



July 23, 2001

Kristina L. Banovac, Project Manager
Facilities Decommissioning Section
Decommissioning Branch
Division of Waste Management
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-001

Dear Ms. Banovac:

This letter is in response to your letter dated May 9, 2001, in which you requested additional information regarding Thorium-230 at the Livonia, Michigan, site. You state that historically, AAR considered only Thorium-232 and Thorium-228 as contaminants, since these are the thorium isotopes in the thorium decay series. However, the Isotopic Thorium Results Summary, which were provided to you on March 19, 2001, indicates the presence of Thorium-230, an isotope associated with the uranium decay series. The ratio of Thorium-230 to Thorium-232 is the same for all of the samples in the report, suggesting that the Thorium-230 is a contaminant and not part of the background. In view of these results, you ask that AAR demonstrate whether uranium or other thorium isotopes are contaminants at the Livonia site. You also ask for the basis of selecting the samples for isotopic analysis, and to provide a background concentration for Thorium-230.

Enclosed with this letter is documentation demonstrating that thorium was the only source material used at the site. Also included is a laboratory report of a sample analyzed in 1990 which shows the same ratio of Thorium-230 to Thorium-232 as discovered in the samples analyzed in 1995. The Thorium-230 most likely comes from the ores from which the thorium was originally extracted. As explained in the referenced literature, uranium and thorium are both present in Monazite and Zircon sands, the usual sources for thorium metals. Hence, the Thorium-230, a daughter of Uranium-238, is present in the ore and is extracted with Thorium-228 and Thorium-230 during refining.

Selection of the soil samples for isotopic analysis was biased to those that exhibited high concentration of thorium when analyzed by gamma spectroscopy. This was done to ensure analysis of the thorium contaminant rather than background thorium. No isotopic analysis was

Ms. Kristina L. Banovac

July 23, 2001

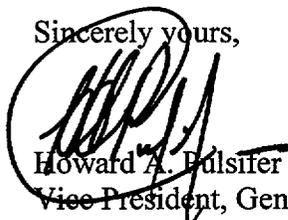
Page 2

Selection of the soil samples for isotopic analysis was biased to those that exhibited high concentration of thorium when analyzed by gamma spectroscopy. This was done to ensure analysis of the thorium contaminant rather than background thorium. No isotopic analysis was done on the background samples so we have no knowledge of background concentration of Thorium-230.

Contrary to your assertion, AAR informed the NRC staff of the presence of Thorium-230 as a site contaminant in a meeting on November 14, 2000, and included the isotope in the dose analysis submitted on December 29, 2000. The meeting and follow-up submittal were in further response to NRC comments on a revised remediation plan submitted on September 17, 1999. Between the time the revised plan was first submitted and now, there have been two rounds of comments and responses. AAR has repeatedly stated that it is prepared to move forward with the remediation. The questions posed by your letter of May 9, 2001, do not impact the fundamental plan submitted by AAR. It is evident from the record available to the NRC that the thorium was the only source material used by Brooks & Perkins. Furthermore, the presence of Thorium-230 has been fully considered and has only a second order impact on the dose analysis.

Since no further issues have been raised with regard to the revised site remediation plan, we respectfully request that it be promptly approved. AAR is committed to executing the plan without further delay.

Sincerely yours,



Howard A. Pulsifer
Vice President, General Counsel, and Secretary

HAP:jk

Encs.

cc: Barry Koh, B. Koh & Associates
Mark J. Wetterhahn, Winston & Strawn

ENCLOSURE

- *USAEC Form 2, Application for Source Material License dated January 10, 1957* – License request to possess and process refined source material in the form of thorium metal pellets (97% minimum, 98% typical thorium content) and magnesium-thorium alloy (3% thorium).
- *USAEC Source Material License No. D-547 dated January 17, 1957* – Authorizing possession of thorium metal pellets and magnesium-thorium alloy.
- *USAEC Compliance Inspection Report dated August 17, 1959* – Inventory at the Livonia plant includes magnesium-40% thorium master alloy and magnesium-3% thorium alloy
- *Brooks & Perkins, Inc., letter dated April 27, 1960* – Requesting license renewal and stating its intent to purchase thorium as a 40% thorium 60% magnesium hardener.
- *Brooks & Perkins, Inc., letter dated July 18, 1961* – Requesting license renewal and stating its intent to purchase thorium as a 40% thorium 60% magnesium hardener.
- *USAEC Source Material License No. D-547 dated August 9, 1961* – Authorizing possession of thorium as thorium magnesium hardener containing not more than 40% thorium and magnesium thorium alloy containing not more than 4% thorium.
- *USAEC Form 2, Application for Source Material License dated August 13, 1962* – License request to possess 40% thorium 60% magnesium ingots.
- *Core Laboratories Analytical Report dated 03/23/90* – The ratio of Thorium-230 to Thorium-232 is the same as reported in 1995.

