



E. I. DU PONT DE NEMOURS & COMPANY
NEWPORT, DELAWARE 19804

CHEMICALS AND PIGMENTS DEPARTMENT

~~SECRET~~
70.30

BCC: P. A. Hopkins - Wilm.
→ P. F. Brown - Legal
F. B. Bredimus
S. A. Tasher - Legal

March 18, 1981

Re: Docket No. 40-6664

JOHN D. KINNEMAN, CHIEF
MATERIALS RADIOLOGICAL PROTECTION SECTION
U.S. NUCLEAR REGULATORY COMMISSION
REGION 1
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

Dear Mr. Kinneman:

I am writing in response to your letter of January 6, 1981 requesting information associated with a former process at our site, which involved the use of Thorium. Specifically, you requested information concerning radiological surveys conducted upon closure of these facilities and the practices employed to dispose of waste materials from this process. This process was discontinued in 1968 at Newport and was subsequently sold to the Fan Steel Corporation in Utah. Concurrent with this transfer of ownership, most of the documentation regarding the process technology and several of the personnel involved also went to Fan Steel. After a thorough review of the information still available regarding this former process, the following appears most appropriate to address your concerns.

Concerning the "close out" surveys, the documentation I have located noted a "preliminary" survey (attachment 1) which indicated no radiological concerns with the exception of some trenches, which were subsequently cleaned employing appropriate disposal procedures. A subsequent survey (attachment 2) "closed out" the facilities with a finding of "safe radiation levels in all areas." As indicated by Ms. Campbell of your office, a final formal close out survey report was issued on August 26, 1968 by a Mr. Lancaster. As apparently in your case, I have been unable to locate a copy of this final report.

I have located standard operating instructions from the process (attachment 3) concerning the disposal of waste materials, which indicate that disposal was in accordance with AEC regulations (10 CFR part 20) and a log was maintained of each burial.

9403170149 940120
PDR ADOCK 04006515
C PDR

JOHN D. KINNEMAN, CHIEF - 2 -
MATERIALS RADIOLOGICAL PROTECTION
SECTION

March 18, 1981

These burials were made in a former landfill at the site. The conditions for burial were:

- Contents of each burial would not exceed 450 kg of Thorium metal.
- Each burial location must be at least four feet deep and six feet from the nearest previous burial.
- Not over twelve burials were to be made each year.

We have conducted radiological monitoring of groundwater and surface conditions at this former disposal site, and have not detected any radiation in excess of "background" levels.

I hope you find this information adequate to establish that adequate surveys and waste disposal practices were effected in compliance with our license No. STB-489.

If I can provide any further clarification, please contact me at 302-999-6141.

Sincerely,


M. BARSZCZ

SAFETY, HEALTH, AND ENVIRONMENTAL SUPERVISOR

MB:cac

Attachments (3)

303541

ATTACHMENT 1

cc: H. K. Schaumann - Newport
~~Z. Fortney~~ "
~~D. A. Nelson~~ "
~~J. M. Chase~~ "
~~E. L. Anderson~~ "
~~D. F. Reddish~~ "

Newport, Delaware
 August 5, 1968

Dr. R. D. Nutting
 Newport

On August 2 a survey was made, using a Geiger counter, of building A-23 areas previously used in the DMM operations. All areas were found to be free of harmful radiation with the possible exception of the grating covered drain gutters both inside and outside of the areas.

These drains were found to be filled, on an average of three inches, with a heavy black sludge (when wet) which gave off discernable radiation.

It is recommended that the gratings covering these drains be removed so that this radioactive material can be shoveled into plastic bags, placed in suitable containers and buried. The material should be wet down before and during the shoveling operation.

COMPLETED

W. A. Lancaster
 W. A. Lancaster
 Radiation Protection Officer

/aj

Handwritten notes:
 AHS
 This should be done
 done along with you
 [initials]

L. H. [unclear]
ATTACHMENT 2

cc: H. H. Scheumann - Newport
R. Z. Fortney - "
D. A. Nelson - "
J. M. Chase - "
E. L. Anderson - "
D. F. Reddish - "
K. M. Kolb - "

Newport, Delaware
August 14, 1968

Dr. R. D. Nutting
Newport

A geiger counter survey was made today of the drain gutters in and adjacent to A-23 building. These drain gutters being the ones mentioned in my letter of August 5, 1968.

