

A-187

GRACE

Davison Chemical Division

W. R. Grace & Co.
P.O. Box 2117
Baltimore, Maryland 21203

(301) 659-9000
Direct Dial (301) 659-9093

December 8, 1981

United States Nuclear
Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

Attn: Ms. Myu A. Campbell

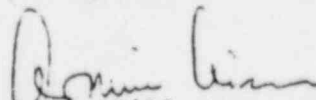
Dear Ms. Campbell,

Enclosed are copies of the AEC contracts that we have found in our files. Please note that these contracts (AT-30-1-1037 dated November 2, 1950 and AT-49-6-993 dated July 18, 1955) are the only ones that we could find. The contract mentioned in earlier correspondence, dated May 26, 1948, is not in our possession. We have only found references to it in general correspondence.

We would also like to call your particular attention to the contractual language of Article 17, pages 15 and 16 providing that all monazite and all derivatives are, and shall at all times be, the property of the U.S. Government. This language has caused DOE to assume responsibility under this very contract for thorium waste at our Curtis Bay, Maryland plant.

We hope that the enclosed will be helpful to your study of the situation at Pompton Plains. Mr. Vierzba of Aerospace Corp. has obtained copies of all pertinent information in our files in his visit today for his report to the DOE.

Sincerely,



Armin Wille

Sr. Facilities Engineer

AW/cm

Enclosures

This document consists of 6 pages
No. 3 of 12 copies, Series A.

CONTRACT NO. AT(30-1)-1037

CONTRACT

CONTRACTOR AND ADDRESS:

RARE EARTHS, INC.
Paterson R. D. #1, New Jersey

CONTRACT FOR:

PURCHASE OF MATERIALS

ESTIMATED CONTRACT PRICE:

\$22,500.00

PAYMENT: To be made by:

Division of Disbursement, United
States Treasury Department, New
York, New York. Submit invoices to:
United States Atomic Energy Commission,
P. O. Box 30, Ansonia Station,
New York 23, New York

End!

THIS CONTRACT, entered into this 2nd day of November, 1950, effective as of the 1st day of July, 1950, by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), as represented by the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter referred to as the "Commission") and RARE EARTHS, INC., a corporation organized and existing under the laws of the State of New Jersey, with its principal place of business in Paterson, R. D. #1, State of New Jersey, (hereinafter referred to as the "Contractor");

WITNESSETH THAT:

WHEREAS the Commission desires to purchase, and the Contractor to sell, thorium oxide in the form of thorium fluoride sludge; and

WHEREAS, this contract is authorized by and executed under the Atomic Energy Act of 1946, in the interest of the common defense and security,

NOW, THEREFORE, the parties hereto do mutually agree as follows:

ARTICLE I - SCOPE OF THE WORK

1. The Government agrees to purchase up to 18,000 pounds of thorium oxide in the form of thorium fluoride sludge conforming to the specifications set forth in Article II of this contract, produced and delivered by the Contractor during the period from July 1, 1950 to and including June 30, 1951, at the unit price of One Dollar and Twenty-Five Cents (\$1.25) per pound of contained thorium oxide.

2. In consideration of the Government's agreement to buy, the Contractor agrees to sell any or all of such thorium oxide in such form at the unit price of One Dollar and Twenty-Five Cents (\$1.25) per pound of contained thorium oxide.

3. After delivery, the Government, through the Commission, will perform all weighing, sampling and assaying at its expense. The Contractor agrees to abide by the findings of the Government resulting from such weighing, sampling and assaying.

ARTICLE II - SPECIFICATIONS

The sludge delivered hereunder shall contain not less than fifty percent (50%) thorium oxide on a dry basis and not more than ten percent (10%) water; provided, however, that in the event that any lot or lots do not meet such specifications, the Commission may, in its discretion, accept such lot or lots at any appropriate reduction in the price as may be agreed upon by the parties. The Contractor shall endeavor in good faith, but shall not be so obligated, to increase the thorium oxide content of the sludge to 55%-60% and to decrease the water content thereof to five percent (5%) or less.

ARTICLE III - DELIVERY AND SHIPMENT

1. The thorium fluoride sludge shall be packed in plywood drums supplied by the Contractor. Each drum shall contain approximately 275 pounds of material. The drums shall be tarred on the outside. The cost of such drums is included in the unit prices set forth in Article I.

2. Delivery of the material shall be f.o.b., Contractor's Plant, Black Oak Ridge Road, Route No. 202, Wayne Township, Passaic County, New Jersey, during the period July 1, 1950 to June 30, 1951. Shipments shall be made by the Contractor as the Commission directs.

ARTICLE IV - PAYMENTS

The Contractor shall be paid upon submission of properly certified invoices or vouchers, or such other evidence as the Commission may request.

- (a) An amount equivalent to eighty percent (80%) of the price stipulated in Article I hereof, based upon the Contractor's statement of the reported net dry weight and assay of the thorium oxide so delivered.
- (b) The balance of any monies due and owing to the Contractor will be paid upon completion of the weighing, sampling and assaying of the thorium oxide by the Commission as provided in paragraph 3 of Article I of this contract. Any excess in payments to the Contractor shall be refunded to the Government, or in the discretion of the Commission, deducted from the amounts due or owing to the Contractor.

ARTICLE V - CHANGES

At any time, the Commission may, by written order, issue additional instructions, change the requirements as to shipping and packaging, and change the specification or composition of the material to be delivered in the performance of this contract. If such changes cause a material increase or decrease in the amount or character of the work, in the amount due the Contractor, or in the time required for the performance of this contract, an equitable adjustment shall be made and the contract shall be modified in writing accordingly. Any claim for adjustment under this Article must be asserted by the Contractor within ten (10) days from the date the change is ordered; provided, however, that the Commission may receive, consider and adjust any such claim at any time prior to the date of final settlement of this contract. A failure to agree mutually upon the adjustment to be made under this Article V shall constitute a dispute to be decided in accordance with Article VIII of this contract.

ARTICLE VI - NOTICE OF SHIPMENTS

In effecting deliveries under this contract by common carrier, the Contractor shall give the Commission prepaid notice of all shipments.

ARTICLE VII - ASSIGNMENT OR TRANSFER

Neither this contract nor any interest or claim relating to this contract, shall be assigned or transferred, except with the prior approval of the Commission in writing.

ARTICLE VIII - DISPUTES

Except as otherwise specifically provided in this contract, all disputes which may arise under this contract, and which are not disposed of by mutual agreement, shall be decided by a representative of the Commission duly authorized to supervise and administer performance of the work under this contract, who shall reduce his decision to writing and mail a copy thereof to the Contractor. Said decision shall be final and conclusive subject to the right of the Contractor to appeal as provided for in the sentence next following. Within thirty (30) days from receipt of such notice, the Contractor may appeal in writing to the Commission, whose written decision or that of its other designated representative or representatives or board shall be final and conclusive. Pending decision of any dispute, the Contractor shall diligently proceed with the performance of the work under this contract.

ARTICLE IX - DISCLOSURE OF INFORMATION

1. It is understood that disclosure of information relating to the work contracted for hereunder to any person not entitled to receive it, or failure to safeguard all top secret, secret, confidential and restricted matter that may come to the Contractor or any person under its control in connection with the work under this contract, may subject the Contractor, its agents, employees, and subcontractors to criminal liability under the laws of the United States. See the Atomic Energy Act of 1946 (Public Law 585 - 79th Congress). See also the provisions of an Act approved June 25, 1948, effective September 1, 1948, set forth in 18 U.S.C. 791-797; 18 U.S.C. 5, 11, 2388 and 3241; 50 U.S.C. 40 and 42.

2. The Contractor agrees to conform to all security regulations and requirements of the Atomic Energy Commission. Except as the Commission may authorize, in accordance with the provisions of the Atomic Energy Act of 1946, the Contractor agrees not to permit any individual to have access to restricted data until the Federal Bureau of Investigation shall have made an investigation and report to the Commission on the character, associations, and loyalty of such individual and the Commission shall have determined that permitting such person to have access to restricted data will not endanger the common defense or security. The term "restricted data" as used in this paragraph means all data concerning the manufacture or utilization of atomic weapons, the production of fissionable material, or the use of fissionable material in the production of power, but shall not include any data which the Commission from time to time determines may be published without adversely affecting the common defense and security.

3. The Contractor shall insert in all subcontracts under this contract, provisions similar to the text of this Article.

ARTICLE X - INSPECTION AND REPORTS

1. The Commission shall have the right to inspect in such manner and at such times as it deems appropriate all activities of the Contractor arising in the course of the work under this contract.

2. The Contractor shall make such reports to the Commission with respect to the Contractor's activities under this contract as the Commission may require from time to time.

ARTICLE XI - RESPONSIBILITY FOR SUPPLIES TENDERED

The Contractor shall be responsible for all materials covered by this contract until delivery to, and acceptance by, the Commission. The Contractor shall bear all risk with respect to such materials which have been rejected by the Commission.

ARTICLE XII - SUBCONTRACTS

The Contractor shall not subcontract any part of the work it is obligated to perform under this contract except as authorized in writing by the Commission; provided, however, that the word "subcontract", as used in this Article, shall not be deemed to include (a) any purchase of a standard commercial or catalog item, or (b) any purchase of a basic raw material, or (c) any purchase of supplies or services for the general operation of the Contractor's Plant.

ARTICLE XIII - COVENANT AGAINST CONTINGENT FEES

The Contractor warrants that it has not employed any person to solicit or secure this contract upon any agreement for a commission, percentage, brokerage, or contingent fee. Breach of this warranty shall give the Government the right to annul the contract, or, in its discretion, to deduct from the contract price or consideration the amount of such commission, percentage, brokerage, or contingent fee. This warranty shall not apply to commissions payable by contractors upon contracts or sales secured or made through bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business.

ARTICLE XIV - OFFICIALS NOT TO BENEFIT

No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

ARTICLE XV - EIGHT-HOUR LAW

To the extent that said law is applicable to this contract, the provisions of the Eight-Hour Law (Title 40, U. S. C. Secs. 324, 325, 325a, 326) shall apply hereto and they shall be deemed incorporated herein by reference.

ARTICLE XVI - DEFINITIONS

As used in this contract, the terms "United States Atomic Energy Commission", "Atomic Energy Commission" and "Commission" shall mean the United States Atomic Energy Commission or its duly authorized representative or representatives.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

Witnesses:

By: UNITED STATES ATOMIC ENERGY COMMISSION

Robert H. Moore
ROBERT H. MOORE
Washington, D.C.
(Address)

M. B. Fry
M. B. FRY
AUTHORIZED REPRESENTATIVE OF THE
U. S. ATOMIC ENERGY COMMISSION

Charles P. Metzger
CHARLES P. METZGER
51 Clifton Ave. Hampt. Jct.
(Address)

RARE EARTHS, INC.

By: Henry H. Mandel
Title: Pres.

I, Richard L. Stone, certify that I am the vice-president of the corporation named as Contractor herein; that Henry H. Mandel who signed this contract on behalf of the Contractor was then President of said corporation; that said contract was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of said corporation this 16 day of Nov., 1950.

(Corporate Seal)

Richard L. Stone

ENG. FILE

This document consists of 3 pages
No. 3 of 15 copies, Series A.

CONTRACT NO. AT(30-1)-1037, Amend. No. 1

AMENDMENT NO. 1

CONTRACTOR:	RAFE EARTHS, INC.
ADDRESS:	Paterson R. D. #1, New Jersey
AMENDMENT FOR:	EXTENSION OF CONTRACT TERM
INCREASE IN COMMISSION OBLIGATION:	\$30,000.00
NEW TOTAL CONTRACT PRICE:	\$52,500.00
PAYMENT TO BE MADE BY:	Division of Disbursement, United States Treasury Department, New York, New York. Submit invoices to: United States Atomic Energy Commission, P. O. Box 30, Ansonia Station, New York 23, New York

JUN 29 1951

Encl

THIS AMENDMENT, entered into as of the 18th day of June, 1951, by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), represented by the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter referred to as the "Commission"), and RARE EARTHS, INC. (hereinafter referred to as the "Contractor"),

WITNESSETH THAT:

WHEREAS, the Government and the Contractor entered into Contract No. AT(30-1)-1037 as of the 2nd day of November, 1950, for the purchase and sale of thorium oxide in the form of thorium fluoride sludge; and

WHEREAS, the Commission desires to purchase such material subsequent to June 30, 1951; and

WHEREAS, this Amendment is authorized by law, including the Atomic Energy Act of 1946;

NOW, THEREFORE, said Contract No. AT(30-1)-1037 is hereby amended, but only as follows:

1. Effective as of July 1, 1951, paragraph 1 of Article I, SCOPE OF THE WORK, is changed to read as follows:

"1. The Government agrees to purchase up to 18,000 pounds of thorium oxide in the form of thorium fluoride sludge conforming to the specifications set forth in Article II of this contract, produced and delivered by the Contractor during the period from July 1, 1950 to and including June 30, 1951, and up to 24,000 pounds of such material produced and delivered by the Contractor during the period from July 1, 1951 to and including June 30, 1952, at the unit price of One Dollar and Twenty-Five Cents (\$1.25) per pound of contained thorium oxide."

2. Substitute the date "June 30, 1952" for the date "June 30, 1951" appearing in paragraph 2 of Article III, captioned DELIVERY AND SHIPMENT.

IN WITNESS WHEREOF, the parties hereto have executed this Amendment as of the day and year first above written.

UNITED STATES OF AMERICA

By: UNITED STATES ATOMIC ENERGY COMMISSION

J. C. Clarke

J. C. Clarke
Authorized Representative of the
U. S. Atomic Energy Commission

Witnesses:

Richard L. Stone
Richard L. Stone
9 Bartholf Ave., Pompton
(Address) Lakes, NJ

Robert H. Moore
Robert Moore
126 Pine St.
(Address)
Pompton Lakes, N.J.

RARE EARTHS, INC.

By: Henry H. Mandle
Title: President

I, Richard M. Mandle, certify that I am the Ass't Sec'y of the corporation named as Contractor herein; that Henry H. Mandle who signed this amendment on behalf of the Contractor was then President of said corporation; that said amendment was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of said corporation.

(Corporate Seal)

Richard M Mandle
Richard M Mandle

This document consists of 3 pages
No. 2 of 11 copies, Series A

CONTRACT NO. AT(30-1)-1037, Amend. No. 2

AMENDMENT NO. 2

CONTRACTOR AND ADDRESS:

RARE EARTHS, INC.
Paterson R. D. #1, New Jersey

AMENDMENT FOR:

CHANGE IN SPECIFICATIONS

Encl 1

THIS AMENDMENT, entered into as of the 30th day of November, 1951, by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), as represented by the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter referred to as the "Commission"), and RARE EARTHS, INC. (hereinafter referred to as the "Contractor"),

WITNESSETH THAT:

WHEREAS, the Government and the Contractor entered into Contract No. AT(30-1)-1037 as of the 2nd day of November, 1950, for the purchase and sale of thorium oxide in the form of thorium flouride sludge; and

WHEREAS, the Government and the Contractor desire to amend this contract to change the specifications therefor; and

WHEREAS, this amendment is authorized by law, including the Atomic Energy Act of 1946;

NOW, THEREFORE, Contract No. AT(30-1)-1037, as heretofore amended, is hereby further amended as follows:

1. Delete Article II and substitute the following therefor:

ARTICLE II - SPECIFICATIONS

The sludge delivered hereunder shall contain not less than forty-seven and one-half per cent ($47\frac{1}{2}\%$) thorium oxide on an as-received basis and not more than ten per cent (10%) water; provided, however, that in the event that any lot or lots do not meet such specifications, the Commission may, in its discretion, accept such lot or lots at any appropriate reduction in the price as may be agreed upon by the parties. The Contractor shall endeavor in good faith, but shall not be so obligated, to increase the thorium oxide content of the sludge to $52\frac{1}{2}\%$ - $57\frac{1}{2}\%$ on an as-received basis and to decrease the water content thereof to five per cent (5%) or less."