REFERENCE

- NUREG-1717, *Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials, Draft for Comment, December 1999*

APPLICATION FOR AEC LICENSE TO
TRANSFER, DELIVER, EXPORT, OR RECEIVE
URANIUM OR THORIUM SOURCE MATERIAL

Pursuant to Code of Federal Regulations, Title 11—
Atomic Energy, Part 40—Control of Source Material

TO: U. S. Atomic Energy Commission,
~~P. O. Box 30, Ansonia Station,
New York 23, N. Y.~~

Washington, D. C.
Attn: Licensing
Branch

2. PREVIOUS AEC LICENSE NUMBER, IF ANY.

40-23

INSTRUCTIONS

File ~~two~~ copies of this application with the U. S. Atomic Energy Commission, P. O. Box 30, Ansonia Station, New York 23, N. Y. This application may be used for an original license or for the renewal of a license. In the case of a renewal, this application should be received by the Commission on or before 30 days before the expiration of the previous license. Complete blocks 1, 2, 3, 9, and if you combine two or more of the activities of Producer, Processor, Distributor, Exporter, or Consumer, complete each of the applicable blocks numbered 4 through 8.

1.

NAME AND ADDRESS OF APPLICANT
(Street, city, zone, state)

BROOKS & PERKINS, INC.
1950 W. Fort Street
Detroit 16, Michigan

3. INVENTORY. INVENTORY OF SOURCE MATERIAL, RAW AND REFINED, AS OF January 14, 1957 - 80 lbs.
(Specify date of last inventory)

INSTRUCTION.—Include all source material in your possession or under your control, regardless of location. Include any source material you have possession of but which is owned by others, whether or not they are licensees of the Commission. Please specify that part of your inventory which is owned by other persons, listing the names, addresses, and quantities owned by each. Do not include in this inventory any raw source material not yet removed from its place of deposit in nature.

(a) Raw Source Material

DESCRIPTION OF MATERIAL	ESTIMATED PERCENT URANIUM OR THORIUM	QUANTITY IN INVENTORY (Gross tons)	NAME AND ADDRESS OF OWNER, IF DIFFERENT FROM THAT IN BLOCK 1 ABOVE
		DOCKETED U.S.A.E.C. JAN 16 1957	
		DATE	
		<i>J.P. [Signature]</i> DOCKET OFFICER	

(b) Refined Source Material

DESCRIPTION OF MATERIAL	GRADE (Comm., CP, USP, etc.)	PERCENT OF URANIUM OR THORIUM	QUANTITY (Lb.)	NAME AND ADDRESS OF OWNER, IF DIFFERENT FROM THAT IN BLOCK 1 ABOVE
Thorium metal pellets (Thorium content to be 97% minimum, 98% typical)		98%	80 lbs.	

5. PROCESSORS. IF YOU REQUEST AN ATOMIC ENERGY COMMISSION LICENSE TO CHEMICALLY PROCESS SOURCE MATERIAL, CHECK THIS BOX AND SUPPLY THE INFORMATION REQUESTED IN THIS BLOCK, AS WELL AS THE INFORMATION REQUESTED IN BLOCKS 1, 2, 3, AND 9.

(a) THE APPLICANT CHEMICALLY PROCESSES SOURCE MATERIAL IN PLANTS LOCATED AT: (These plants include all of the plants in which the applicant will process source material under the terms of any license issued by the Commission.)

1.

2.

3.

4.