The results indicated safe radiation levels in all areas. The residual surface radiation was found to be in the order of 0.05 millirems per hour.

W. A. Lancaster
W. A. Lancaster
Radiation Protection Office

/aj

ATTACHMENT 3

F. Waste Disposal

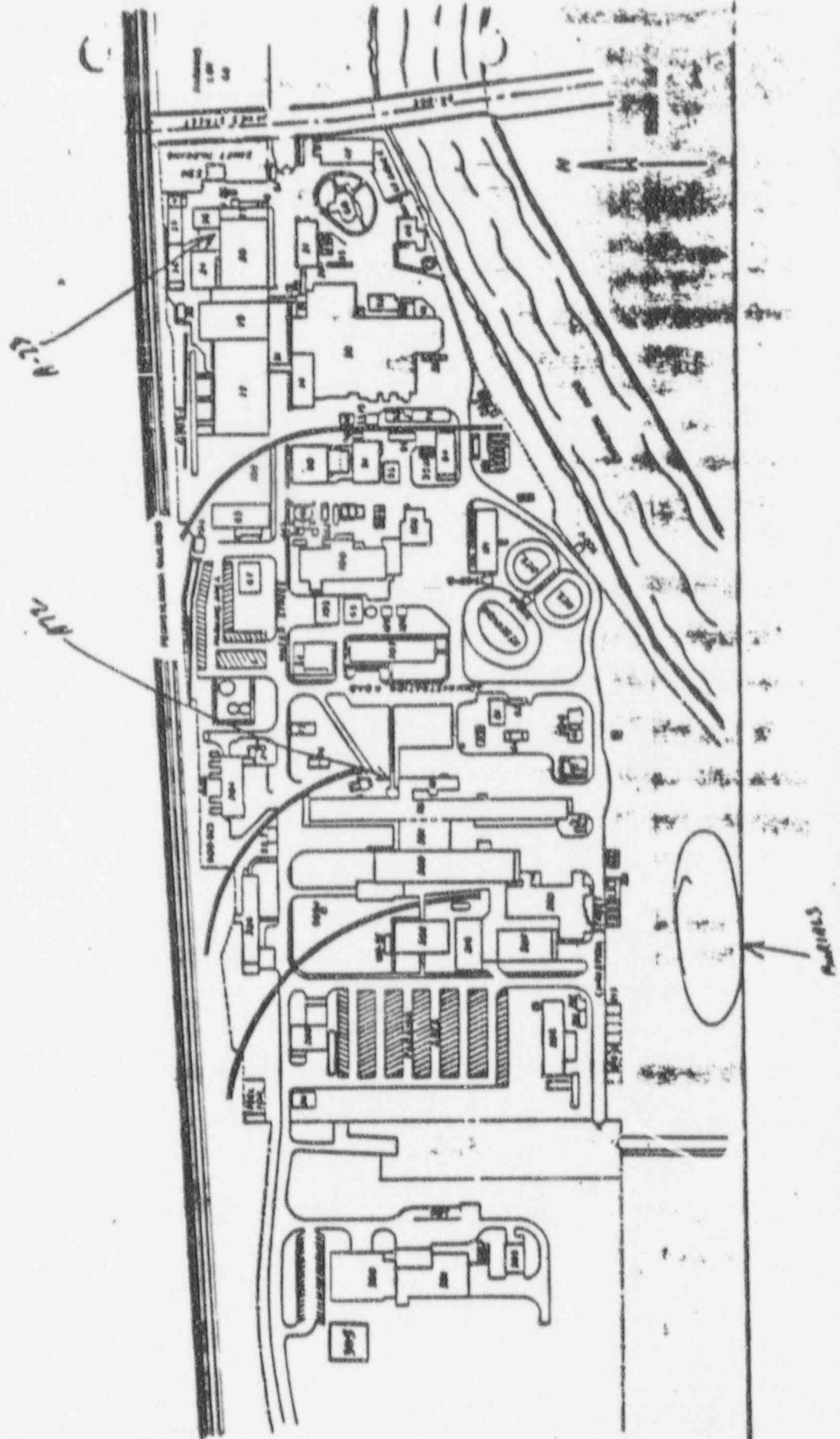
1. Solids

All waste process material, towels, etc., which show a beta plus gamma count on the Geiger Muller counter of over twice background 1-inch from the surface will be regarded as radioactive and placed in a container labeled "Thorium Wastes." When full, this container will be buried. The AEC specifies burial of not over 450 kg of Thorium metal per burial. Each burial is to be at least 4 feet deep and 6 feet from the nearest previous burial. Not over 12 burials are to be made per year. L. Hovis will be responsible for these burials, for notifying H. F. Bartolo in writing of the quantity of source material buried, and for making entry of the burial in the log.

2. Liquids

All liquid which may be contaminated with radioactive materials will be dumped in a drum located in "A" line. An attempt should be made to precipitate the radioactive material when possible. When the drum is full, it will be carefully decanted (by siphon) to the sewer using care not to disturb solid material which has settled to the bottom. Occasionally the solids collected in the bottom of the drum will be removed, filtered, and added to the storage drum for solid waste. West will be responsible for liquid waste disposal.

