



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED

WILMINGTON 98, DELAWARE

PURCHASING DEPARTMENT

October 16, 1961

Mr. Lyall Johnson (4)
Chief-Licensing Branch
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Sir:

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, the Du Pont Company desires a specific license for its Newport Plant located at Newport, Delaware, authorizing the use of Thorium Salts as described in subsequent paragraphs.

Dispersion Modified Metals

General

Material Requested

Thorium salts, including Thorium Nitrate and Thorium Oxalate.

Quantity

A maximum of 1,000 pounds per year Thorium content.

Weight %

33 to 48% Thorium in Thorium Nitrate and 45 to 56% Thorium in Thorium Oxalate, depending on the degree of water of crystallization.

Form

Crystals

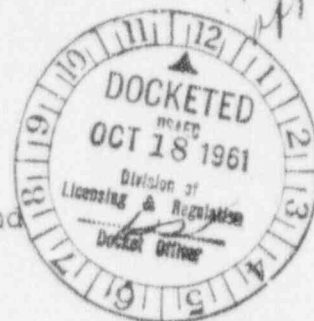
Quantity on Hand

300 pounds of Thorium total, but not exceeding the following in each category:

Raw Material - 150 lbs. of Thorium as a Thorium Salt
Processing Equipment - 20 lbs. of Thorium
Sub-finished Products (Temporary Storage) - 50 lbs.
of Thorium
Products - 150 lbs. of Thorium

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minutes of meeting



Notice of O. & P.

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Intended Use

Dispersions of Thorium Oxide in metal.

Facilities

The processing operation will be carried out in an area which is used only for this work. The area is about 25' x 40'. It is part of a brick building having a concrete ground floor. The area has several working levels. Initially, we will use only the ground level and the first elevated level. The latter will have steel flooring with floor drains and splash panels, so installed that the area can be hosed down.

The operation which is being installed in this area is being transferred from the du Pont Experimental Station where it has been active during the past year. We have measured the radiation exposure of the men on the job at the Station, and find that the annual dosage is less than 0.5 rem. For this reason, we propose to operate the area at Newport as an unrestricted area. If we find that exposure for any employee begins to approach 0.5 rem/year, then we will restrict the area.

Except for Thorium-containing products in transit, and small quantities of samples used in laboratory analyses, all raw materials and Thorium-containing products will be stored in locked cabinets.

Vented Area

The building will contain a general heating and ventilating system. Total intake will be approximately 9000 cu.ft./min., which represents an average of about 20 changes per hour in the building.

Storage

Locked cabinets will be provided for holding closed containers of raw materials, semi-finished, and finished products.

Equipment

Processing

The processing equipment installed in the building will be tanks for dissolving, mixing and reacting the Thorium salt with metal salts, a plate and frame filter press, a calcining oven, a combination drying and calcining oven for mixed precipitates, grinding equipment, and a controlled atmosphere furnace. In addition, other laboratory-type equipment will be employed. Appendix A provides information on the use of this equipment.

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Hood

A hood will be installed so that the calcined Thorium Oxide can be transferred manually without exposing the operator to a local concentration of dust. Air passage through this hood will be about 2000 cu.ft./min. The calcining furnace will be installed in another hood. The total quantities of air passing through this latter hood will be approximately 1000 cu.ft./min.

The Thorium powder being transferred has the following screen analysis:

Greater than 20 mesh	-	0.8%
28 - 40 mesh	-	7.5%
40 - 60 mesh	-	2.2%
60 - 100 mesh	-	1.8%
100 - 200 mesh	-	60.4%
200 - 324 mesh	-	20.8%
Less than 325 mesh	-	6.5%

This material is transferred to a vessel where it can be mixed with water and subsequent operations are performed with a wet, non-dusting product.

The vents from the hood will be discharged to the atmosphere approximately 80 feet above the ground. Present experience indicates that less than 1 microcurie of Thorium will be lost per day from this point, and this quantity will be sufficiently diluted with vented air that air filters are not expected to be required. However, the air in the ducts leaving each hood will be monitored for particulate matter, and if extensive concentrations are encountered, an American air filter, type A (99.97% less than 0.3 micron) or its equivalent will be installed.

Dry Box

None required.

Filters

All mother liquors before being discarded will be processed through either a plate and frame filter press, or a Nutsche filter, after first being treated to precipitate excess quantities of Thorium. See also above considerations for using filter on hood vent.

Respirator Protection

The operations will not require the use of respirators.

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Storage Containers

Dried and finished and semi-finished products will be stored in metal containers (pint, quart, gallon, and 5 gallon paint cans). Raw materials (Thorium salt) will be stored in containers received from the vendor. Samples containing 5 or less microcuries of Thorium may be retained for analytical purposes in closed glass bottles.

Handling

All raw materials and products in containers will be moved manually. Normally, all Thorium containing materials will be handled without direct body contact. Exception will be laboratory samples which have been consolidated to dense forms.

Instruments

Beta and Gamma Monitoring

Nuclear Measurements Corporation Geiger Counter, GS-3L or equivalent will be employed.

