration program can be made. The grade of ore and its amenability to concentration is of secondary importance at this stage of the examination.

Your statement that the asbestos is of no strategic value is very helpful and Mr. Vanderhoff will be advised. A simple evaluation of the 6 kyanite samples also would be very helpful as well as the determination of acceptability for stockpiling.

Truman H. Kuhn

FILE COPY
SURNAME:

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

JUL 15 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

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 Morris, 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.

FILE COPY
SURNAME:

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

John Selfridge

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,

CC 7/15

George C. Selfridge

(JHB)

ACTING Chairman, Operating Committee
Defense Minerals Exploration
Administration

Approved:

J. H. Hedges (JHB)

Member, Bureau of Mines

T. P. Thayer (JHB)

Member, Geological Survey

Enclosure

LGHouk:gad 7/10/52

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

FILE COPY
SURNAME:

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

JUL 11 1952

Houk
H E Johnson

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.

Encl

Sincerely yours,

C. O. Mittendorf (fw) 7/11/52

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
GEOLOGICAL SURVEY
Building 25
Denver Federal Center
Denver, Colorado

June 26, 1952

Defense Minerals Exploration Administration
Non-Metallic Minerals Division
Washington 25, D.C.

Dear Sirs:

In the accompanying package are 6 specimens of kyanite-bearing rock (K-1, K-2, K-3, K-4, K-5, and K-6) and one specimen of asbestos (K-7) for determination of their strategic quality. All specimens are from section 35, T.24N., R.71W., Albany County, Wyoming.

The kyanite-bearing lens in the pre-Cambrian complex has an outcrop length of approximately 600 feet, a width varying from a few feet up to 35 feet and averaging about 15 feet, and an exposed vertical extent of at least 100 feet. Earnest Vanderhoff, Agent, has applied for Government assistance in exploration work (Docket DMEA-2549) estimated to cost $9,544.50.

The asbestos specimen was collected from a pit near the kyanite deposit and is not included in this loan application. However, the applicant may apply for help to explore the asbestos deposit.

Sincerely yours,

Truman H. Kuhn

Truman H. Kuhn

Samples rec'd 6-30-52

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUN 30 1952

FILE COPY
SURNAME:

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

Hank
Muttenkopf

JAN 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 Vanderhoff
Albany County, Wyoming

Dear Mr. King:

Reference is made to the subject application for exploration assistance on the Kyanite No. 1 Claim, Albany County, Wyoming, and to the report of Kenneth G. Skinner on evaluation of six samples of kyanite submitted for evaluation tests.

It is noted at the bottom of page 2, next to the last sentence in Mr. Skinner's report, "however, domestic kyanites produce 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 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.

Reference is made to your letter of December 4, 1952;

the charges for preliminary ceramic testing of the concentrates may be borne by the AEC 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 (JHB)

Chairman, Operating Committee

Approved:

J. H. Hedges (JHB)

Member, Bureau of Mines

A. R. Kinkel, Jr. (JHB)

Member, Geological Survey

J.N. 1-2-53

LGH,uk:gad 12/30/52

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

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

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

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

Not To Be Filled in by Applicant

Docket No. DMEA-2549
Metal or Mineral
Date Received 5-26-52
Amount $
Participation (Government %)

Name and address of applicant

A partnership consisting of:
Durfan O. Thorpe,
4793 Claude Court, Denver, Colo.;
Robert H. Daugherty,
1501 South Decatur, Denver, Colo.; and
Earnest Vanderhoff, who is the authorized agent of the partnership,
234 South Knox Court, Denver, Colo.

Date May 13, 1952

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

DMA Docket Number (if available) .....

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 26 1952

INSTRUCTIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

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

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

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

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

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

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

CERTIFICATION

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

(Name of company)	By (Signature of authorized official)
	Earnest Vanderhoff, Authorized agent of the partnership.
May 13, 1952 (Date)	(Title)

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

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SUPPLEMENT TO FORM MF-103

1. (a) The Kyanite No. 1 mining claim. It is 1,500 feet long and 600 feet wide, running easterly and westerly on a large dike showing kyanite crystals, massive, with vermiculite. The dike is about 35 feet wide and runs the length of this claim, east to west. There are no mines or openings other than the discovery cut.

   (b) Owners under location rights.

   (c) The exploration is to be conducted on the Kyanite No. 1 mining claim, situated in Albany County, Wyo., Section 35, Township 24, Range 71, about 1-1/4 miles northerly of the forks of Grizzly and Duck Creeks. The claim is 1,500 feet long and 600 feet wide, running easterly and westerly on a large dike of kyanite and vermiculite:

   Starting at discovery monument, go 300 feet northerly to north side line, thence 1,000 feet easterly to northeast corner, thence 600 feet southerly to southeast corner, thence 1,500 feet westerly to southwest corner, thence 600 feet northerly to northwest corner, thence 500 feet easterly, thence 300 feet southerly to discovery monument, the starting point.