(b) IN THE EVENT RESIDUES AND TAILINGS ARE TO BE DISCARDED PLEASE DESCRIBE THESE RESIDUES AND TAILINGS, THE FREQUENCY OF DISCARDS, THE PROBABLE SOURCE MATERIAL CONTENT AND THE REASONS FOR NOT CONSERVING THE MATERIAL:

6. DISTRIBUTORS. IF YOU REQUEST AN ATOMIC ENERGY COMMISSION LICENSE TO RECEIVE SOURCE MATERIAL FOR RESALE ONLY, WITHOUT ANY INTERMEDIATE PROCESSING, CHECK THIS BOX AND COMPLETE BLOCKS 1, 2, 3, AND 9.

7. CONSUMERS. IF YOU REQUEST AN ATOMIC ENERGY COMMISSION LICENSE TO USE SOURCE MATERIAL IN CHEMICAL ANALYSIS OR IN THE MANUFACTURE OF, OR FOR INCORPORATION IN, ANY PRODUCT, CHECK THIS BOX AND SUPPLY THE INFORMATION REQUESTED IN THIS BLOCK AS WELL AS THE INFORMATION REQUESTED IN BLOCKS 1, 2, 3, AND 9.

DESCRIPTION OF SOURCE MATERIAL TO BE USED	ESTIMATED ANNUAL REQUIREMENTS (Lb.)	USES
Thorium metal pellets (Thorium content to be 97% minimum, 98% typical)	6000 lbs.	INDICATE WHETHER (1) AS ANALYTICAL REAGENT, (2) FOR INCANDESCENT MAN- TLES, (3) MEDICINAL, OR (4) OTHER. IN THE CASE OF OTHER USES, DESCRIBE THE PRODUCT, THE SOURCE MATERIAL CONTENT, AND THE MANNER IN WHICH THE PRODUCT WILL BE USED. For alloying with magnesium to produce magnesium - Thorium wrought products which will be resold to licensed customers in wrought form or as fabricated parts.
Magnesium Thorium Sheet, Plate & Extrusions (3% Thorium)	2000 lbs.	To be resold to licensed customers as fabricated parts.

8. EXPORTERS. IF YOU REQUEST AN ATOMIC ENERGY COMMISSION LICENSE TO EXPORT SOURCE MATERIAL, CHECK THIS BOX AND SUPPLY THE BALANCE OF THE INFORMATION REQUESTED IN THIS BLOCK AS WELL AS THE INFORMATION REQUESTED IN BLOCKS 1, 2, 3, AND 9. (Note that approval on Form AEC-7 is required for each individual export transaction.)

Name and address of each of your agents who for your account will prepare Department of Commerce "Shipper's Export Declaration" (Form 7525-V), will request permission to export on Form AEC-7, and will ship source material.

NAME OF AGENT	ADDRESS

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

In Reply Refer To:
40-235

SOURCE MATERIAL LICENSE

Brooks & Perkins, Inc.
1950 W. Fort Street
Detroit 16, Mich.

License No. D-547

Dated: JAN 17 1957

Attention: Mr. E. L. Westerdale

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to six thousand (6000) pounds of thorium metal pallets and two thousand (2000) pounds of magnesium-thorium alloy during the term of this license for use in the manufacture of wrought and fabricated parts for resale.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission. Except as herein provided, it is subject also to the provisions of the Commission's proposed regulations, published in the Federal Register July 16, 1955, Title 10, Code of Federal Regulations, Part 20, entitled "Standards for Protection Against Radiation" until such time as said proposed regulations or revisions thereof shall become effective regulations of the Commission. Notwithstanding Section 20.24(f) of said standards, labeling shall not be required for laboratory containers such as beakers, flasks and test tubes, used transiently in laboratory procedures during presence of the user.

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire on February 1, 1958.

FOR THE ATOMIC ENERGY COMMISSION

DICTATED
APPROVED 


Lyall Johnson
Chief, Licensing Branch
Division of Civilian Application

Enclosure:

1. 10 CFR 20

cc: Document Room cc: M. M. Mann, INS with copy of application
Docket Officer

August 17, 1959

6. Inspection Findings (Continued)

Brooks & Perkins were in noncompliance with the terms of their license, which authorizes receipt of source material at 1950 West Fort Street, Detroit, in that source material is received, used, and stored at the Livonia plant. See Section 16 of this report.