2. Delete Article XIII, COVENANT AGAINST CONTINGENT FEES, and Article XV, EIGHT-HOUR LAW, and substitute the following therefor:

ARTICLE XIII - COVENANT AGAINST CONTINGENT FEES

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty the Government shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration the full amount of such commission, percentage, brokerage, or contingent fee.

"ARTICLE XV - EIGHT-HOUR LAW

No laborer or mechanic doing any part of the work contemplated by this contract, in the employ of the Contractor or any subcontractor contracting for any part of said work contemplated, shall be required or permitted to work more than eight hours in any one calendar day upon such work, except upon the condition that compensation is paid to such laborer or mechanic in accordance with the provisions of this article of the contract. The wages of every laborer and mechanic employed by the Contractor or any subcontractor engaged in the performance of this contract shall be computed on a basic day rate of eight hours per day and work in excess of eight hours per day is permitted only upon the condition that every such laborer and mechanic shall be compensated for all hours worked in excess of eight hours per day at not less than one and one-half times the basic rate of pay. For each violation of the requirements of this article of the contract, a penalty of five dollars (\$5.00) shall be imposed upon the Contractor for each laborer or mechanic for every calendar day in which such employee is required or permitted to labor more than eight hours upon said work without receiving compensation computed in accordance with this article of the contract, and all penalties thus imposed shall be withheld for the use and benefit of the Government: Provided, That this stipulation shall be subject in all respects to the exceptions and provisions of the Eight Hour Laws as set forth in U. S. Code, Title 40, Sections 321, 324, 325, 325a, and 326, which relate to hours of labor and compensation for overtime."

IN WITNESS WHEREOF, the parties hereto have executed this Amendment as of the day and year first above written.

Witnesses:

Hilda May Breed
Hilda May Breed
Box L96, R.D.4, Paterson, N.J.
(Address)

Venita S. Benesh
Venita S. Benesh
21 Pearl St., Bloomingdale, N.J.
(Address)

UNITED STATES OF AMERICA

BY: UNITED STATES ATOMIC ENERGY COMMISSION

H. J. Fry
H. J. Fry
AUTHORIZED REPRESENTATIVE OF THE
U. S. ATOMIC ENERGY COMMISSION
RARE EARTHS, INC.

By: Richard L. Stone
Richard L. Stone
Title: Vice-President

I, Richard M. Mandle, certify that I am the Assistant Secretary of the corporation named as Contractor herein; that Richard L. Stone who signed this amendment on behalf of the Contractor was then Vice-President of said corporation; that said amendment was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of said corporation.

(Corporate Seal)

Richard M. Mandle
Richard M. Mandle, Assistant Secretary

This document consists of 6 pages.
No. 3 of // copies. Series Q.

Loggert 7/24/52 HWT

CONTRACT No. AT(30-1)-1037.

File - AEC - Sales

AMENDMENT No. 3

CONTRACTOR AND ADDRESS:

RARE EARTHS, INC.,
Paterson R. D. #1, New Jersey.

AMENDMENT FOR:

EXTENSION OF CONTRACT TERM.

INCREASE IN COMMISSION
OBLIGATION:

\$32,400.00

TOTAL COMMISSION OBLIGATION:

\$84,900.00

PAYMENT TO BE MADE BY:

Division of Disbursement,
United States Treasury Department,
New York, New York.
Submit invoices to:
United States Atomic Energy Commission,
P. O. Box 30 - Ansonia Station,
New York 23, New York.

THIS AMENDMENT, entered into the 26th day of June, 1952, by and between THE UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), acting through the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter referred to as the "Commission"), and RARE EARTHS, INC. (hereinafter referred to as the "Contractor");

WITNESSETH THAT:

WHEREAS, the Government and the Contractor entered into Contract No. AT(30-1)-1037 the 2nd day of November, 1950, for the furnishing and delivering of certain materials; and

WHEREAS, this contract has heretofore been amended and the parties hereto desire to further amend this contract, as hereinafter provided; and

WHEREAS, this Amendment is authorized by law, including the Atomic Energy Act of 1946;

NOW, THEREFORE, said Contract No. AT(30-1)-1037, as heretofore amended, is hereby further amended but only as follows:

1. Effective July 1, 1952, paragraph 2 of Article I is changed to read as follows:

"2. The Contractor agrees to sell and the Government agrees to buy, in the form of thorium fluoride sludge, all of the thorium oxide produced by the Contractor during the period commencing July 1, 1952, and continuing through and including June 30, 1953, at a price of One Dollar and Thirty-Five Cents (\$1.35) per pound of contained thorium oxide; provided, that the quantity of such thorium oxide shall not exceed twenty-four thousand (24,000) pounds; and provided, further, that said thorium oxide shall conform to the specifications set forth in Article II hereof."

2. In paragraph 2 of Article III, the date "June 30, 1952" is changed to "June 30, 1953."

3. Effective July 1, 1952, Article IX is changed to read as follows:

"ARTICLE IX - DISCLOSURE OF INFORMATION

1. It is understood that unauthorized disclosure of any, or failure to safeguard all, material marked as 'Security Information' that may come to the Contractor, or any person under its control, in connection with the work under this contract may subject the Contractor, its agents, and employees to

criminal liability under the laws of the United States. See the Atomic Energy Act of 1946 (Public Law 585 - 79th Congress). See also Title 18, United States Code, Secs. 5 and 11, Secs. 791 to 797, both inclusive, Secs. 2381 to 2390, both inclusive, and Sec. 3241; Title 50, United States Code, Secs. 40 and 42.

2. The Contractor agrees to conform to all security regulations and requirements of the Commission. Except as the Commission may authorize, in accordance with the Atomic Energy Act of 1946, as amended, the Contractor shall not permit any individual to have access to restricted data until the designated investigating agency shall have made an investigation and report to the Commission on the character, associations, and loyalty of such individual, and the Commission shall have determined that permitting such person to have access to restricted data will not endanger the common defense and security. As used in this paragraph the term 'designated investigating agency' means the United States Civil Service Commission or the Federal Bureau of Investigation, or both, as determined pursuant to the provisions of the Atomic Energy Act of 1946, as amended by the Act of April 5, 1952, Public Law 298, 82nd Congress, 66 Stat. 43. The term 'restricted data' as used in this paragraph means all data concerning the manufacture or utilization of atomic weapons, the production of fissionable material, or the use of fissionable material in the production of power, but shall not include any data which the Commission from time to time determines may be published without adversely affecting the common defense and security.

3. Except as otherwise authorized in writing by the Commission, the Contractor shall insert in all agreements, made pursuant to the provisions of this contract which may involve security information, the provisions of paragraphs 1 and 2 of this Article."

4. Effective July 1, 1952, Article XV is changed to read as follows:

"ARTICLE XV - EIGHT-HOUR LAW

No laborer or mechanic doing any part of the work contemplated by this contract, in the employ of the Contractor or any subcontractor contracting for any part of said work contemplated, shall be required or permitted to work more than eight hours in any one calendar day upon such work, except upon the condition that compensation is paid to such laborer or mechanic in accordance with the provisions of this Article of the contract. The wages of every laborer and mechanic employed by the Contractor or any subcontractor engaged in the performance of this contract

shall be computed on a basic day rate of eight hours per day in excess of eight hours per day is permitted only upon the condition that every such laborer and mechanic shall be compensated for all hours worked in excess of eight hours per day at not less than one and one-half times the basic rate of pay. For each violation of the requirements of this Article of the contract a penalty of five dollars shall be imposed upon the Contractor for each laborer or mechanic for every calendar day in which such employee is required or permitted to labor more than eight hours upon said work without receiving compensation computed in accordance with this Article of the contract, and all penalties thus imposed shall be withheld for the use and benefit of the Government: Provided, that this stipulation shall be subject in all respects to the exceptions and provisions of the Eight-Hour laws as set forth in United States Code, Title 40, Secs. 321, 324, 325, 325a, and 326, which relate to hours of labor and compensation for overtime."

5. The following Articles are hereby added to the contract:

"ARTICLE XVII - CONVICT LABOR

In connection with the performance of this contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment at hard labor. This provision shall not be construed to prevent the Contractor or any subcontractor from obtaining any of the supplies or any component parts or ingredients to be furnished under this contract or any of the materials or supplies to be used in connection with the performance of this contract, directly or indirectly, from any Federal, state, or territorial prison or prison industry, provided, that such articles, materials, or supplies are not produced pursuant to any contract or other arrangements under which prison labor is hired or employed or used by any private person, firm, or corporation.

"ARTICLE XVIII - DOMESTIC ARTICLES

Unless the Commission shall determine it to be inconsistent with the public interest, or the cost to be unreasonable, only such unmanufactured articles, materials, and supplies as have been mined or produced in the United States, and only such manufactured articles, materials, and supplies as have been manufactured in the United States substantially all from articles, materials, or supplies mined, produced, or manufactured, as the case may be, in the United States shall be acquired in furtherance of the work of this contract. The provisions of this Article shall not apply with respect to articles, materials, or supplies for use outside the United States, or if articles, materials, or

supplies of the class or kind to be used, or the articles, materials, or supplies from which they are manufactured are not mined, produced or manufactured, as the case may be, in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

"ARTICLE XIX - RENEGOTIATION

1. This contract shall be deemed to contain all the provisions required by Section 104 of the Renegotiation Act of 1951 (Public Law 9, 82d Congress).

2. The Contractor agrees to insert the provisions of this Article, including this paragraph 2 in all subcontracts, specified in Section 103(g) of the Renegotiation Act of 1951; provided, that the Contractor shall not be required to insert the provisions of this Article in any subcontract exempted by or pursuant to Section 106 of the Renegotiation Act of 1951."

IN WITNESS WHEREOF, the parties hereto have executed this Amendment the day and year first above written.

THE UNITED STATES OF AMERICA

By: UNITED STATES ATOMIC ENERGY COMMISSION

H. B. Fry

H. B. FRY
AUTHORIZED REPRESENTATIVE OF THE
U. S. ATOMIC ENERGY COMMISSION

Witnesses:

Ruth Teuk

Pulis Avenue
Franklin Lakes, N. J.

Helen K. Bree

Box 496C, R. D. 4
Paterson, N. J.

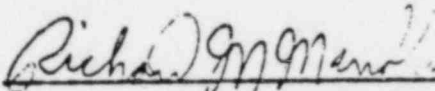
RARE EARTHS, INC.

By: *Richard L. Stone*

Title: *Vice President*

I, RICHARD M. MANDLE, certify that I am the Assistant Secretary of the corporation named as Contractor herein; that Richard L. Stone who signed this Amendment on behalf of the Contractor was then Vice-President of said corporation; that said Amendment was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of said corporation.



Richard M. Mandle

(Corporate Seal)

This document consists of ^{31 Pages} ~~25~~ _{appended} pages. No. 7 of 11. Series A.

CONTRACT NO. AT(29-6)-993

THIS CONTRACT, entered into this 18th day of July, 1955, by and between the UNITED STATES OF AMERICA (hereinafter called the "Government") as represented by the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter called the "Commission") and RARE EARTHS, INC., a corporation organized under the laws of the State of New Jersey (hereinafter called the "Contractor").

WITNESSETH THAT:

WHEREAS, the Government desires to have the Contractor perform certain work and services as hereinafter provided; and

WHEREAS, the Contractor is willing to install the facilities to perform this work and to furnish the services upon the terms and conditions hereinafter stated; and

WHEREAS, this contract is authorized by law, including the Atomic Energy Act of 1954;

NOW, THEREFORE, the parties hereto do mutually agree as follows:

ARTICLE I - SCOPE OF THE WORK

- (1) The Commission agrees to deliver to the Contractor f.o.b. cars or trucks at a plant in Sewaren, New Jersey, or a plant in Baltimore, Maryland, designated by the Contractor, approximately 7,900 short tons of monazite at the rate of approximately 600 tons per month, beginning seven months after the first day of the month following the execution of the contract by the Commission, or such earlier date as is mutually agreeable to the Contractor and the Commission. In the event of delay in any delivery of monazite the Commission shall, if requested by the Contractor, make a determination of the delay occasioned the Contractor thereby and shall grant to the Contractor a reasonable extension of time in respect of performance of this contract.

The Government shall not be liable to the Contractor for damages or loss of profit by reason of any delay in delivery of monazite, except that in case of such delay, upon the written request of the Contractor an equitable adjustment shall be made in the delivery dates, or price or both, and in any other contractual provision affected thereby, in accordance with the procedures provided for in the article entitled "Changes."

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It is mutually agreed by the Commission and the Contractor that this contract is entered into on the assumption that the total amount of all monazite delivered by the Commission will contain the average ThO_2 content and the average Rare Earth Oxide content set forth in Appendix A and that in the event the average ThO_2 content and/or the average Rare Earth Oxide content of such monazite is less than the averages set forth in Appendix A an equitable adjustment will be made in the provisions of this contract relating to deliveries by the Contractor, guaranteed recoveries, and deductions for failure to deliver guaranteed recoveries. It is agreed that any containers used in furnishing monazite to the Contractor are, and shall remain, the property of the Government. The Contractor agrees to dispose of such containers as directed by the Contracting Officer. In the event that no instructions are received from the Contracting Officer within sixty (60) days of the date that each container is emptied, the Contractor may so advise the Commission and the Commission shall have 10 days to direct the disposition of the containers. If directions are not issued within this 10-day period, it shall be assumed that the containers have been abandoned and title to such containers shall pass to the Contractor.

- (2) The Contractor agrees to produce from the monazite furnished by the Commission crude thorium hydroxide and rare earths sodium sulfate conforming to the specifications set forth in Appendices C-3 and D-3 and to the guaranteed recoveries set forth in Article II - Specifications and Recovery.
- (3) The Contractor agrees to deliver the crude thorium hydroxide and rare earths sodium sulfate f.o.b. cars or trucks Contractor's plant where the monazite has been processed. Shipments shall be made by the Contractor in accordance with instructions of the Contracting Officer. Commission undertakes to give to Contractor shipping instructions at least one month in advance of anticipated deliveries of which it has been notified in writing. Unless otherwise authorized by the Contracting Officer crude thorium hydroxide shall be delivered in 44-gallon fibre drums with aluminum foil barrier construction to be in accordance with Consolidated Freight Classification 300 lb. net weight limit for shipment of thorium hydroxide, and rare earths sodium sulfate shall be delivered in 55-gallon steel drums meeting the following specifications: at least 18 gauge steel; full open head; bolted ring-type cover; corrosion resistant inner coating. The Contractor shall furnish all containers. Deliveries by the Contractor shall be commenced as early as practicable (but in no event later than the first day of the month which is twelve months after the first day of the month following execution of this contract by the Commission) and shall be continued in an approximately uniform manner, with final delivery not later than the date which is thirty months from the date which is the first day of the month following the execution of this contract by the Commission.