   NOTE:
   (1) Area described above is the same on which exploration work is proposed.
   (2) We are the owners. There are no loans, liens, or encumbrances against the property.

2. (a) Kyanite.

   (b) We do not have a geologic or engineering report, or assay maps showing width and grade. The geology and mineralization of the area are right, if explored, to find commercial ore body of kyanite.

3. (a) We want to explore the dike with four open cuts across it, each one to be about 100 feet long and about 9 feet wide, to clear bulldozer safely, and 15 feet deep or deeper if safe and practical. We figure about 500 cubic yards to be moved out of each cut. A road of about 3,000 feet is to be put in with a bulldozer, the distance from the road to the kyanite claim.

   The total cost of the project, including equipment, materials and supplies, and labor, is estimated to be $9,544.50.

SUPPLEMENT TO FORM MF-103 (continued)

3. (b) Start work within 30 days after date of approval of application by the Government. Four months' working time will complete the project, unless prevented by casualty, Government regulations, acts of God, or any other circumstances beyond owners' control.

4. Location of the proposed work is shown on the attached sketch map.

5. None.

6. One frame building, size 14 by 20 feet.
Cost of material only $ 450.00

7. Operating equipment:

(a) To be rented

Bulldozer, 280 hours at $7.50 per hour, includes operator, upkeep, and operating supplies	$2,100.00
1 105 c.f.m. air compressor at $165.00 per month, 4 months	660.00
1 Jackhammer at $55.00 per month, 4 months	220.00
200 feet of 1-inch air hose at $40.00 per month, 4 months	160.00

(b) To be purchased

None.

(c) To be furnished by operator

Hand tools on hand, at no charge to project_____

Estimated cost of operating equipment 3,140.00

8. Labor and supervisor:

1 Mucker at $1.50 per hour, 48-hour week, for 4 months	$1,248.00
1 Miner at $1.75 per hour, 48-hour week, for 4 months	1,456.00
1 Working supervisor at $1.75 per hour, 48-hour week, for 4 months	1,456.00

Estimated cost of labor and supervisor, including overtime, insurance, and payroll tax 4,160.00

SUPPLEMENT TO FORM MF-103 (continued)

9. Supplies and material: (exclusive of building materials)

Gas for air compressor for 4 months	$ 500.00	
Oil for compressor and motor and jackhammer for 4 months	50.00	
Drill steel and bits	200.00	
Bit sharpening	140.00	
Explosives, 1,500 pounds powder, with necessary fuse and caps	450.00	
Estimated cost of supplies and material (exclusive of building materials)		$1,340.00
Contingencies (5 percent of above costs)		454.50
Total amount of loan requested		$9,544.50

10. (a) We are prepared to invest $954.45.

(b) Yes.

11. Nothing that we are aware of.

Earnest Vanderhoff
234 South Knox Court
Denver, Colorado

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA

FOR USE UNDER THE

DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2549

Date received 5-26-52

A partnership consisting of:
Durfan O. Thorpe,
4793 Claude Court, Denver, Colo.;
Robert H. Daugherty,
1501 South Decatur, Denver, Colo.; and
Earnest Vanderhoff, who is the authorized
agent of the partnership,
234 South Knox Court, Denver, Colo.

Name and address of applicant

Date May 13, 1952

INSTRUCTIONS

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

GENERAL TECHNICAL DATA

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

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

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 26 1952

3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production None.

   If not in production or operation, estimated date when production will begin subject to discovery.
6. Experience of operators:

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

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

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
PARTNERS:							
Earnest Vanderhoff 234 South Knox Court, Denver, Colorado							
Durfan O. Thorpe 4793 Claude Court Denver, Colorado							
Robert H. Daugherty 1501 South Decatur Denver, Colorado							
	Total		x x x x x			x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues: None.

For Corporate Applicants

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

*Indicate period covered.

10. Production: None.

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

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

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

SUPPLEMENT TO FORM MF-100

1. None. New location.

   (a) Kyanite.
   (b) None.

2. Kyanite No. 1.

   (a) None.
   (b) None.
   (c) None.
   (d) Discovery cut.

3. (a) Twenty-two miles west and south of Wheatland, Wyo.
   (b) New, no name.
   (c) Township 24, Section 35, Range 71.
   (d) Albany County, Wyo.

4. (a) No. New location.
   (b) Owner.

5. None. Subject to discovery.

6. I have had 32 years of experience in prospecting and exploration and development work, including open pit and underground mining. I am the applicant and will manage the project.

7. No previous exploration or development. New location.

   (a) None. New location.
   (b) None. New district.
   (c) No knowledge of any.