They were in noncompliance with Section 20.203 (e)(2) of 10 CFR 20 in that areas in both plants in which more than 16.5 pounds of thorium are used or stored were not posted. See Section 17 of this report.

They were in noncompliance with Section 20.203(f)(2) of 10 CFR 20 in that containers in which more than 1.65 pounds of thorium are transported, stored, or used were not labeled. See Section 17 of this report.

The above items of noncompliance were discussed with the licensee management, who stated that the corrective actions detailed in the indicated sections of this report would be undertaken.

August 17, 1959

DETAILS

9. Persons Accompanying Inspector

The inspector was accompanied by K. M. Jezik of the COO Inspection Division. The Detroit Department of Health had been notified of the scheduled inspection, and they had notified the District Engineer of the Michigan Department of Health.

10. Persons Interviewed

The following employees of Brooks & Perkins were interviewed, and they furnished the information given in this report: H. L. Westerdale, Purchasing Agent; Richard Studer, Metallurgist; Livonia Mill Division; and Charles Summers, Assistant Plant Manager; Livonia Mill Division. John V. Neheimas of the University of Michigan School of Public Health, who made the radiation hazard evaluation for Brooks & Perkins, was present and furnished information about the evaluation.

11. Organization

H. L. Westerdale, Purchasing Agent, has administrative responsibility for the use of source material at Brooks & Perkins. He is located at the Detroit address, where the general offices and plant are situated. He has been designated as the certifying official and handles all contacts with the AEC in regard to licensing. He keeps records of purchases of thorium and sales of 3% alloy.

Richard Studer, Metallurgist, is in charge of the handling of source material in the Livonia Mill Division, where he is located.

Charles Summers, Assistant Plant Manager, Livonia Mill Division, is in charge of the records of receipts, inventories, and transfers of source material kept at Livonia.

12. Administrative Control

For the customers of Brooks & Perkins HK31 alloy (containing 3% thorium, nominally), the customer's AEC license number appears on the customer's purchase order and on the Brooks & Perkins mill order.

Brooks & Perkins have on file copies of the AEC licenses of their major customers, such as The Martin Company and Boeing Aircraft.

13. Source Material Program

In the rolling mill, Livonia Mill Division, located at 12633 Inkster Road, Livonia, Michigan, master alloy containing 40% thorium (nominally) is used in the manufacture of HK31 alloy containing 3% thorium (nominally). About 60 pounds of master alloy are used for one melt.

The operations performed at Livonia include melting, casting, and rolling. More details on the process are given in Exhibit A, "Radiation Hazard Evaluation of Thorium Alloy Processing Operations," pages 3 and 4.

In the Detroit plant, located at 1950 West Fort Street, all types of fabricating operations, including forming, cutting, welding, and sanding, are performed on HK31 alloy. HK31 alloy is the only material containing thorium which is handled at this plant.

14. Receipts, Inventories, and Transfers

The last purchase of 97% thorium pellets was made on 3-10-58, when 400 pounds were received. No thorium pellets have been purchased since the master alloy became available.

August 17, 1959

14. Receipts, Inventories, and Transfers (Continued)

The following amounts of magnesium-40% thorium master alloy in the form of 25-pound notched ingots have been purchased from Davison Chemical Company, Erwin, Tennessee in 1959 to date:

300 pounds, 2-4-59	300 pounds, 5-1-59
300 pounds, 2-27-59	300 pounds, 6-16-59
1500 pounds, 3-9, 3-16-59	300 pounds, 7-20-59
300 pounds, 4-21-59	300 pounds, 8-13-59

At the time of the inspection about 650 pounds of the master alloy were on hand at the Livonia Mill Division.

At the time of the inspection about 3,450 pounds of 3% thorium-magnesium alloy were in process and about 542 pounds of 3% alloy scrap were in process for recovery.

The inventory of 3% alloy on 7-31-59 was 2,791 pounds. This represented a 650-pound increase over the inventory on 12-31-58.

The amount of 3% thorium-magnesium alloy shipped in 1959, was 19,876 pounds. (That is, up to August 17, 1959, the date of inspection.)

15. Radiation Hazard Evaluation

A study dated May 18, 1959 and entitled "Radiation Hazard Evaluation of Thorium Alloy Processing Operations" was prepared for Brooks & Perkins by G. Hoyt Whipple and John V. Mehemias of the University of Michigan School of Public Health. This study is included in this report as Exhibit A. It was previously submitted to the Division of Licensing and Regulation in connection with the renewal of Brooks & Perkins' source material license.