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- (4) For each short ton of monazite processed by the Contractor, the Commission agrees to pay the Contractor \$415.27 minus any adjustments as provided in the article of this contract entitled "Payments."
- (5) The Commission reserves the right to deliver to the Contractor prior to the first day of the month which is twenty-four months following the execution of this contract by the Commission up to 1,000 short tons of monazite in addition to that described in subsection 1 of this Article, and the Contractor agrees to process such additional monazite in accordance with the terms and conditions of this contract, except that the price is to be agreed upon; provided such monazite is received prior to such time.

ARTICLE II - SPECIFICATIONS AND RECOVERY

- (1) The crude thorium hydroxide delivered by the Contractor shall conform to the specifications set forth in Appendix D-3.
- (2) The Contractor agrees to recover and deliver as crude thorium hydroxide conforming to the specifications set forth in Appendix D-3 at least 95% of all the ThO_2 contained in the total amount of monazite furnished the Contractor, as determined pursuant to this contract and its appendices. The Contractor, at its option, may supplement the crude thorium hydroxide recovered from the monazite delivered by the Commission with crude thorium hydroxide obtained from other sources in order to deliver the percentage required by this section (2).
- (3) The rare earths sodium sulfate delivered by the Contractor shall conform to the specifications and the symbolic formula set forth in Appendix C-3.
- (4) The Contractor agrees to recover and deliver as rare earths sodium sulfate conforming to the specifications set forth in Appendix C-3 at least 95% of all the rare earths oxide contained in the total amount of monazite furnished the Contractor, as determined pursuant to this contract and its appendices. The Contractor, at its option, may supplement the rare earths sodium sulfate recovered from the monazite delivered by the Commission with rare earths sodium sulfate obtained from other sources in order to deliver the percentage required by this section (4).
- (5) If the Contractor recovers and delivers less than 85% of the rare earths oxide contained in the total amount of monazite furnished the Contractor, as determined pursuant to this Contract and its appendices,

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The Contractor agrees to obtain from sources other than the Commission and deliver to the Commission sufficient rare earths sodium sulfate conforming to the specifications set forth in Appendix C-3 to make deliveries equal 85% of the rare earths oxide contained in the total amount of monazite furnished the Contractor, as determined pursuant to this contract and its appendices.

ARTICLE III - WEIGHING, SAMPLING AND ANALYSING

- (1) All monazite, crude thorium hydroxide and rare earths sodium sulfate delivered under this contract shall be weighed, sampled, analysed and the moisture content determined in accordance with the methods set forth in the appendices to this contract, or in accordance with method mutually agreeable to the Commission and the Contractor, and at the expense of the Contractor except as otherwise provided in the appendices to this contract.
- (2) Unless otherwise authorized by the Contracting Officer all weighing and sampling of monazite, crude thorium hydroxide and rare earths sodium sulfate shall be performed in the presence of a duly authorized representative of the Commission.

ARTICLE IV - PAYMENTS

- (1) Each month (following a month when monazite is processed) the Contractor shall submit a properly certified invoice for monazite, processing of which was completed during the preceding month. A provisional payment, at the rate stipulated in Article I, of ninety percent (90%) of each properly certified invoice shall be made upon receipt of each invoice. After the amount withheld from such provisional payments equals \$100,000, future provisional payments at the rate stipulated in Article I, of one hundred percent (100%) of each properly certified invoice shall be made upon receipt of each invoice, except as provided in paragraph 2(d) of this article. The balance due, with adjustments as provided herein, shall be paid upon completion of deliveries required by this contract and upon completion of all weighing, sampling, moisture determination and analysis as provided in Article III hereof. Any overpayment, tentatively determined, or any overpayment, finally determined, shall be refunded forthwith by the Contractor or deducted from future payments as the Commission may direct.
- (2) Reports: Upon completion or termination of this contract, the Contractor shall submit with respect to performance during the entire contract period, a report on (i) the quantity of monazite processed, (ii) the ThO₂ and rare earths oxide content of monazite processed, as determined pursuant to the appendices of this contract, and (iii) the quantities of crude thorium hydroxide and rare earths sodium sulfate removed by processing monazite and delivered to the Commission. In addition to the above-described

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report, the Contractor shall submit, three months after the first of the month following the first delivery of monazite to the Contractor and at the end of each succeeding three-month period, a report, on a cumulative basis from inception of the contract, furnishing similar information, adjusted for work in process at the end of the period covered.

(3) Adjustments:

(a) If upon completion of deliveries required by this contract the total quantity of ThO_2 contained in the crude thorium hydroxide delivered to the Commission is less than 95% of the total ThO_2 contained in the monazite delivered to the Contractor, a deduction will be made in accordance with the following schedule:

<u>Percent of ThO_2 Content of Monazite Recovered in Crude Thorium Hydroxide</u>	<u>Deduction Per Unrecovered Pound of ThO_2 Under 95% Contained in Monazite if Less than 95% is Recovered</u>
Less than 95% but not less than 94%	\$2.50
Less than 94% but not less than 93%	\$3.00
Less than 93% but not less than 92%	\$3.50
Less than 92% but not less than 91%	\$4.00
Less than 91% but not less than 90%	\$4.50
Less than 90%	\$5.00

The deduction provided above shall be made from any amounts otherwise due the Contractor and if such deduction exceed the amounts due the Contractor, the Contractor shall forthwith pay the difference to the Commission.

(b) If upon completion of deliveries required by this contract the total quantity of rare earths oxide contained in the rare earths sodium sulfate delivered to the Commission is less than 95% of the total rare earths oxide contained in the monazite

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delivered to the Contractor a deduction will be made in accordance with the following schedule:

<u>Percent of Rare Earths Oxide Content of Monazite Recovered in Rare Earths Sodium Sulfate</u>	<u>Deductions Per Unrecovered Pound of Rare Earths Oxide Under 95% contained in Monazite if Less than 95% is Recovered</u>
Less than 95% but not less than 94%	\$0.05
Less than 94% but not less than 93%	\$0.10
Less than 93% but not less than 92%	\$0.15
Less than 92% but not less than 91%	\$0.20
Less than 91% but not less than 90%	\$0.25
Less than 90% but not less than 85%	\$0.50

The deduction provided above shall be made from any amounts otherwise due the Contractor and if such deduction exceeds the amounts due the Contractor, the Contractor shall forthwith pay the difference to the Commission.

(c) In the event that any product delivered hereunder does not meet the specifications set forth in Appendices C-3 or D-3 of this contract the Commission may, in its discretion, accept such product at an appropriate reduction in price as may be agreed upon by the parties. If the parties fail to agree upon an appropriate reduction in price the Commission shall determine an appropriate reduction in price subject to the right of appeal by the Contractor pursuant to the article entitled "Disputes." The Commission shall pay promptly 90% of the price determined by it, which shall be on account of any price finally determined in the event of an appeal by the Contractor.

ARTICLE V - CHANGES

The Contracting Officer may at any time, by a written order, make changes in the general scope of this contract, in any one or more of the following: (i) method of shipment or packing; and (ii) place of delivery. If any such change causes an increase or decrease in the cost of, or the time required for, performance of this contract, an equitable adjustment shall be made promptly in the contract price or delivery schedule, or both, and the contract shall be modified in writing accordingly. Any claim by the Contractor for adjustment under this clause must be asserted within

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30 days from the date of receipt by the Contractor of the notification of change; Provided, however, That the Contracting Officer, if he decides that the facts justify such action, may receive and act upon any such claim asserted at any time prior to final payment under this contract. Failure to agree to any adjustment shall be a dispute concerning a question of fact within the meaning of the article of this contract entitled "Disputes." However, nothing in this article shall excuse the Contractor from proceeding with the contract as changed.

ARTICLE VI - DISPUTES

Except as otherwise provided in this contract, any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the Contracting Officer, who shall reduce his decision to writing and mail or otherwise furnish a copy thereof to the Contractor. Within 30 days from the date of receipt of such copy, the Contractor may appeal by mailing or otherwise furnishing to the Contracting Officer a written appeal addressed to the Commission, and the decision of the Commission shall, unless determined by a court of competent jurisdiction to have been fraudulent, arbitrary, capricious, or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence, be final and conclusive: Provided, That, if no such appeal to the Commission is taken, the decision of the Contracting Officer shall be final and conclusive. In connection with any appeal proceeding under this clause, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its appeal. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the contract and in accordance with the Contracting Officer's decision.

ARTICLE VII - ASSIGNMENT

- (1) Subject to section (2) of this article, neither this contract nor any interest therein nor claim thereunder shall be assigned or transferred by the Contractor, except as expressly authorized in writing by the Contracting Officer.
- (2) Pursuant to the provisions of the Assignment of Claims Act of 1940 (31 U. S. Code 203, 41 U. S. Code 15), if this contract provides for payments aggregating \$1,000 or more, claims for moneys due or to become due the Contractor from the Government under this contract may be assigned to a bank, trust company, or other financing institution, including any Federal lending agency, and may thereafter be further assigned and reassigned to any such institution. Any such assignment or reassignment shall cover all amounts payable under this contract and not already paid, and shall not be made to more than one party,

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except that any such assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in such financing. Notwithstanding any provision of this contract, payment to an assignee of any claim under this contract shall not be subject to reduction or set-off, to the extent provided in said Act as amended.

ARTICLE VIII - EXAMINATION OF RECORDS

- (1) The Contractor agrees that the Commission and the Comptroller General of the United States or any of their duly authorized representatives shall have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to this contract until the expiration of three years after final payment under this contract unless the Commission authorizes their prior disposition.
- (2) The Contractor further agrees to include in all his sub-contracts hereunder a provision to the effect that the subcontractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall have access to and the right to examine any directly pertinent books, documents, papers, and records of such subcontractor involving transactions related to the sub-contract until the expiration of three years after final payment under this contract unless the Commission authorizes their prior disposition. The term "subcontract" as used herein means any purchase order or agreement to perform all or any part of the work or to make or furnish any materials required for the performance of this contract, but does not include (i) purchase orders not exceeding \$1,000, (ii) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public, or (iii) subcontracts or purchase orders for general inventory items not specifically identifiable with the work under this contract.
- (3) Nothing in this contract shall be deemed to preclude an audit by the General Accounting Office of any transaction under this contract.

ARTICLE IX - INSPECTION OF CONTRACTOR'S ACTIVITIES, REPORTS

- (1) The Commission shall have the right to inspect at reasonable times all activities of the Contractor arising in the course of the work under this contract.
- (2) The Contractor shall make such reports to the Commission with respect to the Contractor's activities under this contract as the Commission may reasonably require from time to time.

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ARTICLE X - SECURITY

- (1) Contractor's Duty to Safeguard Restricted Data and Other Classified Information. In the performance of the work under this contract the Contractor shall, in accordance with the Commission's security regulations and requirements, be responsible for safeguarding restricted data and other classified matter and protecting against sabotage, espionage, loss and theft, the classified documents, materials, equipment, processes, etc., as well as such other material of high intrinsic or strategic value as may be in the Contractor's possession in connection with performance of work under this contract. Except as otherwise expressly provided in the specifications the Contractor shall upon completion or termination of this contract transmit to the Commission any classified matter in the possession of the Contractor or any person under the Contractor's control in connection with performance of this contract.
- (2) Regulations. The Contractor agrees to conform to all security regulations and requirements of the Commission and the Commission agrees to reimburse the Contractor for all necessary and reasonable expenses incurred as a result of any changes in the security regulations and requirements relating to this contract.
- (3) Definition of Restricted Data. The term "Restricted Data," as used in this article, means all data concerning (1) design, manufacture or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of energy, but shall not include data declassified or removed from the Restricted Data category pursuant to section 142 of the Atomic Energy Act of 1954.
- (4) Security Clearance of Personnel. Except as the Commission may authorize, in accordance with the Atomic Energy Act of 1954, the Contractor shall not permit any individual to have access to Restricted Data until the designated investigating agency shall have made an investigation and report to the Commission on the character, associations, and loyalty of such individual and the Commission shall have determined that permitting such person to have access to Restricted Data will not endanger the common defense and security. As used in this paragraph, the term "designated investigating agency" means the United States Civil Service Commission or the Federal Bureau of Investigation, or both, as determined pursuant to the provisions of the Atomic Energy Act of 1954.
- (5) Criminal Liability. It is understood that disclosure of Restricted Data and other classified information relating to the work or services ordered hereunder to any person not entitled to receive it, or failure to safeguard any Restricted Data or any top secret,

secret, or confidential matter that may come to the Contractor or any person under the Contractor's control in connection with work under this contract, may subject the Contractor, his agents, employees, and subcontractors to criminal liability under the laws of the United States. (See the Atomic Energy Act of 1954, 68 Stat. 919. See also Title 18, U. S. C. Sec. 791-798 and Executive Order 10104 of February 1, 1950, 15 F.R. 597.)

- (6) Subcontracts and Purchase Orders. Except as otherwise authorized in writing by the Contracting Officer, the Contractor shall insert provisions similar to the foregoing in all subcontracts and purchase orders under this contract.

ARTICLE XI - SUBCONTRACTS

The Contractor shall not subcontract any part of the work it is obligated to perform under this contract except as authorized in writing by the Commission.

ARTICLE XIII - LABOR

(1) Eight Hour Laws

This contract, to the extent that it is of a character specified in the Eight-Hour Law of 1912 as amended (40 U. S. Code 324-326) and is not covered by the Walsh-Healey Public Contracts Act (41 U. S. Code 35-45), is subject to the following provisions and exceptions of said Eight-Hour Law of 1912 as amended, and to all other provisions and exceptions of said Law:

No laborer or mechanic doing any part of the work contemplated by this contract, in the employ of the Contractor or any subcontractor contracting for any part of the said work, shall be required or permitted to work more than eight hours in any one calendar day upon such work, except upon the condition that compensation is paid to such laborer or mechanic in accordance with the provisions of this clause. The wages of every such laborer and mechanic employed by the Contractor or any subcontractor engages in the performance of this contract shall be computed on a basic day rate of eight hours per day; and work in excess of eight hours per day is permitted only upon the condition that every such laborer and mechanic shall be compensated for all hours worked in excess of eight hours per day at not less than one and one-half times the basic rate of pay. For each violation of the requirement of this clause a penalty of five dollars shall be imposed upon the Contractor for each such laborer or mechanic for every calendar day in which such employee is required or permitted to labor more than eight hours upon said work without receiving compensation computed in accordance with this clause; and all penalties thus imposed shall be withheld for the use and benefit of the Government

(2) Walsh-Horley Public Contracts Act

To the extent that this contract is subject to the Walsh-Horley Public Contracts Act, as amended (41 U. S. Code 35-45), there are hereby incorporated by reference the representations and stipulations required by said Act and regulations issued thereunder by the Secretary of Labor, such representations and stipulations being subject to all applicable rulings and interpretations of the Secretary of Labor which are now or may hereafter be in effect.

(3) Convict Labor

In connection with the performance of work under this contract the Contractor shall not employ any person undergoing sentence of imprisonment at hard labor.

(4) Nondiscrimination

(a) In connection with the performance of work under this contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, religion, color, or national origin. The aforesaid provision shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of the non-discrimination clause.

(b) The Contractor further agrees to insert the provisions of section (4)(a) above in all subcontracts hereunder, except subcontracts for standard commercial supplies or raw materials.