NEWPORT PLANT



SKETCH NO. NPD-9439

TITLE: LAYOUT OF NEWPORT PLANT DUMP

DATE: 4-22-57

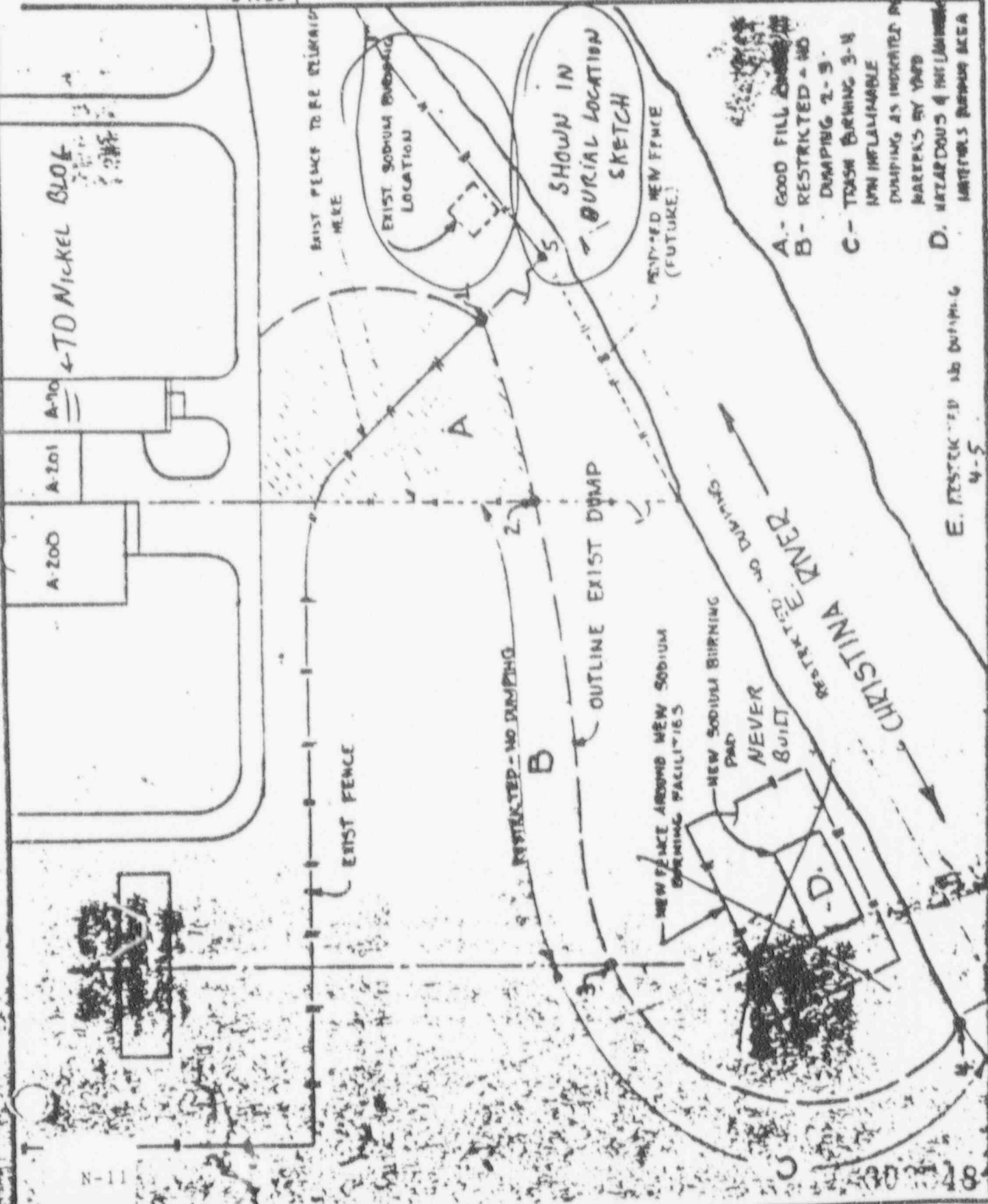
DRYD NO. C.M. T.T.L. SURVEY

R. F. LE PONT DE NEBOURS & CO., INC.
ENGINEERS, DELAWARE
NEWPORT, DELAWARE

SCALE: NONE

SIGNATURE: W. S. KAPP

ENGINEERING SKETCH SHEET



3.2.5 - RESEARCH METALS

rest of the ore piles. This assumption is based on... Four specific metals were worked with at the research level, zirconium, hafnium, niobium (Columbium), and tantalum. These metals were worked with during the period from approximately 1950 to 1965. The only one of these metals that was produced in any significant amount was niobium (total of several hundred pounds per day). These metals were very valuable and were handled in a manner as to prevent any loss due to carelessness. The only waste materials from the manufacturing of these metals were incompletely reacted chlorides.

3.2.6 THORIA DISPERSED MODIFIED NICKEL

Plate 8 is a 1930's photograph that shows the area just south of the Pennsylvania-Baltimore Railroad in the vicinity of Buildings 83 and 17. These piles are believed to be... Thorium-232 was used at the Site during the period from 1961 to 1968 as part of Du Pont's Dispersion Modified Metals program to impart improved high temperature properties to metals such as nickel. Thoria Dispersed Nickel (TD Nickel) was the only material of this type to be produced at the Newport Plant in pilot unit quantities (several hundred pounds per day). The process operations, licensing, and waste disposal for the TD Nickel program are described below.

Process Operations:

The TD Nickel process consisted of the preparation of a colloidal suspension (a sol) of the thorium oxide (thoria), mixing with a solution of nickel salt (generally nickel nitrate), co-precipitation and filtration of the mixture, and finally drying and then calcining of the precipitate. The nickel oxide in calcined material was, in turn, reduced to elemental nickel with hydrogen. The thoria remained unchanged. The levels of thoria were generally in the range of 2 to 5 percent in the finished material.