This radiation hazard evaluation was made in response to a letter dated December 13, 1958 from J. C. Delaney to H. L. Westerdale.

On the final page of their evaluation, Whipple and Mehemias draw the following conclusions.

"The results of the survey reported herein indicate that the thorium alloy manufacturing as now performed at the Brooks & Perkins plant in Livonia does not produce hazardous amounts of airborne thorium dust, nor constitute any violation of the AEC Regulations."

"As long as thorium processing at the Brooks & Perkins plant is maintained at the present level, no violation of the AEC regulations should occur, and we do not feel that routine surveys are required."

"Waste disposal. Thorium may leave the Brooks & Perkins plant at any of several possible points.... Airborne dust or liquid samples were collected at these points and analyzed for thorium content. At no point were values found to be in excess of the Federal Register limitations, when dilution and occupancy were considered."

16. Location of Operations

License D-547 authorizes Brooks & Perkins to receive source material at 1950 West Fort Street, Detroit, Michigan. Since they are receiving, using, and storing source material at the Livonia Mill Division in Livonia, Michigan, they are in noncompliance with the terms of their license.

This was brought to the attention of Richard Studer and H. L. Westerdale. Mr. Westerdale stated that Brooks & Perkins would apply for an amendment to their license to cover use of source material at their Livonia location.

BROOKS & PERKINS

INCORPORATED

MAGNESIUM FABRICATORS

GENERAL OFFICES AND PLANT
1950 WEST FORT STREET
TASHMOO 5-3900

DETROIT 16, MICHIGAN

April 27, 1960

ROLLING MILL
LIVONIA MILL DIVISION
LIVONIA, MICHIGAN

DOCKET NO. 40-235
File Copy

Mr. J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing and Regulation
UNITED STATES ATOMIC ENERGY COMMISSION
Washington 25, D. C.

Reference: Docket No. 40-235
License D-547

Dear Mr. Delaney:

Enclosed is a report dated April 22, 1960 of the results of a survey conducted over the past ninety (90) days by Dr. G. Hoyt Whipple and Mr. A. P. Kenneke, covering radiation levels at our Livonia Mill. Based on the conclusions set forth in Section 7 of the report, we believe that we are justified in requesting a renewal of our License D-547, and in requesting a thorium allotment of 12,000 pounds per year. Intent is to purchase thorium as a 40% Th 60% Mg hardener.

A Gelman continuous air sampling machine, of the metering type, has been purchased and will be used to implement the recommendations of paragraphs b, c, and e of Section 8. In compliance with paragraph g of Section 8, release of spent pickle solutions will be timed to avoid exceeding daily release limits. Other recommendations in this section i.e., paragraphs a, f, and h, are complied with by our retainer arrangement with Dr. Whipple. Paragraph c, if further air sampling indicates necessity therefor, will be met by modification of processes and/or mechanical equipment.

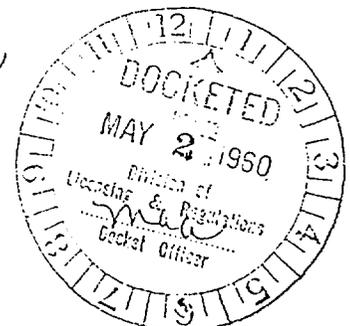
Very truly yours,

BROOKS & PERKINS, INC.

R. R. Studer
R. R. Studer
Metallurgist

RRS/hram

Attachment



NO. 40-235
BROOKS & PERKINS *file*

INCORPORATED
DETROIT 16, MICHIGAN
TASHMOO 5-5900

GENERAL OFFICES AND
DEFENSE PRODUCTS DIVISION
1950 WEST FORT STREET



MILL AND INDUSTRIAL
PRODUCTS DIVISION
LIVONIA, MICHIGAN

July 18, 1961

Mr. J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing and Regulation
UNITED STATES ATOMIC ENERGY COMMISSION
Washington 25, D. C.