ARTICLE XIII - PATENTS

- (1) Whenever any invention or discovery is made or conceived by the Contractor or its employees in the course of, in connection with, or under the terms of this contract, the Contractor shall furnish the Commission with complete information thereon; and the Commission shall have the sole power to determine whether or not and where a patent application shall be filed, and to determine the disposition of the title to and the rights under any application or patent that may result; provided, however, that the Contractor in any event, shall retain at least a sole (except as against the Government or its account), irrevocable, royalty-free license with the sole right

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to grant sublicenses, under said invention, discovery, application or patent, such license being limited to the manufacture, use, and sale for purposes other than use in the production or utilization of source material or values associated therewith, special nuclear material or atomic energy. Subject to the license retained by the Contractor, as provided in this paragraph, the judgment of the Commission on these matters shall be accepted as final; and the Contractor, for itself and for its employees, agrees that the inventor or inventors will execute all documents and do all things necessary or proper to carry out the judgment of the Commission.

- (2) No claim for pecuniary award or compensation under the provisions of the Atomic Energy Acts of 1946 and 1954 shall be asserted by the Contractor or its employees with respect to any invention or discovery made or conceived in the course of, in connection with, or under the terms of this contract.
- (3) Except as otherwise authorized in writing by the Commission the Contractor will obtain patent agreements to effectuate the purposes of paragraphs 1 and 2 of this article from all persons who perform any part of the work under this contract, except such clerical and manual labor personnel as will not have access to technical data.
- (4) Except as otherwise authorized in writing by the Commission, the Contractor will insert in all subcontracts provisions making this article applicable to the subcontractor and its employees.
- (5) Patent Indemnity

The Contractor agrees to indemnify the Government, its officers, agents, servants and employees against liability of any kind (including costs and expenses incurred) for the use of any invention or discovery and for the infringement of any Letters Patent (not including liability, arising pursuant to Section 183, Title 35, (1952) U.S. Code, prior to the issuance of Letters Patent) occurring in the performance of this contract.

ARTICLE XIV - TAXES

(1) Definitions

As used throughout this article, the following terms shall have the meanings set forth below:

- (a) The term "direct tax" means any tax or duty directly applicable to the completed supplies or services covered by this contract, or any other tax or duty from which the Contractor or this

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transaction is exempt. It includes any tax or duty directly applicable to the importation, production, processing, manufacture, construction, sale, or use of such supplies or services covered by this contract. The term does not include transportation taxes, unemployment compensation taxes, social security taxes, income taxes, excess-profits taxes, capital stock taxes, property taxes, and such other taxes as are not within the definition of the term "direct tax" as set forth above in this paragraph.

(b) The term "contract date" means the effective date of this contract if it is a negotiated contract, or the date set for the opening of bids if it is a contract entered into as a result of formal advertising.

(2) Federal Taxes.

Except as may be otherwise provided in this contract, the contract price includes all applicable Federal taxes in effect on the contract date.

(3) State or Local Taxes.

Except as may be otherwise provided in this contract, the contract price does not include any State or local direct tax in effect on the contract date.

(4) Evidence of Exemption.

The Commission agrees, upon request of the Contractor, to furnish a tax exemption certificate or other similar evidence of exemption with respect to any direct tax not included in the contract price pursuant to this article; and the Contractor agrees, in the event of the refusal of the applicable taxing authority to accept such evidence of exemption, (i) promptly to notify the Contracting Officer of such refusal, (ii) to cause the tax in question to be paid in such manner as to preserve all rights to refund thereof, and (iii) if so directed by the Contracting Officer, to take all necessary action, in cooperation with and for the benefit of the Government, to secure a refund of such tax (in which event the Commission agrees to reimburse the Contractor for any and all reasonable expenses incurred at its direction).

(5) Price Adjustment.

If, after the contract date, the Federal Government or any State or local government either (i) imposes or increases (or removes an exemption with respect to) any direct tax, or any tax directly applicable to the materials or components used in the

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manufacture or furnishing of the completed supplies or services covered by this contract, or (ii) refuses to accept the evidence of exemption, furnished under paragraph (4) hereof, with respect to any direct tax excluded from the contract price, and if under either (i) or (ii) the Contractor is obliged to and does pay or bear the burden of any such tax (and does not secure a refund thereof), the contract price shall be correspondingly increased. If, after the contract date, the Contractor is relieved in whole or in part from the payment or the burden of any direct tax included in the contract price, or any tax directly applicable to the materials or components used in the manufacture or furnishing of the completed supplies or services covered by this contract, the Contractor agrees promptly to notify the Contracting Officer of such relief, and the contract price shall be correspondingly decreased or the amount of such relief paid over to the Government. Invoices or vouchers covering any increase or decrease in contract price pursuant to the provisions of this paragraph shall state the amount thereof, as a separate added or deducted item, and shall identify the particular tax imposed, increased, eliminated, or decreased.

(6) Refund or Drawback

If any tax or duty has been included in the contract price or the price as adjusted under paragraph (5) of this article, and if the Contractor is entitled to a refund or drawback by reason of the export or re-export of supplies covered by this contract, or of materials or components used in the manufacture or furnishing of the completed supplies or services covered by this contract, the Contractor agrees that he will promptly notify the Contracting Officer thereof and that the amount of any such refund or drawback obtained will be paid over to the Government or credited against amounts due from the Government under this contract: Provided, however, That the Contractor shall not be required to apply for such refund or drawback unless so requested by the Contracting Officer.

ARTICLE XV - COVENANT AGAINST CONTINGENT FEES

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration the

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full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE XVI - OFFICIALS NOT TO BENEFIT

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

ARTICLE XVII - BUY AMERICAN ACT

The Contractor agrees that there will be delivered under this contract only such unmanufactured articles, materials and supplies (which term "articles, materials and supplies" is hereinafter referred to in this clause as "supplies"), as have been mined or produced in the United States, and only such manufactured supplies as have been manufactured in the United States substantially all from supplies mined, produced or manufactured, as the case may be, in the United States. The foregoing provisions shall not apply (i) with respect to supplies exempted by the Commission from the application of the Buy American Act (41 U. S. C. 10a-4), (ii) with respect to supplies for use outside the United States, or (iii) with respect to supplies to be delivered under this contract which are of a class or kind determined by the Commission not to be mined, produced, or manufactured, as the case may be, in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality, or (iv) with respect to such supplies, from which the supplies to be delivered under this contract are manufactured, as are of a class or kind determined by the Commission not to be mined, produced, or manufactured, as the case may be, in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality, provided that this exception (iv) shall not permit delivery of supplies manufactured outside the United States if such supplies are manufactured in the United States in sufficient and reasonable available commercial quantities and of a satisfactory quality. The Commission confirms that the product, crude thorium hydroxide, to be delivered by the Contractor hereunder, and the monazite from which that product and rare earths is derived and the rare earths extracted from monazite furnished by the Commission, are excepted from the terms of the "Buy American Act."

ARTICLE XVIII - PROPERTY

- (1) Title to monazite delivered to the Contractor and to all materials extracted under this contract from such monazite shall be in the Government and shall remain in the Government throughout the

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performance of all work hereunder. The Contractor may without accountability to the Commission dispose of gangue and other residue and effluent as the work progresses by any means other than sale or transfer to others (or by sale or transfer to others if the same is approved by the Contracting Officer) or may use or sell or transfer the effluent in other operations or products of the Contractor. If the Commission shall request and a mutually satisfactory method is available, the Contractor shall recover and deliver to the Commission uranium values contained in the effluent provided the Commission shall compensate the Contractor by a mutually satisfactory processing fee.

- (2) The Contractor shall be liable for loss or destruction of or damage to Government-furnished property except where such loss, destruction, or damage is due to any excepted peril, as hereinafter defined; provided, further, that notwithstanding the foregoing the Contractor shall be liable where such loss, destruction, or damage is due to any excepted peril through failure of the Contractor to comply with paragraph 3 or through the wilful misconduct or lack of good faith on the part of the Contractor's managerial personnel, as hereinafter defined. The term "excepted perils" shall mean: Fire; lightning; windstorm; cyclone; tornado; hail; explosion; riot attending a strike; civil commotion; vandalism and malicious mischief; aircraft or objects falling therefrom; vehicles running on land or tracks (excluding vehicles owned or operated by the Contractor or any agent or employee of the Contractor); smoke; sprinkler leakage; earthquake or volcanic eruption; flood, meaning thereby rising of rivers or streams; enemy attack or any action by the military, navy, or air forces of the United States in resisting enemy attack.

The term "Contractor's managerial personnel" shall mean the Contractor's directors, officers and any of its managers, superintendents, or other equivalent representatives who have supervision or direction of 1. all or substantially all of the Contractor's business; or 2. all or substantially all of the Contractor's operation at any one plant or separate location at which the contract is being performed; or 3. a separate and complete major industrial operation in connection with the performance of the contract; or 4. a separate and complete major construction, alteration or repair operation in connection with performance of the contract. The Government, at its discretion, may repair or replace Government-furnished material that has been lost or destroyed for which the Contractor is not liable. If the Contractor is not liable under this subparagraph for the loss or destruction of Government-furnished property, the amount of such property lost or destroyed shall be deducted prior to computing any price adjustment pursuant to Article IV or prior to computing the minimum delivery of rare earths oxide pursuant to Article II (5).

- (3) The Contractor shall take all reasonable precautions, as directed by the Contracting Officer, or in the absence of such directions in accordance with sound industrial practice, to safeguard and protect Government property in the Contractor's possession or custody. Special measures shall be taken by the Contractor in the protection of and accounting for any classified or special materials involved in the performance of this contract, in accordance with the regulations and requirements of the Commission.

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- (4) Upon the happening of any loss or destruction of or damage to Government-furnished property in the possession or custody of the Contractor, the Contractor shall immediately inform the Commission of the occasion and extent thereof, shall take all reasonable steps to protect the property remaining, and shall, except to the extent that the Contractor is relieved of liability in accordance with paragraph 2, repair or replace, if and as directed by the Contracting Officer, the lost, destroyed, or damaged Government-furnished property, but shall take no action prejudicial to the right of the Government to recover therefor from third parties and shall furnish to the Government on request all reasonable assistance in obtaining such recovery.

ARTICLE XIX - TERMINATION FOR DEFAULT

- (1) The Commission may, subject to the provisions of paragraph (2) below, by written Notice of Default to the Contractor terminate the whole or any part of this contract in any one of the following circumstances:
- (1) if the Contractor fails to make delivery of the supplies or to perform the services within the time specified herein or any extension thereof; or

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- (ii) if the Contractor fails to perform any of the other provisions of this contract, or so fails to make progress as to endanger performance of this contract in accordance with its terms, and in either of these two circumstances does not cure such failure within a period of 10 days (or such longer period as the Contracting Officer may authorize in writing) after receipt of notice from the Contracting Officer specifying such failure.
- (2) The Contractor shall not be liable for any damages or excess cost if any failure to perform the contract arises out of causes beyond the control and without the fault or negligence of the Contractor. Such causes include, but are not restricted to, acts of God or of the public enemy, acts of Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, inability to obtain essential equipment or materials, unusually severe weather, and defaults of subcontractors due to any of such causes unless the Contracting Officer shall determine that the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery schedule.
- (3) In the event the Commission terminates this contract in whole or in part as provided in paragraph (1) of this article, the Commission may procure, upon such terms and in such manner as the Contracting Officer may deem appropriate, supplies or services similar to those so terminated, and the Contractor shall be liable to the Commission for any excess costs for such similar supplies or services, Provided, that the Contractor shall continue the performance of this contract to the extent not terminated under the provisions of this clause.
- (4) If this contract is terminated as provided in paragraph (1) of this clause, the Commission, in addition to any other rights provided in this clause, may require the Contractor to transfer title (if title is not in the Government) and deliver to the Commission, in the manner and to the extent directed by the Contracting Officer, (i) any completed supplies, and (ii) such partially completed supplies and materials, parts, tools, dies, jigs, fixtures, plans, drawings, information, and contract rights (hereinafter called "manufacturing materials") as the Contractor has specifically produced or specifically acquired for the performance of such part of this contract as has been terminated; and the Contractor shall, upon direction of the Contracting Officer, protect and preserve property in possession of the Contractor in which the Government has an interest. The Government shall pay to the Contractor the contract price for completed supplies delivered to and accepted by the Commission, and the amount agreed upon by the Contractor and the Contracting Officer for manufacturing materials delivered to and accepted by the Commission and for the protection and preservation of property. Failure to agree shall be a dispute concerning a question of fact within the meaning of the clause

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of this contract entitled "Disputes."

- (5) If, after notice of termination of this contract under the provisions of paragraph (1) of this clause, it is determined that the failure to perform this contract is due to causes beyond the control and without the fault or negligence of the Contractor pursuant to the provisions of paragraph (2) of this clause, such Notice of Default shall be deemed to have been issued pursuant to the clause of this contract entitled "Termination for Convenience of the Government," and the rights and obligations of the parties hereto shall in such event be governed by such clause.
- (6) The rights and remedies of the Government provided in this article shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

ARTICLE XX - TERMINATION FOR CONVENIENCE OF THE GOVERNMENT

- (1) The Commission may at any time terminate performance of all or part of the work under this contract for the convenience of the Government, by written notice to the Contractor stating the ground for termination. Such termination shall be effective in the manner and upon the date specified in said notice and shall be without prejudice to any claims which the Government may have against the Contractor. Upon receipt of such notice, the Contractor shall, unless the notice directs otherwise --
- (a) complete processing of such monazite as is being processed at the time of the termination; immediately discontinue all other work and the placing of all orders for materials, facilities, and supplies in connection with the performance of this contract, except to the extent needed to complete processing of monazite in process as aforesaid;
 - (b) proceed to cancel promptly all existing orders and terminate all subcontracts insofar as such orders or subcontracts are related to this contract, except to the extent needed to complete processing of monazite in process as set forth in paragraph (a) above,
 - (c) assign to the Government in the manner and to the extent directed by the Commission all the right, title and interest of the Contractor under the terminated portion of the orders and subcontracts so terminated.
- (2) Upon such termination of performance of work under this contract for the convenience of the Government, full and complete settlement of all claims of the Contractor arising out of such termination

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shall be made as follows:

- (a) The Government shall reimburse the Contractor for such further expenditures made after the date of termination for the protection of Government property, for the cost to the Contractor of terminating subcontracts and canceling orders as required by Article XI, and for such legal and accounting services in connection with the settlement of this contract as are required or approved by the Commission.
- (b) The Contractor shall be paid, according to the contract terms, the unpaid balance for products delivered in accordance with the contract terms to the date of termination, and for such products which were in process at the time of termination and which were completed pursuant to paragraph 1 (a) of this article and delivered in accordance with the contract terms.
- (c) The Commission shall promptly reimburse the Contractor for the capital cost to the Contractor of machinery, equipment, installations and plant (all of which is collectively referred to as plant) provided specially for the purposes of this contract as certified by the Contractor and audited and approved by the Commission which approval will not be unreasonably withheld, or 1.9 million dollars, whichever is the lesser, as reduced by (a) the capital cost of the plant or 1.9 million dollars, whichever is the lesser, divided by 7900 multiplied by the number of tons of monazite completely processed by the Contractor and (b) the agreed value of such plant at the date of termination. Failure to agree will be considered a dispute within the meaning of Article VI. In lieu of the agreed value of the plant or of a portion thereof, there shall be substituted the net proceeds of sale of the plant or such portion thereof, less the cost of dismantling the plant or such portion thereof, if the Commission and Contractor agree on such sale and the terms thereof. The dollar figure in this paragraph (c) assumes that the plant will be located at Baltimore, Maryland. In the event the plant is located at Sewaren, New Jersey, the amount of 1.9 million dollars shall remain the same.
- (d) The obligation of the Government to make any of the payments required by this article shall be subject to any unsettled claims in connection with this contract which the Government may have against the Contractor.
- (e) Any other provisions of this contract to the contrary notwithstanding, the Contractor and the Commission may agree upon the whole or any part of the amount or amounts which the Contractor is to receive upon and in connection with any termination pursuant to this article. Any agreement so reached shall be evidenced by a supplemental agreement to

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this contract which shall be final and binding upon the parties with regard to their respective claims against each other concerning this contract except as therein otherwise expressly provided.