Alpha Particulate Matter

Particulate matter emitting alpha particles will be counted by Nuclear Measurements Corp. Proportional Counter, PC-3A, or equivalent.

Neutrons

None required.

Air Samplers

Eight samplers will be employed to monitor the air continuously at various points, including: at working level, in front of hood; at working level near the center of operations in the room; and in exhaust from the hood. Samplers will consist of Gelman filter, holder No. 1200-A, using 2" Gelman Glass Filter Paper, type E or equivalent. Air at the rate of 1.0 cubic feet per minute will be drawn through each filter, using a Bell and Gossett air pump, number SYC 16-1, or equivalent.

Scaler

The alpha counting instrument above includes a scaler.

Fluorimeters

The Thorium content of the final products and intermediate products will be established by X-ray fluorescence, using a Phillips OEG-

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Administrative Procedure

Initial operation of the process facilities will be done by engineers and laboratory assistants. The normal complement will be 2 to 4 persons per shift. Initially, only one shift operation per day is anticipated, but facilities will accommodate 24 hr. per day operation. Personnel to be involved have had laboratory experience in handling both hazardous chemicals, and the engineers have had experience in handling laboratory quantities of Thorium.

Standard operating procedures and safety considerations will be written for the use of each of the major pieces of equipment, and each person in the area will be trained to use and follow the procedures. A written operating log will be kept.

Supervision of the entire operation will be by technically trained personnel. All changes in operation, safety procedures, and written procedures must receive their approval.

Radiation Protection

Because the Thorium will normally be handled in lots of 10 lbs. or less, special protection facilities will not be required for the shipping, handling, and processing of the product. (Part 20.20 3f.)

Radiation Survey Procedures

Radiation Levels

Will be monitored with a Geiger counter.

Contamination

Will be checked by the use of a Geiger counter, and/or a wipe test, using a PC-3 proportional counter.

Air Samples

See section on air samplers, under Instruments.

Effluents

Air effluents - see air samplers under Instruments. Thorium content of precipitates and mother liquors will be established by assay of mass (X-ray and wet chemical for each step).

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Leak Testing

Visual inspection of equipment.

Personnel Monitoring

Film Badges

Film badges will be issued to each worker assigned to the area. The films will be processed on a once-per-week and once every three months basis, using Tracerlabs' film badge service or equivalent.

Dosimeters

None will be required.

Urine Analysis

Will be done for Thorium once per year.

Waste Disposal

Estimated Quantity

500 lbs. per year.

Methods

Two general methods of waste disposal will be employed; burial and discharge to plant sewage and water effluent streams.

All solid or hemi-solid Thorium containing materials will be accumulated, stored, and periodically buried. Burial will be in the plant dump, located remotely at the far end of the plant.

All solutions containing Thorium will be normally treated chemically to precipitate as much of the Thorium as possible before discarding them. The resulting solutions will be emptied into the sewer on the plant. The resulting concentration of Thorium in these discarded solutions will be below detectable limits, and several orders of magnitude below those specified by AEC regulations, Part 20.

Spills will normally be picked up and discarded along with other solids, and the floor of the building will normally be washed down from time to time to remove trace quantities of material, and these will also be discharged into the plant effluent.

Less than 2 millicuries per day (18 grams) of Thorium are expected to be vented into the atmosphere from these facilities. All ventings will

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Laboratory analytical samples will also be buried.

Training and Experience Available

See sections on administrative procedures.

The Newport plant personnel are used to safety hazards of the type encountered with Thorium, for example. The plant has had many years of experience in complex chemical handling, including producing titanium from titanium chloride.

Appendix A gives the details of our process. This is submitted as an Appendix so that it can be maintained as confidential, since:

1) Public inspection does not seem to be required in the public interest, since the potential safety hazards have been fully covered.

2) The du Pont Company has gone to considerable expense in developing this process, and we are not yet in a position to disclose it publicly.

The du Pont Company fully appreciates that anyone receiving materials made as authorized by any license granted would be required to conform to the appropriate Federal Regulations governing source materials.

The potential for this use is approximately 500,000 pounds per year. We will request an amendment when quantities in excess of 1000 pounds per year are required.

STB 58³ This operation is similar to the one at our Belle Works. License STB 58 covers the work at Belle. My letter to you dated December 23, 1960, supplied information for this installation. It is expected that the work being done at Belle will eventually be transferred to Newport. The Belle License would be no longer required. When this change is to be made, you will be advised and the changes, if any, required to the Newport License will be requested.

Columbium Extraction

At our Newport plant, we have in progress a program for extracting columbium from its ores. In this program we work with ores which contain very low levels of Thorium. During the processing, this source material is concentrated. In this work, we have been operating under License SMB-273 expiration date May 31, 1964.

We expect to continue with this project. Concentrates containing Thorium will be buried, along with wastes from our dispersion modified metal program.

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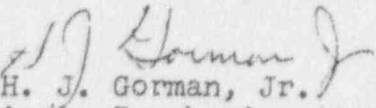
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The total quantity on hand in this process will be less than 15 pounds of contained Thorium.

Very truly yours,


H. J. Gorman, Jr.
Asst. Purchasing Agent
Chemicals & Containers Div.

HJG/dat