Reference: Renewal of License D-547

Dear Mr. Delaney:

Enclosed are three copies of a report dated June 21, 1961 by Dr. G. Hoyt Whipple and Charles A. Pelletier entitled "Radiation Hazard Evaluation of the Thorium - Magnesium Alloy Production at the Livonia Plant, Brooks & Perkins, Inc." Based on the summary and conclusions set forth in Section II of the report, we request a renewal of our License D-547 and request a thorium allotment of 15,000 pounds per year. Intent is to purchase the thorium in the form of a 40% Th - 60% Mg hardener.

We intend to follow the recommendations set forth in Section VI of the report.

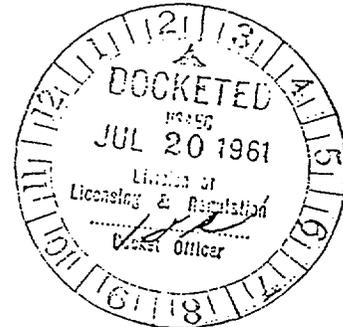
Very truly yours,

BROOKS & PERKINS, INC.

H. M. Luehmann
Metallurgist

(2 copies)

Attainment a/s



UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR SOURCE MATERIAL LICENSE

Pursuant to the regulations in Title 10, Code of Federal Regulations, Chapter 1, Part 40, application is hereby made for a license to receive, possess, use, transfer, deliver or import into the United States, source material for the activity or activities described.

<p>1. (Check one)</p> <p><input type="checkbox"/> (a) New license</p> <p><input type="checkbox"/> (b) Amendment to License No. _____</p> <p><input type="checkbox"/> (c) Renewal of License No. <u>STB-362</u></p> <p><input type="checkbox"/> (d) Previous License No. _____</p>	<p>2. NAME OF APPLICANT</p> <p style="text-align: center;">BROOKS & PERKINS, INC.</p> <hr/> <p>3. PRINCIPAL BUSINESS ADDRESS</p> <p style="text-align: center;">1950 W. Fort St. Detroit 16, Mich.</p>																
<p>4. STATE THE ADDRESS(ES) AT WHICH SOURCE MATERIAL WILL BE POSSESSED OR USED</p> <p>(a) 12633 Inkster Rd. Livonia, Mich. (b) 1950 W. Fort St. Detroit 16, Mich.</p>																	
<p>5. BUSINESS OR OCCUPATION</p> <p>(a) <u>magnesium sheet & plate production</u></p> <p>(b) <u>Magnesium sheet fabricators</u></p>	<p>6. (a) IF APPLICANT IS AN INDIVIDUAL, STATE CITIZENSHIP</p> <p>(b) AGE</p>																
<p>7. DESCRIBE PURPOSE FOR WHICH SOURCE MATERIAL WILL BE USED</p> <p style="text-align: center;">The 40% thorium magnesium master alloy will be used to produce magnesium sheet and plate containing a nominal 2% or 3% thorium at the Livonia plant.</p>																	
<p>8. STATE THE TYPE OR TYPES, CHEMICAL FORM OR FORMS, AND QUANTITIES OF SOURCE MATERIAL YOU PROPOSE TO RECEIVE, POSSESS, USE, OR TRANSFER UNDER THE LICENSE</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:20%;">(a) TYPE</th> <th style="width:30%;">(b) CHEMICAL FORM</th> <th style="width:25%;">(c) PHYSICAL FORM (Including % U or Th.)</th> <th style="width:25%;">(d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds)</th> </tr> </thead> <tbody> <tr> <td>NORMAL URANIUM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>URANIUM DEPLETED IN THE U-235 ISOTOPE</td> <td></td> <td></td> <td></td> </tr> <tr> <td>THORIUM</td> <td>alloy of thorium and magnesium</td> <td>40% th.-60% magnesium ingot</td> <td>3000</td> </tr> </tbody> </table> <p>(e) MAXIMUM TOTAL QUANTITY OF SOURCE MATERIAL YOU WILL HAVE ON HAND AT ANY TIME (in pounds)</p> <p style="text-align: center;"><u>15,000 combined master alloy plus sheet and plate containing 3% th. maximum</u></p>		(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (Including % U or Th.)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds)	NORMAL URANIUM				URANIUM DEPLETED IN THE U-235 ISOTOPE				THORIUM	alloy of thorium and magnesium	40% th.-60% magnesium ingot	3000
(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (Including % U or Th.)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds)														
NORMAL URANIUM																	
URANIUM DEPLETED IN THE U-235 ISOTOPE																	
THORIUM	alloy of thorium and magnesium	40% th.-60% magnesium ingot	3000														
<p>9. DESCRIBE THE CHEMICAL, PHYSICAL, METALLURGICAL, OR NUCLEAR PROCESS OR PROCESSES IN WHICH THE SOURCE MATERIAL WILL BE USED, INDICATING THE MAXIMUM AMOUNT OF SOURCE MATERIAL INVOLVED IN EACH PROCESS AT ANY ONE TIME, AND PROVIDING A THOROUGH EVALUATION OF THE POTENTIAL HAZARDS ASSOCIATED WITH EACH STEP OF THOSE OPERATIONS.</p> <p style="text-align: center;">For use in accordance with the procedures described in the licensee's application dated Feb. 22, 1960, April 27, 1960, and July 18, 1961</p>																	
<p>10. DESCRIBE THE MINIMUM TECHNICAL QUALIFICATIONS INCLUDING TRAINING AND EXPERIENCE THAT WILL BE REQUIRED OF APPLICANT'S SUPERVISORY PERSONNEL INCLUDING PERSON RESPONSIBLE FOR RADIATION SAFETY PROGRAM (OR OF APPLICANT IF APPLICANT IS AN INDIVIDUAL).</p> <p style="text-align: center;">Applicant's Metallurgical Supervisor has a B.S. Degree in Metallurgical Engineering with 14 years experience in Metallurgical Research. He is responsible for the Radiation Safety Program as directed by Dr. G. Hoyt Whipple, University of Michigan School of Public Health who is retained as a consultant. Refer letter of 8/2/62</p>																	
<p>11. DESCRIBE THE EQUIPMENT AND FACILITIES WHICH WILL BE USED TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE OR PROPERTY AND RELATE THE USE OF THE EQUIPMENT AND FACILITIES TO THE OPERATIONS LISTED IN ITEM 9; INCLUDE: (a) RADIATION DETECTION AND RELATED INSTRUMENTS (including film badges, dosimeters, counters, air-monitoring and other survey equipment as appropriate. The description of radiation detection instruments should include the type of radiation detected and the range(s) of each instrument.)</p> <p style="text-align: center;">Surveys have been made under the direction of our consultant and his results are contained in the reports dated 6/21/61 and 8/2/62 enclosed with this application. Film badges are supplied and checked by Picker X-ray Corp., 8514 W. McNichols, Detroit, Mich.</p> <p>(b) METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED IN (a) ABOVE (for film badges, specify method of calibrating and processing, or name supplier.)</p> <p style="text-align: center;">Film badges supplied by Picker X-ray Corp.</p>																	