- (f) The foregoing provisions of this article shall in no way affect or limit the rights which the Government may have as the result of default by the Contractor under this contract.

ARTICLE XXI - DEFINITIONS

(1) As used in this contract:

- (a) The term "Contracting Officer" means the person executing this contract on behalf of the Government and includes his successors or any duly authorized representative of any such person.
- (b) The term "Commission" means the United States Atomic Energy Commission or any duly authorized representative thereof, including the Contracting Officer except for the purpose of deciding an appeal under the article entitled "Disputes."

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the date and year first above written.

THE UNITED STATES OF AMERICA

BY: UNITED STATES ATOMIC ENERGY COMMISSION

Date of Signing by the Commission

July 18, 1955

Jane Johnson
Director, Division of Raw Materials

RARE EARTHS, INC.

Witnesses:

Pete J. Savino, President, R.E.I. BY: Richard L. Stone Richard J. Menck
Peter J. Callahan, Secretary TITLE: Vice Pres. Vice Pres.

Date of Signing by Rare Earths, Inc.

July 16, 1955

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I, Harry C. Helmsinger certify that I am the Vice President of the corporation named as contractor herein; that Richard W. Randall ^{and himself} who signed this contract on behalf of the Contractor was then President of said corporation; that said contract was signed duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and seal of said corporation this 16th day of July, 1955.

Harry C. Helmsinger



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APPENDIX

TABLE OF CONTENTS

<u>EXHIBIT</u>		<u>PAGE</u>
A	Representation of Monazite Sand.	1
<u>MONAZITE SAND</u>		
B-1	Sampling Procedure.	2
B-2	Analytical Procedure.	4
B-3	Procedure for Resolving Differences.	6
<u>RARE EARTHS SODIUM SULFATE PRODUCT</u>		
C-1	Sampling Procedure.	9
C-2	Analytical Procedure.	11
C-3	Product Specifications.	14
C-4	Procedure for Resolving Differences.	15
<u>THORIUM HYDRATE PRODUCT</u>		
D-1	Sampling Procedure.	16
D-2	Analytical Procedure.	18
D-3	Product Specifications.	24
D-4	Procedure for Resolving Differences.	25

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APPENDIX "A"

REPRESENTATION OF MONAZITE SAND TO BE
DELIVERED BY THE A.E.C. UNDER THIS CONTRACT

Source	Lot Sand		Rare Earth Oxide		Thorium Oxide	
	Ton	% Total Oxide	Tons	%	Tons	%
Brazil	3831	66.5	2333	60.9	215.4	5.6
Indian	2171	69.6	1318	60.7	193.2	8.9
Netherlands- East Indies	502	56.4	267	53.2	16	3.2
Domestic	<u>1419</u>	57.5	<u>771</u>	54.3	<u>45.7</u>	3.2
	7923		4689		470.3	

Average ThO_2 content $\frac{470.3}{7923} = 5.9\%$

Average Rare Earth Oxide $\frac{4689}{7923} = 59\%$

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APPENDIX "B-1"
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SAMPLING PROCEDURE

FOR

MONAZITE SAND

This procedure is based upon batch sampling; each batch equal to approximately 300 tons net, and assumes that the monazite sand is free flowing.

Weighing

Determination of the weight of the material will be made by either weighing the drums prior to dumping or by the use of a batch weigh hopper located immediately beyond the sampler, whichever is mutually agreeable. If a weigh hopper is used, the weight of the sample plus the weight of any spillage or dusting which may take place between the drum dumping point and the weigh hopper should be included in the total weight for the batch. If drums are used the net weight of material will be obtained by obtaining gross and tare weight for all the drums in the batch. Drums may be weighed individually or in groups on pallets.

Sampling

The material will be fed at a constant rate of flow out of a hopper to an automatic sampler. Either a Vezin or a Galliger type sampler will be satisfactory.

This sampler will be either a two or three stage sampler, and will take a sample of approximately 0.1% from the flow of material. This sample, weighing approximately 600 pounds, will be collected in a container which will be sealed. Care will be exercised to protect this sample from conditions which might affect its moisture content. This sample will be weighed as soon as it is taken.

Sample Preparation

After the entire sample has been taken, it should be mixed in a blender or rotating drum. A drum large enough to contain the gross sample and so constructed as to allow for both feeding into and out of, with tracks around its circumference to enable it to be rolled, and containing about 4 vanes on its inside to improve mixing, will be satisfactory.

1. Secondary Sample

After mixing, the gross sample will be fed at a uniform rate to a 10% single stage Vezin or Galliger type continuous sampler. The discard from this sampler should be temporarily held in reserve in case of loss of the official sample. An approximately 60 pound sample will, therefore, be obtained from this sampler.

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2. Official Moisture Determination

The 60 pound sample will be placed in suitable trays for drying, and dried to constant weight at $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for moisture determination. (The type of tray and the length of time required for this drying will be determined from mutual experience).

3. Grind to -20 Mesh

The 60 pound dried sample will then be ground in a mill so that not more than a trace will be retained on a U.S. Standard 20 mesh screen. Care will be exercised in this grinding to prevent excessive loss of dust.

4. Blending and Size Reduction

The -20 mesh, 60 pound sample will then be blended in V-type blender for $\frac{1}{2}$ hour. After blending, the sample will be cut in half (approximately) by emptying one leg of the V blender. The remaining sample will be blended and cut as above two more times. This will leave a sample of approximately 7.5 pounds in the blender. The discard sample will be sealed and held until a final analysis is agreed upon.

5. Grind to -150 Mesh

The 7.5 pound sample will then be ground in a ball mill to yield a particle size distribution of 90% through a U.S. Standard 150 mesh screen. (The grinding time required will be determined from experience).

6. Blending of Final Sample

The pulverized sample will then be placed in a blender and blended $\frac{1}{2}$ hour.

7. Final Bottling of Sample

After blending, four (4) 8 ounce sample bottles will be half filled by withdrawing the material directly out of the blender. The sample bottles will be immediately sealed. These samples will be used for chemical analysis by the participating laboratories. The chemical analyses will be reported on a dry basis. Moisture at 110°C will also be reported by the laboratories. Each sample bottle will be appropriately identified and permanent records established.

8. Sample Distribution

One (1) sample will be forwarded to the Commission and one (1) retained by the contractor. The other two (2) will be held in reserve for referee, or as replacement in case of damage to the other samples.

Adequate reserve samples will be held by the contractor until agreement is reached on analysis. This reserve material will be the material from the other leg of the V-blender in #7.

APPENDIX "B-2"

ANALYTICAL PROCEDURE FOR THE
CHEMICAL ANALYSIS OF MONAZITE SANDPrinciple

The dry ground sample is reacted with sulfuric acid. Thorium and the rare earths are separated from phosphates and sulfates by oxalate precipitations. Thorium is separated from the rare earths by repeated precipitations with hexamine and finally precipitated by oxalic acid and ignited to the oxides at 1000°C. The rare earths filtrates are precipitated by NH_4OH and finally separated as the oxalates.

Reagents Required

Sulfuric acid	96% H_2SO_4
Oxalic Acid	10% Solution
Oxalic Acid	2% Solution
Hexamine (Hexamethylenetetramine)	2% Water Solution
Ammonium Chloride	5% Solution
Ammonium Chloride	2% NH_4Cl - 10% NH_4OH
Ammonium Hydroxide	28% Solution
Sodium Meta Bisulfite	Crystals
Gelatin	1% Water Solution
HCl	37% HCl
Oxalic Acid	3% Solution

Step I Procedure for the Determination of Moisture on the Ground Prepared Sample

Accurately weigh, in duplicate, 10 grams of sample in tared aluminum dishes. Dry to constant weight at 110°C and calculate the loss in weight as moisture. The average of results found here is to be used only for calculating the chemical analysis to the dry basis. This is not the moisture on the monazite sand as delivered.

Step II Procedure for Decomposition of Monazite Sand

In duplicate, accurately weigh 5 grams of the ground prepared sample and transfer to clean, dry 140 ml. porcelain casseroles. To each, add 15 ml. of c.p. H_2SO_4 and stir constantly to prevent caking as the temperature of the mixture is brought up to gentle evolution of SO_3 fumes. Cover the casserole with a watch glass and maintain the temperature at gentle fuming for 1½ hours.

Note - Do not allow the temperature to go higher than is required to maintain gentle evolution of SO_3 fumes and do not bake to dryness, or formation of insoluble thorium pyro phosphates may occur. Stir frequently near the end of the reaction, as the mass becomes thick from the formation of the sulfates, to insure contact between the hot acid and the crystal-coated unreacted sand.

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Cool the casserole in a cold-water bath and add 40 ml. of cold water. Again cool below room temperature, while stirring, to dissolve the sulfates. Allow the heavy unreacted sand to settle and decant into a 250 ml. pyrex beaker. Wash 3 times with cool water by decantation and dry the unreacted matter by heating the casserole on a steam bath. Add 2 ml. of c.p. H_2SO_4 and repeat the digestion on the hot plate as before for an additional 1½ hours or until all the monazite is reacted. Cool and wash the remaining sample from the casserole into the 250 beaker containing the main solution. Add 1 ml. of 1% gelatin solution and stir to complete solution of the rare earth sulfates. Allow the siliceous matter to settle and decant to funnel fitted with a 11 cm #42 Whatman paper containing a small amount of paper pulp to aid filtration. Wash several times by decantation and transfer all the unreacted matter to the filter, washing until free of sulfates with cool water. Dry and ignite at $1000^\circ C$. Weigh as unreacted matter.

Note - This result is not to be reported and is found only to permit the analyst to know if a complete reaction has been accomplished. Duplicates should agree.

Collect the filtrate and washings in a 250 ml. volumetric flask, dilute to volume at room temperature, and mix.

Step III Separation of Thorium and Rare Earths from Phosphates and Sulfates

Transfer a 100 ml. aliquot (2 gram sample) of the sulfuric acid solution from Step II above to a 500 ml. separatory funnel. Add 400 ml. of water and allow this dilute solution to flow dropwise into a 800 ml. beaker containing 50 ml. (5 grams) of saturated solution of oxalic acid and 5 ml. HCl. Stir constantly on a magnetic stirrer during the addition of the sample. Rinse out the sample remaining in the separatory funnel, and add to the stirring solution. Continue stirring for 3 or 4 minutes, remove the magnet bar, rinse off with water, cover the beaker, and allow to stand at room temperature for at least 15 hours.

Filter through #40 Whatman $12\frac{1}{2}$ cm paper, and wash free of sulfates with 2% oxalic acid solution. Transfer the residue to a porcelain dish (100 ml. size). Dry in oven at $110^\circ C$, ignite at $600^\circ C$ to destroy the organic matter. Cool, add 25 ml. of HCl, cover with watch glass, and warm on top of a steam bath to complete solution. Hold until the final recovery from the filtrate is made. Collect the filtrate and washings in a liter pyrex beaker.

To the liter beaker containing the filtrates, add 20 ml. of HCl, and sufficient NH_4OH for precipitation. Heat to boiling, remove from the heat, and add 10% excess NH_4OH . Cover with watch glass and cool in the water bath, allowing the precipitate to settle. Filter thru #40 Whatman paper and wash with cool 2% NH_4Cl - 10% NH_4OH solution. Dissolve the precipitate with hot 1 + 1 HCl, washing the filter well with hot 5% HCl solution, and collecting the filtrates in a 300 ml. platinum dish. Evaporate the HCl solution to near dryness on the steam bath, then add 10 ml. HF (48%) and take to dryness. Wash down sides of the dish with a small amount of hot water, add 50 ml (1 + 7) HF and digest for a few minutes on the steam bath. Cool, and filter thru #42 Whatman paper. Wash the insoluble fluorides with (1 + 7) HF and finally with one washing of cool water. Transfer the filter paper and precipitate to a 100 ml. platinum

dish. Dry and ignite at 475°C to destroy the organic matter. Cool, add 5 ml. of HNO_3 , 5 ml. of H_2SO_4 , and carefully heat until strong fumes of SO_3 are evolved. Cool, wash down the sides of the dish with cool water, and fume strongly again. Repeat fuming until all fluorides have been expelled. Cool, and using cool water, transfer the sample to a 250 ml. beaker, add 5 ml. of HNO_3 , 5 ml. HCl , and heat to boiling or until complete solution of all the sample. Precipitate with 1 + 1 NH_4OH and add 10% excess. Allow the solution to cool and the precipitate to settle. Filter thru #40 Whatman paper and wash with cool 2% NH_4Cl - 10% NH_4OH solution. Dissolve the precipitate with hot 1 + 2 HCl and combine this solution with the chloride solution from the oxalate separation, in a 400 ml. beaker.

Step IV Separation of Thorium from the Rare Earths

Heat the combined HCl solutions from Step III in a 400 ml. beaker to boiling. Dilute to 250 ml. with water, add 10 grams NH_4Cl crystals, .2-.3 gram sodium meta bisulfite and stir to solution. Add NH_4OH until a turbidity is formed (permanent), then add 1 + 1 HCl dropwise to dissolve the precipitate and 2 drops in excess. Add a pinch more of sodium meta bisulfite and stir to solution, and to complete reduction of Ce. Heat the solution to 60° - 70°C and remove from the heat. Now slowly add 2% hexamine solution until a turbidity appears, then about 5 ml. in excess. Stir well and allow to stand on the top of the covered steam bath (not over 70°C) for $\frac{1}{2}$ hour or until the precipitate settles completely. Add 1 ml. more of 2% hexamine solution to the clear supernatant solution. If no turbidity appears precipitation is complete. If turbidity does appear, add 2 or 3 more ml. of hexamine, stir and allow to settle. Filter through #40 Whatman paper and wash with 5% NH_4Cl solution, made just ammoniacal to methyl orange collecting the filtrate in a liter volumetric flask.

Dissolve the precipitate on the paper with 100 ml. of hot 1 + 2 HCl and wash the paper well with hot 5% HCl , collecting the solution in the original beaker. Repeat the hexamine precipitation twice more exactly as described above or until the final filtrate gives no precipitate when made strongly ammoniacal. Combine the filtrates in the liter volumetric flask and save for Step V.

Dissolve the final hexamine precipitate, as before, collecting the solution in a 250 ml. pyrex beaker. Evaporate to dryness on the steam bath. Add 25-30 ml. of saturated oxalic acid, allow to stand for 5-10 minutes, then dilute to 100 ml., cover with watch glass, and boil gently for 5 minutes. Allow to stand overnight at room temperature, and filter through #42 Whatman paper. Wash well with cool 2% oxalic acid solution.

Transfer paper and precipitate to a tared platinum crucible, dry, and ignite to constant weight at 1000°C. Weigh as ThO_2 and calculate the average of the duplicate results to dry basis, using the average moisture result found on the prepared sample in Step I.