Small scale operations were performed in only two buildings at the Site. Small scale operations were conducted in Building 23 and somewhat larger operations were performed in Building 72.

The initial thorium for this process was purchased as either thorium nitrate or oxalate. Thorium nitrate is water soluble. Thorium oxalate is insoluble. When the thorium

nitrate was used as the starting material, it was converted to the insoluble oxalate by mixing with oxalic acid. Then the thorium oxalate crystals were heated to form thorium oxide. From that point on in the process, the thorium was only present as the insoluble oxide and was generally in a homogeneous mixture with the nickel in the 2 percent to 5 percent range as a dispersed metal oxide.

The representative of only the Department of Energy without any influence from the Commission (shall be) Licenses were obtained from the Atomic Energy Commission (AEC) to handle materials containing thorium. The first license was issued by the AEC in December, 1961 and permitted a maximum of only 300 pounds of thorium at any one time. This was renewed in 1965, extending to 1968. The renewal license permitted an increase in the maximum usage to 5000 pounds. However, during the period of greatest activity, the license not only still restricted the total amount of thorium at any one time to 300 pounds, but also placed restrictions on the amount on hand in each stage of the process:

process was a tightly-controlled operation that was conducted only on a very small scale. There is no indication of any radioactive materials in the soil or ground water. The products manufactured at the Site were valuable, and perhaps more importantly, they were only on a small scale.