8. See Form MF-100.

9. None.

10. None.

11. New location. Undeveloped.

12. Undeveloped.

    (a) A long, wide dike of kyanite and vermiculite, kyanite crystals showing massive. The dike is exposed on surface about 600 feet long and about 35 feet wide. To the best of my knowledge, there is no available report on geology and ore reserves. This is a new, undeveloped location.
    (b) New location. Undeveloped.

(*b*) If deposit is other than placer:

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

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

TOTAL ORE OR MINERAL RESERVES

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

(*c*) If placer:

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

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

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

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

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

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

13. Access Roads:

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

14. Water Supply:

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

15. Power:

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

16. Labor:

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

17. Equipment and Facilities:

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

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

CERTIFICATION

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

(Name of company)

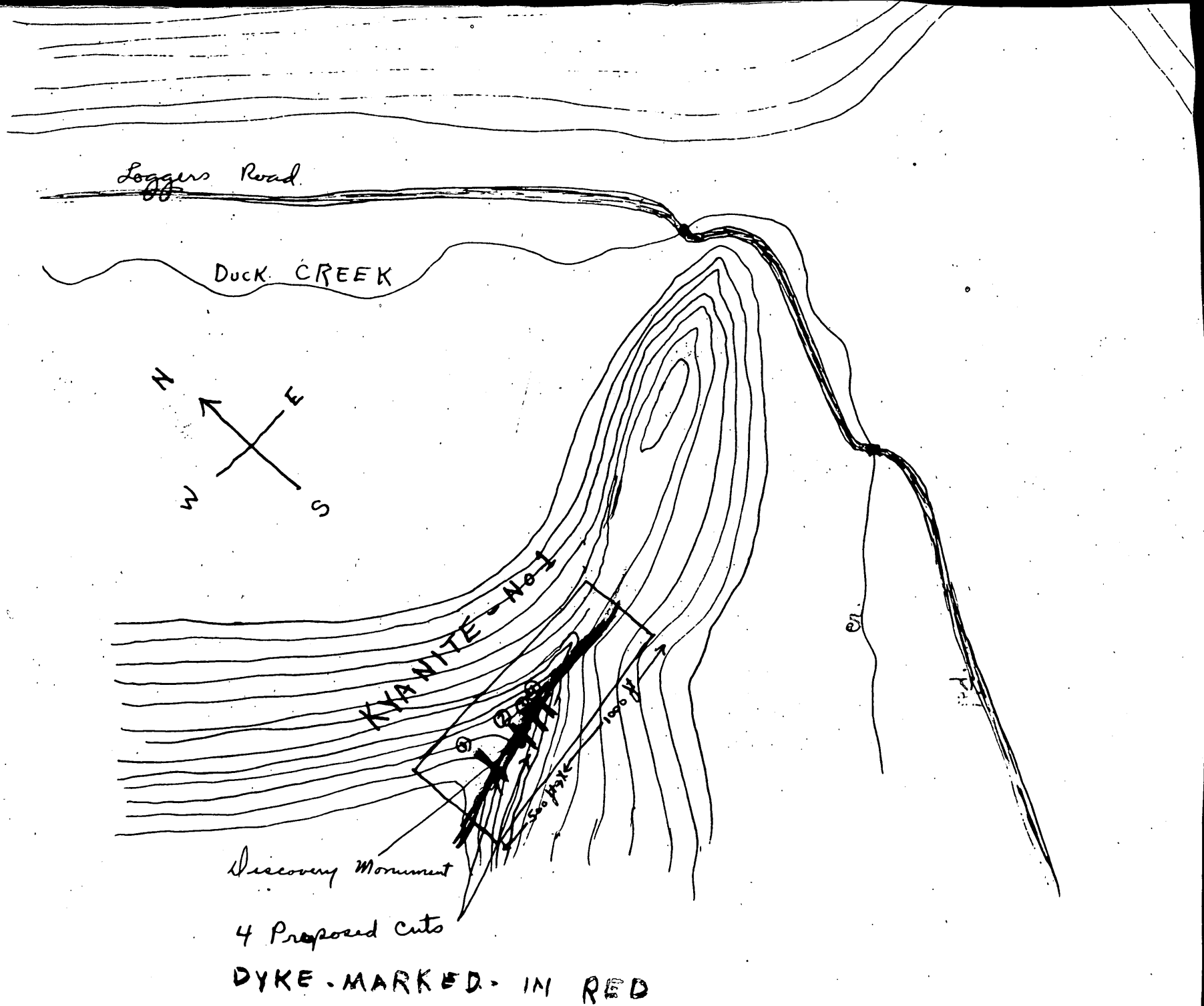
By _____
(Signature of authorized official)

May 13, 1952
(Date)

Earnest Vanderhoff,
Authorized agent of the partnership.
(Title)

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

U. S. GOVERNMENT PRINTING OFFICE 16—63792-1


Loggers Road
DUCK CREEK
N
E
W
S
KYANITE - No 1
100 ft
50 ft
Discovery Monument
4 Proposed Cuts
DYKE - MARKED - IN RED