Step V Determination of Rare Earth Oxides

Make to volume, the combined cooled filtrates and washings from the hexamine precipitations in Step IV, collected in the liter volumetric flask. Mix and transfer a 200 ml. aliquot (.4 gm. sample) to a 400 ml. beaker, heat to near boiling. Add c.p. NH_4OH to precipitation and 10% by volume in excess. Cool in water bath, allow the precipitate to settle, and filter through #40 Whatman paper. Wash with cool 2% NH_4Cl -10% NH_4OH solution. Discard the filtrate and dissolve the precipitate with hot 1 + 2 HCl , washing the paper free of sample, with hot 5% HCl . Collect the solution in a 250 ml. pyrex beaker. Evaporate to dryness on a steam bath. Add 25-30 ml. of saturated oxalic acid, allow to stand 5 - 10 minutes, then dilute to 100 ml., cover with watch glass and boil gently for 5 minutes. Allow to stand at room temperature overnight and filter through #42 Whatman paper, washing with cool 2% oxalic acid solution.

Transfer the paper and precipitate to a tared platinum crucible. Dry and ignite to constant weight at 1000°C .

Weigh as rare earth oxides and calculate the average of the duplicate results to the dry basis, using the average moisture result found on the prepared monazite sand sample in Step I.

Note I. Filtrations throughout this procedure may be speeded up by use of a small amount of filter paper pulp in the paper except for the first oxalate filtrations.

Note II. It is important to have present 5% of NH_4Cl during the hexamine separations.

APPENDIX "B-3"

PROCEDURE FOR RESOLVING
DIFFERENCES-MONAZITE SAND.

For each lot of monazite sand analyzed, each laboratory shall run duplicate analyses for the thorium oxide and rare earth oxide content of the sample. The analysis reported by each laboratory shall be the mean value of a duplicate set of analyses in which the assay for thorium oxide agree within 0.18%, or any other percent mutually agreed upon, and the assay for the rare earth oxide agree within 0.5% rare earth oxide, or any other percent mutually agreed upon. If the difference between the reported analysis of the commission and the reported analysis of the contractor does not exceed 0.18% thorium oxide and 0.5% rare earth oxide, the mean value of these analyses shall be accepted as final and binding on both parties.

If the difference exceeds 0.18% in the case of the thorium oxide content and/or 0.5% in the case of the rare earth oxide content, or any other percent or percents mutually agreed upon, one of the retained samples shall be submitted to a mutually acceptable umpire laboratory for umpire analysis of the thorium oxide content or the rare earths oxide content or both the thorium oxide content and the rare earths oxide content thereof. The mean of the analysis by the umpire and the analysis of the contractor or the commission, whichever is closer to the umpire analysis (or the analyses of both the contractor and the commission if they are equally distant from the umpire analysis) shall be final and binding on the parties to this contract. The cost of the umpire analysis shall be borne by the party whose determination is furthest from the analysis of the umpire. In the event that the umpire analysis is equidistant from the analysis of the contractor and the commission, the costs shall be equally divided between both parties.

APPENDIX "C-1"

SAMPLING PROCEDURE FOR
RARE EARTHS SODIUM SULFATESampling

The Rare Earths sodium sulfate will pass through a continuous sampler of the Vezir type. The sampler will be arranged so as to cut out a sample of approximately 0.5% of the total material flow.

One day's normal production of this material will be considered a batch. The sample from this total batch will be collected in a suitable container. This container will be sealed, properly labeled and stored in a location where the sample will not be subjected to contaminants or extreme changes in temperature.

Official Sample

The official sample for analysis (which will represent approximately 200 tons of material) will be obtained by compositing the daily batch samples. This official sample will be made up prior to the shipment of the material which it represents.

Sample Preparation

Each primary daily batch sample will be mixed by rolling prior to opening.

1. Secondary Sample

Each container of the primary sample will be sampled by passing the product through a Vezir type sampler of such design that the secondary composite sample will be approximately 5% of the primary samples.

2. Moisture Determination

The secondary sample will be placed in a suitable tray(s) for drying and dried to constant weight at $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for official moisture determination. (The length of time required for drying to be determined from mutual experience).

3. Grinding

The dried secondary sample will be ground so that not more than 5% will be retained on a U.S. Standard 100 mesh screen (or other fraction as mutually agreeable).

4. Blending and Bottling of Official Samples

The sample will then be transferred to a V-type blender and blended for $\frac{1}{2}$ hour. Four (4) samples of approximately $\frac{1}{2}$ pound each will then be taken by withdrawing the material directly out of the blender.

Each sample bottle will be approximately one half filled and bear appropriate identification. The sample bottle will be immediately sealed and permanent records established.

One (1) sample will be retained by the contractor, one (1) will be forwarded to the Commission and two (2) samples retained for reference. Adequate reserve samples will be held by the contractor until agreement is reached on analysis.

5. Weighing

The product stream of rare earths double sulphate from the sampler will be collected in the tared shipping drums, and the drums filled and closed. The drums will be weighed before and after filling on a scale equipped with a weight printing mechanism. The drum weight records will be printed on triplicate sets which are numbered in series to correspond with drum numbers. One drum weight record will be placed on top of the material in the drum, and one drum weight record furnished to the representative of the Commission when the material is shipped. The drums will be closed as soon as filled and appropriately identified. The official product weight will be the sum of the net weights of the drums shipped.

In the event that the Commission wishes to spot check drum weights, the following procedure will be used. The individual gross weights of the drums on every fifth pallet chosen at random (4 drums will be on each pallet) will be checked against their printed gross weight records. Should the sum of the gross check weights vary from the sum of the original printed gross weights by more than one-half percent (0.5%) all the drums will be check weighed before shipment and the weight of the shipment computed from the gross check weights.

6. Retention of Samples

Samples will be held by the contractor until agreement has been reached on analysis. Samples on hand after agreement on analysis will be added to subsequent production before sampling.

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APPENDIX "C-2"

ANALYTICAL PROCEDURE FOR THE CHEMICAL ANALYSIS
OF RARE EARTH SODIUM SULFATES

Principle

The sample is dissolved in 1 + 2 HCl, separated from sodium and sulfates by NH₄OH precipitation. Resolution in HCl and separation of thorium from the rare earths is made by precipitation with hexamine. Thorium is determined colorimetrically with the reagent thoron. Rare Earths are determined on the filtrates from the hexamine separations by precipitation first with NH₄OH, then as the oxalate, and ignition to the oxides at 1000°C.

Reagents Required

Hydrochloric Acid	c.p. 37% HCl
Ammonium Hydroxide	c.p. 28% NH ₄ OH
Ammonium Chloride	c.p. Crystals
Hexamine (Hexamethylenetetramine)	2% Solution in water
Sodium Meta Bisulfite	Crystals
Thoron Reagent	Sodium Thoronate .1% solution in H ₂ O
Thorium Nitrate	Reagent grade Th(NO ₃) ₄
Oxalic Acid	Crystals

Step I Determination of Moisture on Prepared Sample

Accurately weigh in duplicate, 10 gram sample in tared aluminum dishes. Dry to constant weight at 110°C, and calculate the loss in weight as moisture. This moisture result is not to be used for reporting purposes. It will be used only for calculating the chemical analysis to the dry basis.

Step II Determination of Thorium Oxide

Accurately weigh in duplicate, 2.5 grams of prepared sample and transfer to 250 ml. volumetric flasks, add 225 ml. of cool 1 + 2 HCl and shake to dissolution of the sample. Dilute to volume with water, mix and transfer a 100 ml. aliquot (1 gram sample) to a 400 ml. pyrex beaker. Add 100 ml. of water, 10 grams NH₄Cl, 2 ml. of aluminum nitrate solution containing 10 mg. Al per ml., and heat to boiling. Add NH₄OH to precipitation and 10% in excess. Mix and allow the precipitate to settle while cooling to room temperature. Filter thru #40 Whatman paper and wash with cool 2% NH₄Cl - 10% NH₄OH solution. Dissolve the ppt. with hot 1 + 1 HCl and wash paper free of sample with hot 5% HCl, collecting the solution in the original 400 ml. beaker. Dilute to 200 ml. volume, add 10 gms. NH₄Cl, and NH₄OH just to produce a slight permanent turbidity. Add 1 + 1 HCl, dropwise, to dissolve the precipitate and 2 drops in excess. Now add approximately:

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.3 grams of sodium meta bisulfite crystals and heat to 60 - 70°C. Remove from the heater, and while stirring, slowly add 2% hexamine solution until a turbidity is just produced and 2 ml. in excess. Allow to stand at 70°C for 30 minutes or until coagulation occurs. Add 1 ml. of 2% hexamine to the clear supernatant liquid. If no turbidity occurs, precipitation of thorium is complete. Stir and allow the precipitate to settle, and filter thru #40 Whatman paper. Wash with 5% NH_4Cl solution which has been made neutral to methyl orange indicator. Save the filtrate in a 600 ml. pyrex beaker for the determination of rare earths as directed in Step III.

Dissolve the precipitate on the filter with hot 1 + 2 HCl and wash the paper with hot 5% HCl and repeat the hexamine precipitation in the original beaker as directed before. Filter and wash as before adding the filtrate to the 600 ml. beaker containing the first filtrate.

Dissolve the precipitate with hot 1 + 1 HCl and wash the filter with hot 5% HCl. Collect the filtrate and washings in a 250 ml. volumetric flask. Cool to room temperature and dilute to volume. Mix and transfer a 25 ml. aliquot of the solution to a 50 ml. pyrex beaker. Adjust the pH of the solution to $1 \pm .5$ with NH_4OH and/or HCl, and transfer the solution to a 50 ml. volumetric flask. Add 10 ml. of 95% ethyl alcohol and 2 ml. of .1% water solution of thoron reagent. Dilute to volume with water, mix, and read the optical density of the solution in the Beckman Du Spectrophotometer at 545 mm wave length. From the calibration curve, determine the thorium content of the sample. Calculate to ThO_2 dry basis using the average moisture found in Step I. Prepare a standard calibration curve with each set of samples run by preparing a series of solutions containing zero-10-20-40-60 and 80 micrograms of thorium. Add to each, 10 ml. 75% ethyl alcohol, 2 ml. thoron reagent and 2 ml. HCl, and dilute to 50 ml. volume.

Step III Determination of Rare Earth Oxides

Heat the combined filtrates from the two hexamine separations contained in a 600 ml. beaker to near boiling and precipitate by addition of NH_4OH . Add 10% excess NH_4OH by volume and allow to cool in the water bath as the precipitate settles. Filter thru #40 Whatman paper, washing with cool 2% NH_4Cl - 10% NH_4OH solution several times.

Dissolve the precipitate with hot 1 + 2 HCl, collecting the solution in a 250 ml. pyrex beaker. Evaporate to dryness on a steam bath and add 30 ml. 10% oxalic acid solution. Allow to stand for 5 minutes, dilute to 100 ml. volume, cover with watch glass and boil gently for 5 minutes. Adjust volume to 100 ml. with water, cover and allow to stand overnight.

Filter thru #42 Whatman paper and wash with 2% cool oxalic acid solution. Dry in a tared platinum crucible, place in cool furnace and raise the temperature to 1000°C. Heat at 1000°C to constant weight, as Rare Earth Oxides. Calculate the results to dry basis, using the moisture determined in Step I as follows:

$$\frac{\text{Weight per cent as determined}}{100 - \text{per cent moisture on prepared sample}}$$

$$\times 100 = \text{Wt. \% Rare Earth}$$

Oxides on dry basis.

All analyses are to be made in duplicate and the average result is to be reported.

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APPENDIX "C-3"

SPECIFICATIONS OF RARE

EARTHS SODIUM SULFATE

The rare earths sodium sulfate delivered by the contractor shall not contain more than 1% moisture when dried at $110 \pm 5^{\circ}\text{C}$ to constant weight, shall meet the following specifications when assayed in accordance with the specified method, and shall conform to the symbolic formula set forth below

Rare earths expressed as the oxides,
when dried at $110 \pm 5^{\circ}\text{C}$ to constant
weight

42.0% min.

Thorium expressed as the oxide, dry
basis, when dried at $110 \pm 5^{\circ}\text{C}$ to
constant weight

0.25% max.

Formula - $\text{RE}_2 (\text{SO}_4)_3 \cdot \text{Na}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$.

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APPENDIX "C-4"

PROCEDURE FOR RESOLVING DIFFERENCES

THORIUM AND RARE EARTHS OXIDE CONTENT

The analysis for rare earth oxide content and thorium oxide content reported by each laboratory shall be the mean of duplicate analyses for each lot of rare earth sodium sulphate delivered by the Contractor. The duplicate analyses used in computing the mean shall agree within 0.5% rare earths oxide, or any other percent mutually agreed upon.

If the analyses of the rare earths oxide content reported by the Commission and by the Contractor do not differ by more than 0.5% rare earths oxide, or any other percent mutually agreed upon, then the mean of the two reported determinations shall be accepted as final and binding on both parties.

If the difference between the two analyses is greater than 0.5% rare earths oxide or any other percent mutually agreed upon, then a retained sample shall be submitted to a mutually acceptable laboratory for umpire analysis of the rare earth oxide content.

The mean of the analyses of the umpire and the analysis of the Contractor or the Commission whichever is closer to the umpire analysis (or the analyses of both the Contractor and the Commission if they are equally distant from the umpire analysis) shall be final and binding on the parties to this contract. The cost of the umpire analysis shall be borne by the party whose determination is further from the analysis of the umpire. In the event that the umpire analysis is equally distant from the analysis of each party, the cost shall be divided equally by the parties.

If the mean of the Contractor's analysis and the Commission's analysis for thorium oxide content fails to meet the specifications a retained sample will be sent to the umpire if either party requests same. The mean of the analyses of the umpire and the analysis of the Contractor or the Commission whichever is closer to the umpire analysis (or the analyses of both the Contractor and the Commission if they are equally distant from the umpire analysis) shall be final and binding on the parties of this contract.

SAMPLING PROCEDURE FOR
THORIUM HYDRATE PRODUCT

The thorium hydrate product will be collected in a storage bin which will hold one day's production.

Daily Sampling

At the end of the production day the material in the storage bin will be discharged at a constant rate through a continuous sampler of the Vezin type. The sampler will be arranged to cut approximately 5% of the total flow as sample. This sample will be collected in a drum, sealed, properly labeled and stored in a location where the sample will not be subject to contaminants or extreme changes in temperature.

Composite Sample

The sample for analysis will be obtained by compositing the daily samples obtained from approximately 20,000 pounds production. This sample will be made up prior to the shipment of the material it represents. The gross sample will weigh approximately 1,000 pounds. The daily samples will be composited in the presence of a representative of the Commission.

Sample Preparation

Each drum of the total daily samples will be mixed by rolling prior to opening.

1. Secondary Sample

Each drum of the primary daily samples will be sampled by passing the material through a Vezin type sampler one after the other in succession until the entire gross sample has been sampled. The sample taken at this point will be approximately 5% of the total or approximately 50 pounds.

2. Moisture Determination

The 50 pound sample will be placed in a suitable tray for drying and dried to constant weight at $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$, for moisture determination. (The length of time and temperature required for drying to be determined by experience).

3. Grinding to -100 Mesh

The dried sample will then be ground to 95% minimum through 100 mesh.

4. Blending and Bottling

The ground sample will be transferred to a V-type blender and blended for 1 hour. Four (4) one pound (approximately) samples will be removed from the blended sample. Each will be placed in a bottle, sealed immediately and appropriately identified.

One (1) sample will be retained by the Contractor, one (1) will be forwarded to the Commission and two (2) samples retained for reference. Adequate reserve samples will be held by the Contractor until agreement is reached on analysis.