Raw Materials - 150 lbs.

In Process - 20 lbs.

Semi-finished product - 50 lbs.

Product - 150 lbs.

The specific operational areas and the associated chemicals and procedures for the various manufacturing processes are described in the AEC license application. The AEC license application described the two means of disposal and the methods to be used to handle spills. In general, waste solids containing thorium were to be accumulated, stored and periodically buried in the plant landfill (North Disposal site).

Horizontally and vertically across the entire operations area. These groundwater data are considered representative of all the groundwater quality data available. All waste solutions or suspensions containing thorium were to be treated to precipitate the thorium. The precipitate would be accumulated with the other solid waste and ultimately buried and the thorium-free liquid would be discharged to the plant cooling tower.

An excerpt from operating instructions in the AEC license application is included here, which provides guidance on burial procedures and also discusses how liquids contaminated with radioactive materials were to be treated. The activity level is limited to the current drinking water standards (5 pCi/l) in the groundwater at monitoring well 10.

Solids: "All waste process material, towels, etc., which show a beta plus gamma count on the Geiger Muller counter of over twice background 1-inch from the surface will be regarded as radioactive and placed in a container labeled "Thorium Wastes." When full, this container will be buried. The AEC specifies burial of not over 450kg of thorium metal per burial. Each burial is to be at least 4 feet deep and 8 feet from the nearest previous burial. Not over 12 burials are to be made per year. L. Hovis will be responsible for these burials, for notifying H.F. Barfelo in writing of the quantity of source material buried, and for making entry of the burial in the log."

Liquids: "All liquid which may be contaminated with radioactive materials will be dumped in a drum located in "A" line. An attempt should be made to precipitate the radioactive material when possible. When the drum is full, it will be carefully decanted (by siphon) to the sewer using care not to disturb solid material which has settled to the bottom. Occasionally the solids collected in the bottom of the drum will be removed, filtered, and added to the storage drum for solid waste. Mr. West will be responsible for liquid waste disposal."

Ground water from SM-4 and upgradient monitoring wells NW-1A; V-1

From discussions with Du Pont pensioners who had worked on the process, the solid wastes were normally paper towels, gloves, filter cloths, etc., which had been used in the process. By far, however, the largest amount of solid waste was material found to be out of specification after the calcining step and before reduction. Due to the strict AEC regulations, it is very unlikely that the cleanup and disposal of any spilled materials was not handled properly. Consequently, it is concluded that due to the stringent materials handling procedures, the operations area is not a likely source of radiological contamination. This has been confirmed by the background levels of alpha and beta activity at wells SM-5 and DM-8, adjacent to the former TD Nickel operations main building (Building 72) sampling efforts. Results are presented in a report prepared by Du Pont (see Appendix C).

Discussions with pensioners also confirmed that an estimated 20 tons of waste containing a maximum of 2 percent to 5 percent thorium oxide were buried in the North Disposal site. Based on these discussions and a review of extant maps and drawings, it is concluded with a high degree of certainty that the burial location was restricted to the area shown on Figure 4. According to the pensioners the waste materials were transported from Buildings 73 and 72 to the burial area and the burial location of the drums was recorded on a burial log. Except for a small amount of material buried slightly east of the Sodium Burning Pad that existed in 1957, all of the wastes were buried immediately to the southwest of this pad in an area about 35 feet wide and 130 feet long, parallel to the river, as schematically shown in the burial log on Figure 5. (Figure 5 is a reproduction of the Du Pont

file burial log required by the AEC license; as excerpted above in the operating instructions.)
No additional investigation or documentation of the thoriated waste burial location or handling
practices is considered necessary; west of the landfill, was more recently located with

of the by the... have barriers to the north and west. The... exception is the
...
...
...



E. I. DU PONT DE NEMOURS & COMPANY

WILMINGTON, DELAWARE

PURCHASING DEPARTMENT

W. A. JENKINS - PIGMENTS DEPT. - WILM.
G. B. ALEXANDER - NEWPORT, DELAWARE
R. M. MC ADAM - NEWPORT, DELAWARE

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.

6176316

Quantity

DWI

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) - 30 lbs.

October 16, 1961

Mr. Lyall Johnson

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.