8389

UNITED STATES
ATOMIC ENERGY COMMISSION

SOURCE MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954, and Title 10, Code of Federal Regulations, Chapter 1, Part 40, "Licensing of Source Material," and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, possess and import the source material designated below; to use such material for the purpose(s) and at the place(s) designated below; and to deliver or transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission, now or hereafter in effect, including Title 10, Code of Federal Regulations, Chapter 1, Part 20, "Standards for Protection Against Radiation," and to any conditions specified below.

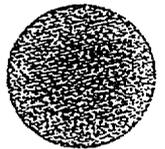
Licensee		3. License No.
1. Name	Brooks & Perkins, Inc.	STB-362
2. Address	1950 West Fort Street Detroit 16, Michigan	4. Expiration Date
	Attention: Mr. H. M. Luehmann	August 31, 1962
		5. Docket No.
		40-235
6. Source Material	7. Maximum quantity of source material which licensee may possess at any one time under this license	
Thorium as thorium magnesium hardener containing not more than 4% thorium and magnesium thorium alloy containing not more than 4% thorium.	Fifteen thousand (15,000) pounds	

CONDITIONS

8. Authorized use (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.)

For use in accordance with the procedures described in the licensee's applications dated February 22, 1960, April 27, 1960, and July 18, 1961.

For use at the licensee's facilities at 12633-7 Inkster Road, Livonia, Michigan and for use of magnesium thorium alloy containing not more than 4% thorium by weight at the above stated location.