5. Weighing

The main stream of thorium hydrate from the sampler will be collected in tared 55 gallon drums and the drums filled and closed. The drums will be weighed before and after filling on a scale equipped with a weight printing mechanism. The drum weight records will be printed on triplicate sets which are numbered in series to correspond to the drum numbers. One drum weight record will be placed on top of the material in the drum and one drum weight record furnished to the representative of the Commission when the material is shipped. The drums will be closed as soon as filled and tagged so as to show the date of production and identification with the corresponding sample.

The 20,000 pounds production which corresponds to the daily samples referred to under "Composite Sample" above will be shipped as a lot.

In the event that the Commission wishes to spot check drum weights, the following procedure will be used. The individual gross weights of the drums on every fifth pallet chosen at random will be checked against their printed gross weight records. Should the sum of the gross check weights vary from the sum of the original printed gross weights by more than one-half percent (0.5%) all the drums will be check weighed before shipment and the weight of the shipment computed from the gross check weights.

Samples will be held by the Contractor until agreement has been reached on analysis. The samples on hand after agreement will be added to subsequent production prior to sampling.

APPENDIX "D-2"

ANALYTICAL PROCEDURE FOR THE CHEMICAL
ANALYSIS OF THORIUM HYDROXIDEPrinciple

The sample is dissolved in HNO_3 . Thorium and the rare earths are separated from sulfates and phosphates by oxalate precipitation. The oxalates are destroyed by ignition at 380°C . Thorium is separated from the rare earths by repeated precipitations with hexamine and reprecipitated as oxalates and ignited to ThO_2 at 1000°C . The separated rare earths are purified by NH_4OH and finally as the oxalates and ignited to the oxides.

C. P. Reagents Required

Nitric Acid	Sulfuric acid
Oxalic Acid	Perchloric acid
Ammonium Hydroxide	Molybdic acid
Hydrochloric Acid	Brom cresol green
Hexamine (Hexamethylenetetramine)	Ammonium chloride
Ammonium Nitrate	Silver nitrate
Sodium Hydroxide	Quinine sulfate
Sodium Alizarin Sulfonate	Hydrogen peroxide
Phenolphthalein	Thorium nitrate
Sulfuric Acid	Monochloroacetic acid
Sodium Chloride	Hydrofluoric acid
Barium Chloride	

Step I Determination of Moisture on the Dry Prepared Sample

Accurately weigh 10 grams, in duplicate, in tared weighing bottles and dry to constant weight at 110°C . Calculate the loss in weight as moisture.

The average moisture found here is to be used for calculating the chemical analysis to the dry basis. This is not the moisture of the product as shipped.

Step II Determination of the Nitric Acid Insoluble Matter

Accurately weigh, in duplicate, 2.5 grams of the dry prepared sample and transfer to 250 ml. pyrex beakers. To each, add 50 ml. of water and heat to boiling. Add 75 ml. of c.p. HNO_3 and boil gently for 60 minutes with watch glass cover in place during the digestion, to prevent evaporation of the acid. Cool, and filter thru a 11 cm Whatman #42 paper, washing free of acid with hot water. Dry, ignite at 1000°C to constant weight in a tared platinum crucible. Average the results and calculate the weight of the insoluble residue to the dry basis, using the average moisture found in Step I. Report as nitric acid insoluble matter. Collect the filtrates and washings in a 500 ml. volumetric flask, make to volume at room

temperature, mix, and set aside for use in making the chemical analysis.

Step III Separation of Thorium and Rare Earths From Sulfates and Phosphates

Transfer a 50 ml. aliquot (.25 gram sample) of the solution contained in the 500 ml. volumetric flask from Step II to a 250 ml. pyrex beaker. Add 2 ml. of H_2SO_4 and evaporate to fumes of SO_3 , cool, wash down the sides of the beaker with water, and fume again to expel the nitric acid. Cool, wash down the sides of the beaker with cold water, and stir to solution. Transfer the cool solution to a separatory funnel, diluting the total volume to 200 ml. and allow the sample solution to flow dropwise into a 400 ml. beaker containing 25 ml. of 10% oxalic acid and 2 ml. HCl which is being stirred constantly by a magnetic stirrer. Allow to stand overnight at room temperature. Filter thru #40 Whatman paper and wash well with cool 2% oxalic acid solution. Dry the paper and precipitate, in a 250 ml. vycor beaker and ignite for 30 minutes at $380^\circ C$ to destroy oxalates. Cool, add 50 ml. HCl, 10 ml. 30% H_2O_2 and warm on top of covered steam bath for 1 hour, and then boil to expel the H_2O_2 . Hold for the recovery of the traces of thorium and rare earths as follows:

Precipitate the filtrate and washings from the oxalate precipitation with NH_4OH and heat to boiling. Add 10% excess NH_4OH , cool below room temperature, and filter thru #40 Whatman paper, washing with cool 2% NH_4Cl - 10% NH_4OH solution. Dissolve the precipitate with hot 1 + 2 HCl and collect the solution in a 300 ml. platinum dish. Evaporate the HCl solution to near dryness, add 10 ml. HF and evaporate to complete dryness. Wash down the sides of the platinum dish with warm water, add a few drops of HF and warm on the steam bath for 10 minutes. Cool, and filter thru #42 Whatman paper, washing the precipitate with cool water containing a few drops of HF per 100 ml. solution. Transfer the paper and precipitate to 100 ml. platinum dish, dry, and ignite at $475^\circ C$ to destroy the paper. Cool, add 2 ml. H_2SO_4 , 1 ml. HNO_3 , and fume strongly. Cool, wash down the sides of the dish with water, and again heat to fumes of SO_3 to expel fluorides. Cool, and using cool water, transfer the solution to a 250 ml. beaker. Add 5 ml. HCl, 1 ml. HNO_3 , and boil to complete solution. Add NH_4OH to precipitation and 10% in excess. Cool, and filter thru #40 Whatman paper washing with cool 2% NH_4Cl - 10% NH_4OH solution.

Step IV Separation of Thorium From the Rare Earths

Dilute the HCl solution of the oxides from the main oxalate precipitation in Step III to 100 ml. volume. Add 10 ml. of HCl and heat near to boiling. Now filter this hot solution thru the paper containing the NH_4OH precipitate. Collect the filtrate and washings in a 400 ml. beaker. Transfer the filter paper and any insoluble residue to a tared platinum dish, dry and ignite to constant weight at $1000^\circ C$. Deduct the weight of the filter paper ash. Any residue found at this point will most certainly be thorium oxide, and must be dissolved by fusion with potassium bisulfate, freed of sulfates by NH_4OH precipitation, dissolved with hot HCl and added to the main chloride solution in the 400 ml. beaker.

Add 0.2 - 0.3 gram sodium meta bisulfite crystals and 10 grams of NH_4Cl . Add NH_4OH until a permanent turbidity is produced and then bring back in solution with 1 + 1 HCl adding dropwise. Add 1 drop HCl in excess and heat the solution to 60 - 70°C. Remove from the heat and add 2% hexamine solution slowly until a turbidity appears and then 5 ml. more. Warm at 70°C for 30 minutes or until the precipitate settles leaving a clear supernatant solution. Add 1 ml. more of 2% hexamine solution, and if no turbidity appears, precipitation is complete. Filter thru a #40 Whatman paper and wash with warm 5% NH_4Cl solution made just ammoniacal to methyl orange, collecting the filtrate in a liter beaker.

Dissolve the precipitate on the paper with 100 ml. hot 1 + 2 HCl and wash paper well with hot 5% HCl collecting the solution in the original beaker. Repeat the hexamine precipitation exactly as described above until the filtrate shows no precipitate when made strongly ammoniacal. Combine all the filtrates in the liter beaker and proceed as directed under Step V. Dissolve the final hexamine precipitate as before collecting the solution in a 250 ml. pyrex beaker. Evaporate to dryness on a steam bath, add 25 ml. saturated oxalic acid and allow to stand for 5 minutes, then dilute to 100 ml., cover with a watch glass, and boil gently for 5 minutes. Allow to stand overnight at room temperature and filter thru #42 Whatman paper. Wash well with cool 2% oxalic acid solution. Transfer the paper and precipitate to a tared platinum crucible, dry and place in a cool electric muffle furnace. Bring the temperature up to 1000°C and ignite to constant weight as ThO_2 . Calculate the average of the duplicate tests to dry basis using the average moisture result found in Step I.

Step V Determination of Rare Earths

Heat the combined filtrates from Step IV in the liter beaker to near boiling and add NH_4OH to precipitation and 10% in excess. Cool in water bath and allow the precipitate to settle. Filter thru #40 Whatman paper, wash with cool 2% NH_4Cl - 10% NH_4OH solution and discard the filtrate. Dissolve the precipitate with hot 1 + 2 HCl and wash the paper free of sample with hot 5% HCl. Collect the solution in a 250 ml. pyrex beaker and evaporate to dryness on a steam bath. Add 25 ml. saturated oxalic acid and allow to stand for 5 minutes, then dilute to 100 ml., cover with watch glass and boil gently for 5 minutes. Allow to stand overnight at room temperature, filter thru #42 Whatman paper, and wash with cool 2% oxalic acid solution.

Transfer the paper and precipitate to a tared platinum crucible. Dry and place in a cool muffle furnace. Bring the temperature up to 1000°C and ignite to constant weight. Weigh as rare earth oxides and calculate the average of the duplicate results to the dry basis, using the average moisture result found in Step I.

Note - All filtrations may be speeded up by adding a small amount of ashless paper pulp to the filter.

Step VI Determination of Sulfates

In duplicate, accurately weigh 2.5 grams of the prepared sample and transfer to a 500 ml. volumetric flask. Add 25 ml. of HCl and boil until the volume is 10 ml. Dilute to 400 ml. with water, add 25 ml. of 10% oxalic acid solution, and heat to boiling. Allow to stand overnight at room temperature. Make to volume with water and mix. Filter thru a dry paper and transfer a 200 ml. aliquot (1 gram sample) to a 400 ml. beaker. Dilute to 250 ml. volume and heat to boiling. Add 10 ml. of 10% BaCl₂ solution, dropwise while stirring and digest on a steam bath until the precipitate settles completely. After 4 hours filter thru #42 Whatman paper and wash with water.

Dry in a tared platinum crucible and ignite to constant weight at 1000°C. Weigh as BaSO₄ and calculate the average weight, to SO₃.

$$\frac{\text{Weight of BaSO}_4 \times .343}{\text{Weight of sample (1 gm.)}} \times 100 = \text{SO}_3, \text{ weight } \%$$

Using the average moisture found in Step I, calculate to dry basis.

Step VII Determination of Phosphorus

Transfer a 50 ml. aliquot (.25 gm. sample) of the HNO₃ solution contained in the 500 ml. volumetric flask from Step II to a 250 ml. pyrex beaker. Add 15 grams of NH₄NO₃ and heat to 45°C in a constant temperature water bath. Add 25 ml. of ammonium molybdate solution, stir well and allow to stand in the constant temperature water bath for 30 minutes with stirring every 10 minutes. Filter thru #42 Whatman paper and wash free of acid with cool water. Return the precipitate and paper to the original beaker, add 50 ml. of water and slowly add standard alkali hydroxide solution, while stirring, until all the precipitate has dissolved and not more than 2 ml. of excess, if half normal alkali is used. Add 5 drops of phenolphthalein indicator solution and titrate the excess alkali present with standard HNO₃ solution (to the disappearance of the pink color).

$$\frac{(A R - B R) \times .3086}{\text{Weight of sample (.25 gm.)}} = \text{Phosphorus expressed as P}_2\text{O}_5, \text{ wt. } \%$$

When A = ml. standard alkali hydroxide added
 B = ml. standard HNO₃ solution required
 R = normality of standard solutions

Preparation of Ammonium Molybdate Solution

Dissolve 100 grams of MoO₃ in a mixture of 144 ml. NH₄OH and 271 ml. water. Cool and syphon slowly into a cool mixture of stirring 489 ml. HNO₃ and 1148 ml. water. Allow to stand overnight and filter just before use. Store in glass stoppered bottle.

Step VIII Determination of Chlorides

Chlorides are precipitated with silver nitrate and determined by measuring the scattered light caused by the particles in suspension, using the Fisher Photo Nephelometer with ultra violet light and quinine sulfate solution for generating fluorescence. Water used should be chloride free.

Standardization of Nephelometer

Use #440 filter on left side
Blank filter in center
430 + filter on right

Reagents required and preparation of Standard Curve.

.025% water solution of quinine sulfate
.1649 grams c.p. NaCl diluted to 1000 ml. (Solution "A")
each ml. contains .0001 gram chlorine.
From the stock Solution "A" prepare a standard curve by placing into 100 ml. volumetric flasks 1 ml. of HNO₃ and to flask

- | | | |
|----|-----------------------|--------------------------|
| #1 | Water only for blank | |
| #2 | 1 ml. of Solution "A" | - containing .0001 gm Cl |
| #3 | 2 ml. of Solution "A" | - containing .0002 gm Cl |
| #4 | 3 ml. of Solution "A" | - containing .0003 gm Cl |
| #5 | 5 ml. of Solution "A" | - containing .0005 gm Cl |

Turn on the ultra violet lamp and allow to warm up. Add 1 ml. of 1% silver nitrate to flask #5 containing .0005 gm chlorides, make to volume immediately and mix. Transfer the sample to the Half Black cell, place in the nephelometer, fill the other cell with the .025% quinine sulfate generating solution and balance the nephelometer at 100% transmission against the standard containing the .0005 gm chloride precipitation.

Then precipitate #4 in the same manner, record the reading, and continue on thru the series of standards and the blank. Deduct the blank reading from each of the standards and on linear graph paper, plot the net reading against gram of sample per 100 ml. volume. Draw the curve connecting the points.

Analytical Procedure

Balance the nephelometer with the #5 solution, prepared each time a new sample is run, and transfer an aliquot of the sample solution from Step II equivalent to .25 gm (50 ml.) to a 100 ml. volumetric flask. Add 1 ml. of 1% AgNO₃ solution, dilute to volume and mix. Immediately transfer the solution to a half black cell and determine the transmission of scattered light due to the sample. Record the reading and from the standard curve, determine the chloride content of the sample, deducting the reading found on the blank. Calculate to dry basis using the moisture found in Step I.

Step IX Determination of Fluorine

Transfer a 100 ml. aliquot (.5 gm sample) of the solution in the 500 ml. volumetric flask from Step II to a 250 ml. vycor beaker.

Make ammoniacal and evaporate to near dryness. Add 10 ml. of lime water and evaporate to complete dryness. Ignite the residue at 600°C to expel the ammonium nitrate and ammonium sulfate salts. Cool and transfer the residue to the fluorine distillation flask. Add 2 glass beads and 10 ml. of 60% perchloric acid. Attach the thermometer stopper, and place the flask in the constant temperature bath. Allow the temperature to reach 85°C and turn on the steam. Distill 175 ml. at 135°C into a 250 ml. beaker, keeping the distillate alkaline during the distillation by the dropwise addition of 0.1N NaOH. Neutralize with 5% NaOH solution to phenolphthalein indicator and evaporate the solution to less than 50 ml. volume. Transfer the sample solution to a 100 ml. tall form beaker, add 5 drops of .1% aqueous solution of sodium alizarin sulfonate indicator and neutralize with .1 normal acetic acid. Add 2½ ml. of monochloroacetic acid-sodium hydroxide buffer solution and titrate the fluorine with standard .01 normal thorium nitrate solution.

From the volume of thorium nitrate solution required, read the milligrams of fluorine present from the standard curve.

Calculate the average result to dry basis using the average moisture found in Step I.