Wipe Analysis

Will be done for Thorium once per year.

DW 6176317

Waste Disposal

Estimated Quantity

500 lbs. per year.

Methods

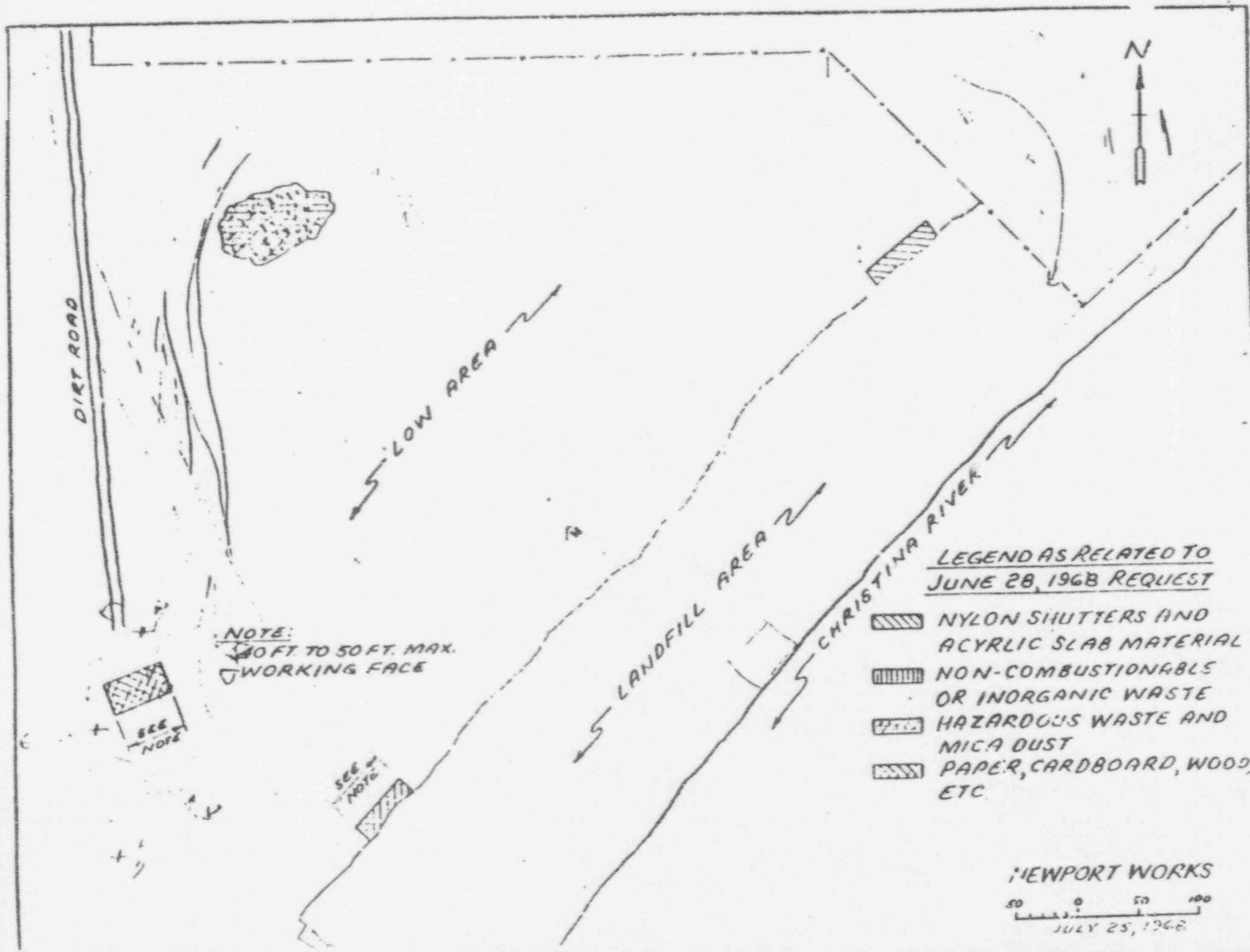
Two general methods of waste disposal will be employed; burial and discharge to plant sewage and water effluent streams.