For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance _____

DN
8/9/61

Donald A. Nussbaumer

Division of Licensing and Control

CORE LABORATORIES



ANALYTICAL REPORT
 900006
 FOR
 AAR Brooks & Perkins
 Karl Schaler
 Advanced Structures Division
 Livonia, MI 48150
 03/23/90

Handwritten signature



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12649 Richfield Court
Livonia, Michigan
48150
(313) 462-3900

LABORATORY TESTS RESULTS

03/23/90

JOB NUMBER: 900086 CUSTOMER: AAR Brooks & Perkins ATTN: Karl Schafer

SAMPLE NUMBER: 0001 DATE RECEIVED: 01/24/90 TIME RECEIVED: 08:37 SAMPLE DATE: 01/24/90 SAMPLE TIME: 08:37
PROJECT ID: Soil Sample SAMPLE ID: Soil Sample REM: 1x1 gal can

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, Total	2.9	pCi/g		03/23/90	CAS
Thorium 230, total, error, +/-	0.9	pCi/g		03/23/90	CAS
Thorium 230, total, LLD	0.6	pCi/g		03/23/90	CAS
Thorium 232, total	1.4	pCi/g		03/23/90	CAS
Thorium 232, total, error, +/-	0.6	pCi/g		03/23/90	CAS
Thorium 232, total, LLD	0.3	pCi/g		03/23/90	CAS

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APPROVED BY: *[Signature]*

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QUALITY ASSURANCE REPORT 03/23/90

JOB NUMBER: 900305 CUSTOMER: AAR Seiber & Perkins ATTN: Karl Schafer

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (A-B)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER: Thorium 230, total				DATE/TIME ANALYZED: 03/23/90 16:20		QC BATCH NUMBER: 102489				
DETECTION LIMIT: UNITS: pCi/g				METHOD REFERENCE:		TECHNICIAN: CAS				
STANDARD DUPLICATE	prep prep	900305 900305-1	6.7 2.9	2.4	18.87	6.9	97.1			
PARAMETER: Thorium 230, total, error				DATE/TIME ANALYZED: 03/23/90 16:26		QC BATCH NUMBER: 102490				
DETECTION LIMIT: UNITS: pCi/g				METHOD REFERENCE:		TECHNICIAN: CAS				
PARAMETER: Thorium 230, total, ILD				DATE/TIME ANALYZED: 03/23/90 16:27		QC BATCH NUMBER: 102491				
DETECTION LIMIT: UNITS: pCi/g				METHOD REFERENCE:		TECHNICIAN: CAS				
PARAMETER: Thorium 232, total				DATE/TIME ANALYZED: 03/23/90 16:37		QC BATCH NUMBER: 102492				
DETECTION LIMIT: UNITS: pCi/g				METHOD REFERENCE:		TECHNICIAN: CAS				
DUPLICATE	prep	900305-1	1.9	1.4	30.3					
PARAMETER: Thorium 232, total, error				DATE/TIME ANALYZED: 03/23/90 16:29		QC BATCH NUMBER: 102493				
DETECTION LIMIT: UNITS: pCi/g				METHOD REFERENCE:		TECHNICIAN: CAS				
PARAMETER: Thorium 232, total, ILD				DATE/TIME ANALYZED: 03/23/90 16:30		QC BATCH NUMBER: 102494				
DETECTION LIMIT: UNITS: pCi/g				METHOD REFERENCE:		TECHNICIAN: CAS				

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NC = Not Calculable Due to Values Lower Than The Detection Limit

Quality Control Acceptance Criteria:

- Blanks..... Analyzed Value <= The Detection Limit
- Reference Standards..... 100 +/- 10 Percent Recovery
- Duplicates..... 20% Relative Percent Difference, or +/- The Detection Limit
- Spikes..... 100 +/- 25 Percent Recovery

- (1) EPA 600/4-79-020, Methods For Chemical Analysis of Water and Wastes, March 1983
- (2) EPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition, November 1986
- (3) Standard Methods For the Examination of Water and Wastewater, 16th Edition, 1985
- (4) EPA 600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, August 1980
- (5) Federal Register, Friday, October 26, 1984 (40 CFR Part 136)
- (6) EPA 600/8-78-017, Microbiological Methods for Monitoring the Environment, December 1978

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