Preparation of the Standard Curve

Prepare a standard curve with c.p. sodium fluoride, titrating aliquots containing .025 - .05 - .1 - .2 - .5 and 1.0 milligrams of fluorine with .01 normal thorium nitrate solution. Plot milliliters of .01 normal thorium nitrate solution against milligrams of fluorine. The curve is not a straight line and the same analyst should titrate the standards and samples.

OFFICIAL USE ONLY

APPENDIX "D-3"
SPECIFICATIONS OF
THORIUM PRODUCT

The crude thorium hydroxide product delivered by the Contractor shall have average moisture content of 15% and shall meet the following specifications when assayed in accordance with the specified method, after drying at $110 \pm 5^\circ\text{C}$ to constant weight, or when dried according to other mutually agreed upon conditions.

ThO ₂	63% min.
Rare Earth Oxide	8% max.
SO ₃	2% "
P ₂ O ₅	7% "
Insol. in HNO ₃	2% "
Cl	0.1% "
F	0.1% "

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APPENDIX "D-4"

PROCEDURE FOR RESOLVING

DIFFERENCES--THORIUM HYDRATE PRODUCT

The analyses for thorium oxide content and rare earth oxide, P_2O_5 , SO_3 , insolubles fluorine and chlorine impurities reported by each laboratory shall be the mean of duplicate analyses for each lot of thorium hydroxide delivered by the Contractor. The duplicate analyses used in computing the mean shall agree within 0.5% thorium oxide, or any other percent mutually agreed upon.

If the thorium oxide content of the crude thorium hydroxide product as reported by the Commission and the Contractor do not differ by more than 0.5% thorium oxide, or any other percent mutually agreed upon, then the mean of the two reported determinations shall be accepted as final and binding on both parties.

If the difference between the two analyses is greater than 0.5% thorium oxide, or any other percent mutually agreed upon, then a retained sample shall be submitted to a mutually acceptable laboratory for umpire analysis of the thorium oxide content.

The mean of the analyses of the umpire and the analysis of the Contractor or the Commission whichever is closer to the umpire analysis (or the analyses of both the Contractor and the Commission if they are equally distant from the umpire analysis) shall be final and binding on the parties to this contract. The cost of the umpire analysis shall be borne by the party whose determination is further from the analysis of the umpire. In the event that the umpire analysis is equally distant from the analysis of each party, the cost shall be divided equally by the parties.

If the mean of the Contractor's analysis and the Commission's analysis for impurities content fails to meet specifications, a retained sample will be sent to the umpire if either party requests same. The mean of the analyses of the umpire and the analysis of the Contractor or the Commission whichever is closer to the umpire analysis (or the analyses of both the Contractor and the Commission if they are equally distant from the umpire analysis) shall be final and binding on the parties to this contract.

THIS AMENDMENT, entered into and effective as of November 30, 1956, by and between the UNITED STATES OF AMERICA (hereinafter called the "Government") acting through the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter called the "Commission"), RARE EARTHS, INC., a corporation of the State of New Jersey and W. R. GRACE & CO., a corporation of the State of Connecticut, having a place of business at Baltimore, Maryland:

WITNESSETH THAT:

WHEREAS, the Commission and Rare Earths, Inc., entered into Contract No. AT(49-6)-993 on July 18, 1955; and

WHEREAS, on the day and year first above written W. R. Grace & Co., sole shareholder of Rare Earths, Inc., dissolved Rare Earths, Inc., and succeeded to all of its outstanding rights, liabilities and obligations; and

WHEREAS, documentary evidence of the lawful dissolution of Rare Earths, Inc. has been furnished the Commission; and

WHEREAS, this amendment is authorized by and negotiated under the Atomic Energy Act of 1954 in the interest of the common defense and security;

NOW, THEREFORE, the parties hereto mutually agree as follows:

1. W. R. Grace & Co. hereby becomes a party to Contract No. AT(49-6)-993 in the place of Rare Earths, Inc. and undertakes to perform according to the terms and provisions thereof the work heretofore required to be performed by Rare Earths, Inc. and remaining unperformed on the effective date of this amendment.
2. Rare Earths, Inc., hereby waives any and all rights that it may have against the Commission or the Government under Contract No. AT(49-6)-993 and consents to the substitution of W. R. Grace & Co. as contracting party thereto in its place.
3. W. R. Grace & Co., as successor to Rare Earths, Inc., hereby succeeds to all of the rights and privileges and assumes all of the obligations and liabilities of Rare Earths, Inc. under Contract No. AT(49-6)-993 to the same extent as if W. R. Grace & Co. and not Rare Earths, Inc. had been the original contracting party with the Commission under the contract; and wherever the term "Rare Earths, Inc." appears in Contract No. AT(49-6)-993 the term "W. R. Grace & Co." shall be substituted therefor.

IN WITNESS WHEREOF, the parties hereto have executed this amendment as of the day and year first above written.

THE UNITED STATES OF AMERICA

WITNESSES:

Mrs. J. Hall, Secy
James W. Smead

By: UNITED STATES ATOMIC ENERGY COMMISSION

Title: James W. Smead
Director, Division of Raw Materials
Date: January 16, 1957

WITNESSES:

R. S. Clark
Edith B. Schmincke

RARE EARTHS, INC.

By: Richard M. Mardle
Title: Director
Date: December 18, 1956

WITNESSES:

James W. Geiser
Helen C. Baker

W. R. GRACE & CO.

By: M. G. Geiser
Title: Executive Vice President
Date: _____

I, R. S. Clark, certify that I am the Assistant Secretary of Rare Earths, Inc., a corporation named as a party herein; that R. M. Mardle who signed this amendment on behalf of Rare Earths, Inc. was then Director of said corporation; that said amendment was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

WITNESS my hand and the seal of said corporation.

R S Clark

R. S. Clark

(Corporate Seal)

I, M. C. Roop, certify that I am Assistant Secretary of W. R. Grace & Co., a corporation named as a party herein; that M. G. Geiser who signed this amendment on behalf of W. R. Grace & Co. was then Executive Vice President of said corporation; that said amendment was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

WITNESS my hand and the seal of said corporation.

M C Roop

M. C. Roop

(Corporate Seal)

*Agreement file
Amendment will
mrg*

THIS AMENDMENT, entered into this 9th day of July, 1957, and effective as of September 21, 1956, by and between the UNITED STATES OF AMERICA acting through the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter called the "Commission") and W. R. GRACE & CO., a corporation organized under the laws of the State of Connecticut (hereinafter called the "Contractor"):

WITNESSETH THAT:

WHEREAS, by Amendment No. 1 effective November 30, 1956, subject contract was assigned to Contractor; and

WHEREAS, by Change Order No. 1, dated September 21, 1956, the Commission ordered the Contractor to alter the specifications for shipping containers for rare earths sodium sulphate; and

WHEREAS, Contract No. AT(49-6)-993 provides for an equitable adjustment in price in the event an ordered change causes an increase or decrease in the cost of performing the contract work; and

WHEREAS, it has been determined that Change Order No. 1 causes an increase in the cost of performing the work under Contract No. AT(49-6)-993; and

WHEREAS, it is now desired to modify Contract No. AT(49-6)-993 to provide for an appropriate increase in the contract price; and

WHEREAS, this amendment is authorized by and executed under the Atomic Energy Act of 1954;

NOW, THEREFORE, the parties hereto agree that Contract No. AT(49-6)-993 shall be and is hereby amended in the following particulars only:

(1) By deleting the specifications for the shipping containers for rare earths sodium sulphate set forth in paragraph (3) of ARTICLE I - SCOPE OF THE WORK and inserting the following specifications in lieu thereof:

"55 gallon, hot-dipped, galvanized steel drum made of 18-gauge steel with two rolling hoops which will permit the clearance of the clamp ring when the drum is rolled on its side and have full open-head with 12-gauge belt-type, clamp ring closure made airtight with a synthetic rubber gasket. In case the component parts of the drums are hot-dipped galvanized before assembly, the body of the drum shall be hot-dipped galvanized after the side seam is welded."

04716

(2) by adding the following paragraph (4) to ARTICLE IV-PAYMENTS:

"(4) In addition to all other payments provided for under this contract, and upon submission of a properly certified invoice, the Commission shall pay to the Contractor once each month a sum equal to the number of drums of rare earths sodium sulphate delivered hereunder during the previous month multiplied by either (i) Three Dollars and Ninety-Six Cents (\$3.96) or (ii) the difference between the actual cost to the Contractor of each such drum and Five Dollars and Seventy-Five Cents (\$5.75), whichever sum is smaller."

IN WITNESS WHEREOF, the parties hereto have executed this amendment on the day and year first above written.

WITNESSES:

THE UNITED STATES OF AMERICA

By: UNITED STATES ATOMIC ENERGY COMMISSION

Madge J. Halliday
Eva O. Petrus

[Signature]
Title: Director, Division of Raw Materials

WITNESSES:

W. R. GRACE & CO.

[Signature]
[Signature]

By: *[Signature]*
Title: Executive Vice President

I, M. C. Roop, certify that I am the Assistant Secretary of the corporation named as Contractor herein; that M. G. Geiger who signed this amendment on behalf of the Contractor was then Executive Vice President of said corporation; that said amendment was duly signed for and on behalf of said Contractor by authority of its governing body and is within the scope of its corporate powers.

WITNESS my hand and the seal of said corporation.

[Signature]

(Corporate Seal)

Harold Davis went through all files
and determined this was the only
contract we had for the Monozite Plant
at Curtis Bay with the USAEC.

MJBerger 5/5/78

Contract No. AT(49-6)-993
Amendment No. 3
Date: November 16, 1959

SUPPLEMENTAL AGREEMENT

THIS AGREEMENT entered into this 16th day of November and effective as of January 31, 1958, by and between the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter referred to as the "Commission") and W. R. GRACE & CO., a corporation organized under the laws of the State of Connecticut (hereinafter referred to as the "Contractor").

WITNESSETH THAT:

WHEREAS, Contract No. AT(49-6)-993, effective July 18, 1955 (hereinafter referred to as "the Contract") was entered into between the Commission and Rare Earths, Inc. for the performance of certain work and services; and

WHEREAS, by Amendment No. 1, effective November 30, 1956, the Contract was assigned to Contractor; and

WHEREAS, by Amendment No. 2, effective September 21, 1956 the specifications of the Contract for shipping containers for rare earths sodium sulphate were altered; and

WHEREAS, it is now desired to further amend the Contract with respect to amounts of monazite to be delivered to Contractor by the Commission, size of delivery containers, final delivery date, and methods of weighing, sampling, and packaging; and

WHEREAS, this Amendment is authorized by and executed under the Atomic Energy Act of 1954, as amended, in the interest of the common defense and security;

NOW, THEREFORE, the parties hereto agree that the Contract as heretofore amended shall be and is hereby further amended in the following particulars only:

1. By deleting the words and figures "7900 short tons" set forth in paragraph (1) of Article I - SCOPE OF THE WORK and inserting the words and figures "997.61 short tons" in lieu thereof.

2. By deleting the specifications for the shipping containers for thorium hydroxide as set forth in paragraph (3) of Article I - SCOPE OF THE WORK and inserting the following specifications in lieu thereof:

"24-gallon fibre drums with aluminum foil barrier construction to be in accordance with Consolidated Freight classification, 300 pound net weight limit"

3. By adding the following paragraph (5) to Article IV - PAYMENTS

"(5) Upon completion of delivery to the Commission of thorium hydroxide obtained from other sources as provided in Article II - SPECIFICATIONS AND RECOVERY there shall be deducted from any amounts otherwise due the Contractor a sum equal to the number of drums of thorium hydroxide obtained from other sources and delivered to the Commission multiplied by \$0.745, the difference in cost between 44 gallon drums and 24 gallon drums."

4. By inserting the following sentence at the end of the fifth (5th) sentence as amended of paragraph (3) of Article I - SCOPE OF THE WORK:

"All drums of rare earth sodium sulphate will contain 700 pounds net material."

5. By deleting from the last sentence of paragraph (3) of Article I - SCOPE OF WORK the words "the date which is thirty months from the date which is the first day of the month following the execution of this contract by the Commission" and inserting the date "June 1, 1960" in lieu thereof.

6. By deleting Appendix "C-1" and inserting the following in lieu thereof:

"Appendix 'C-1'
Sampling procedure for
Rare Earths Sodium Sulphate

"Rare earths sodium sulphate will be packed into the galvanized steel drums and stored pending inspection. In the presence of a Government inspector each drum will be opened and a gross sample will be taken using a grain trier 30 inches long and $\frac{1}{2}$ inch diameter with 9 openings. The gross sample will be riffled to form a composite sample for each lot. The composite sample will then be divided into four equal parts. One (1) part will be retained by the Contractor for analysis, one (1) part will be forwarded to the U. S. Atomic Energy Commission, New Brunswick, New Jersey for analysis and two (2) parts will be held by the Contractor for possible umpire analysis. Weighing of the drums will be witnessed by the Government inspector and the gross and tare weights as well as the lot number will be marked on each drum."

7. By deleting Appendix "D-1" and inserting the following in lieu thereof:

"Appendix 'D-1'
Sampling Procedure for
Thorium Hydrate Product

"Thorium hydroxide will be packed into the pre-numbered tared fibre drums. Samples for the plant control system will be taken during the packing. The drums will be immediately closed. Drums of product approved by the plant control system will be moved to a warehouse area set aside for this purpose. Accumulation of drums will go on until a minimum shipment weight has been reached at which time the Government Inspector will be called in for the official gross weighing and sampling. Under the supervision of the Government inspector, each drum will be opened and a sample taken by pipe thief inserted to the full depth of the contents and with placement varied out from the top center so as not to take all samples from the same spot. The sample so taken will approximate 0.5% of the weight of the material and will be immediately placed in a clean container and the container closed. The drum opened for sampling will be immediately closed and weighed. The gross and tare weights will be marked on the drum. When all the drums in the shipment have been sampled, the sample will be thoroughly mixed by rolling for one-half hour. The blended sample shall be passed through crushing rolls set one-quarter inch apart. If the sample is essentially all minus one-quarter inch the crushing operation may be omitted. The blended, minus one-quarter inch sample will be cut down by passing through a Jones splitter and two samples of about 15 pounds each derived for moisture determination. The two 15 pound samples shall be weighed into a suitable tray for drying and dried to constant weight at 110°C + 5° for moisture determination. The two moisture contents so determined shall not be further apart than 0.5%. The two dried samples shall be blended together. After blending, four one-pound analytical samples will be taken and placed in sealed glass jars. One (1) sample will be retained by the Contractor for analysis, one (1) will be forwarded to the U. S. Atomic Energy Commission, New Brunswick, New Jersey for analysis, and two (2) will be held by the Contractor for possible umpire analysis."

IN WITNESS WHEREOF, the parties hereto have executed this amendment on the day and year first above written.

WITNESSES:

Lois M. Clark
Patricia M. Bennett

WITNESSES:

W. R. Grace
E. S. Schlegel

THE UNITED STATES OF AMERICA

BY: UNITED STATES ATOMIC ENERGY COMMISSION

R. H. Faulkner
 Acting Director
 Title: Division of Raw Materials

W. R. GRACE & CO.

By: W. R. Grace JW
 Title: Executive Vice Presidents

I, W. A. Case, certify that I am the Assistant Secretary of the corporation named as Contractor herein; that M. G. Geiger who signed this amendment on behalf of the Contractor was then Executive Vice President of said corporation; that said amendment was duly signed for and on behalf of said Contractor by authority of its governing body and is within the scope of its corporate powers.

WITNESS my hand and the seal of said corporation.

W. A. Case

(Corporate Seal)