All solid or semi-solid Thorium containing materials will be accumulated, stored, and periodically buried. Burial will be in the plant dump, located remotely of 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 discharging 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 cleaned by hand. Discharge will be into the sewer, and the floor of the building will normally be washed down from the spill to remove trace quantities of material, and this will also be discharged into the plant sewer.

Less than 2 milligrams of Thorium will be discharged into the atmosphere from the plant stack, which is located 20 feet above ground.



NOTE:
 40 FT. TO 50 FT. MAX.
 WORKING FACE

LEGEND AS RELATED TO
 JUNE 28, 1968 REQUEST

-  NYLON SHUTTERS AND
ACRYLIC SLAB MATERIAL
-  NON-COMBUSTIONABLE
OR INORGANIC WASTE
-  HAZARDOUS WASTE AND
MICA DUST
-  PAPER, CARDBOARD, WOOD,
ETC.

NEWPORT WORKS
 50 0 50 100
 JULY 25, 1968

12. (c) - Cont'd.

areas and weekly in unrestricted areas. This sampling is done in all areas where dry, thoriated material is handled, except the small laboratory tools, and including all points where dust can be ejected from our area. A total of fifteen dust samplers are now in use; this number may vary slightly from time to time as our experience dictates, or as a temporary experimental unit is built or dismantled.

Film Badges - Film badges are used for all personnel assigned to and working regularly in areas where thorium compounds are used in the production or storage of dispersion-modified metals. They are also used by selected personnel working with experimental quantities on a laboratory scale. The badges are read on a monthly basis. So far, they show no exposure to significant amounts of beta-gamma radiation.

Smear Tests - Smear tests are taken weekly in all areas, and daily at random locations in operating areas. The specimens are read for alpha count rate, to serve as a check on the effectiveness of cleanup procedures. (For details, see paragraph 4, H. J. Gorman, Jr. to D. A. Nussbaumer, dated August 7, 1962.) Cleanup is now required if smear sample counts exceed one count/min./cm².

Beta-gamma surveys of radiation levels are made weekly in operating and storage areas. This supplements the film badge service.

USAEC Inspection - Attention is drawn to the fact that these procedures were judged to be adequate by the Division of Compliance, U.S.A.E.C., on the occasion of an on-site inspection on November 12, 1963, during which no item of noncompliance was found.

13. (a) It is possible that up to 2,000 pounds per year of waste thorium may be disposed of by burying. A very small fraction of this could be raw material salts, but almost all of it would be thorium dispersed in intermediates or in metal as product. Most of it will be in the form of sludge or powders, chemically unreactive, and will be buried in accordance with 10CFR20.304.

A small part of the waste is aqueous effluent, overflowing from a settling tank, (see Par. 3, Supplement II to Appendix A, letter from C. R. Whitcombe to D. A. Musshaumer, dated October 4, 1963, see also Par. 5, H. J. Gorman, Jr. to D. A. Musshaumer, dated August 7, 1962; Par. 3, H. J. Gorman, Jr. to D. A. Musshaumer, dated August 16, 1962). This effluent is sent to sanitary sewers in accordance with 10CFR20.503 and 10CFR20.106.



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON 98, DELAWARE

PURCHASING DEPARTMENT

*48-6664
filed*

October 16, 1961

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

*copy of this letter
sent in 40-6515
for info only
because of p. 2
in p. 2.*

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.

*Memo
Apparent*

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.

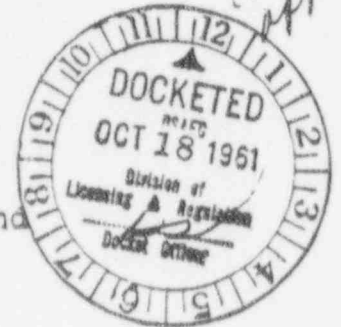
Form

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



Notice sent 10/18

October 16, 1961

Mr. Lyall Johnson -

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 ^{micro}millicuries per day (18 grams) of Thorium are expected to be vented into the atmosphere from these facilities. All ventings will be at least 20 feet above ground level, at permissible concentration levels.

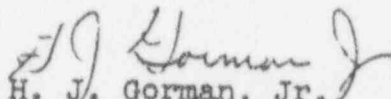
Page 8 (continued)

October 16, 1961

Mr. Lyall Johnson -

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