



DuPont Legal

January 20, 1994

Heather M. Astwood, Project Manager
Nuclear Regulatory Commission
Division of Low-Level Waste Mngmt.
Office of Nuclear Material Safety
Washington, D.C. 20555-0001

Re: Thorium Disposal Information Request - 12/9/93
DuPont Newport Superfund Site

Dear Ms. Astwood:

This letter represents the response of E. I. du Pont de Nemours and Company to your information request dated December 9, 1993 regarding the disposal of thorium wastes at DuPont's Newport Plant (North Landfill). As you are aware, this activity took place between the years 1961 to 1968. Your questions appear in bold type and DuPont's response/reference to attached documents follows each question. Although your initial request was directed to Mr. Joel Karmazyn, DuPont's project coordinator for this Site, I would appreciate it if all future correspondence concerning this matter were also directed to my office at the address indicated below.

1. The location(s) of the thorium waste disposal in the North Landfill?

Attached is a complete copy of DuPont's response to an Information Request from the USEPA pursuant to §104(e) of CERCLA (Attachment A). DuPont's response is dated 11/30/93. This same question was a part of that request/response. See DuPont Response #3(e) along with the attached drawings, maps, etc. These documents represent the known extent of DuPont information about the exact location of the thorium burial locations in the Newport Site North Landfill.

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2. **The concentrations of thorium in the soils and waste in the North Landfill?**

Since DuPont can locate no documents or other information sources which verify the exact amount and type (i.e. waste material, towels, protective clothing, debris from waste handling operations, etc.) of thorium waste, guessing about the concentration levels of thorium in the soils and other North Landfill waste (referred to as "overburden" in the attached documents) would be speculative. See DuPont Response to EPA Questions 3(b) and (d) and attached document referred to in the response. However, we've included a portion of the 1989 Data Sufficiency Memorandum submitted to USEPA which contains calculations on the issue of concentrations based on certain assumptions set forth in the document (Attachment B).

3. **All chemical forms of thorium known to be present in the landfill?**

See DuPont responses to USEPA Questions 1 and 2. (Attachment A)

4. **Potential for leaching and groundwater transport of thorium and its decay products at the North Landfill under existing and remedial (in accordance with the ROD) conditions?**

See Attached document entitled: "Technical Review and Comments by Douglas Conzales, Ph.D. - Radiological Investigation Data for the DuPont Newport Site (Attachment C)

Attachment "D" are several miscellaneous documents related, but not directly responsive to the questions.

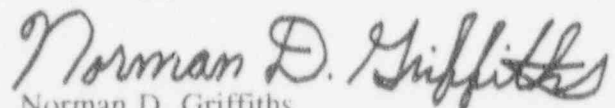
DuPont appreciates and does not contest the authority and jurisdiction of the Nuclear Regulatory Commission over the disposal of thorium by facilities which operated under the Atomic Energy Act of 1954. We are concerned however, that the NRC may order DuPont to perform characterization and assessment activities to determine the concentrations of thorium in the soils of the North Landfill as stated in your letter.

It appears to us that "sufficient" documentation no longer exists in DuPont's files to provide the NRC with the detailed information you indicate is necessary in order for the NRC to determine the long-term fate and potential risks to the public and environment arising from the thorium disposal. We are hopeful that the NRC recognizes the inherent problem of requesting documents from a period of more than 30 years ago and will be reasonable in its approach to the Site.

As you know, a thorough study of the North Landfill has already been performed during the EPA-approved RI/FS. The Record of Decision, which must have had NRC concurrence (as an ARAR) does not require any special characterization of the thorium buried in the landfill. DuPont is puzzled as to the NRC's involvement at this late stage in the process. The NRC's involvement, as you can appreciate, puts DuPont in the untenable position of having to satisfy "two masters" -- the NRC and the EPA, which we believe is already satisfied with the thorium disposition as reflected in the ROD remedy for the North Landfill. I would hope that both agencies would work together to resolve their positions on this matter rather than placing DuPont in the middle of this issue and possibly leading to a delay in implementation of the ROD.

We look forward to your reply.

Very truly yours,



Norman D. Griffiths
Senior Counsel
Environmental Law Group

Full Address:

Norman D. Griffiths, Esq.
E. I. du Pont de Nemours and Company
DuPont Legal - D-8067
1007 Market Street
Wilmington, DE 19898

cc*: P. B. Butler, DuPont, CRG, B-12228
R. Wiederhorn, DuPont, CRG, B-12226
J. Karmazyn, DuPont, DERS, BPCC, 390
Randy Sturgeon, USEPA, Region III, RPM
Wayne Walters, Esq., USEPA, Region III, ORC
Ann Hiller, DNREC, NCCo Office

* Recipients of DuPont's CERCLA 104(e) Response when it first issued (11/30/93) will not receive Attachment "A", only Attachments "B", "C" and "D".

ATTACHMENT A



LEGAL
Wilmington, Delaware 19898

November 30, 1993

OVERNIGHT DELIVERY

Mr. Randy Sturgeon (3HW42)
U.S. EPA, Region III
841 Chestnut St. Bldg.
Philadelphia, PA 19107

Re: Response of E. I. du Pont de Nemours and Company
CERCLA §104(e) Information Request - 9/15/93
Thorium Disposal
DuPont Newport Superfund Site

Dear Mr. Sturgeon:

The attached document represents DuPont's response to the above-referenced Information Request. DuPont's response is being submitted in conformance with a new submittal deadline agreed upon by Regional Counsel and the undersigned -- December 1, 1993 (ref. Ltr. 10/27/93 Walters to Griffiths).

The information contained in the attachment represents a good faith effort by DuPont to find responsive information. But it should be recognized that the pilot plant involved with thoriated nickel alloys operated from 1961 to 1968. Locating records and personnel from that era with knowledge about this AEC-licensed operation was difficult. In the case of any submitted documents, originals were not available in some instances and only parts of documents were found in the files. Also, pursuant to this Request, DuPont did not strike through any portions of document #N-12. The struck-through portions were on the originals found in the files. DuPont will continue to search for more legible copies, but for the time being, the attached documents are the extent of responsive records. Attached is a list of the names and job titles of current and former DuPont employees who were interviewed pursuant to this Request.

If you have any further questions regarding this matter, please do not hesitate to contact me.

Very truly yours,



Norman D. Griffiths
Counsel
Environment Group

Attachments

cc: P. B. Butler, DuPont, CRG, B-12228
J. Karmazyn, DuPont, DERS, BPCC, 390
Robyn Magee, DuPont Legal

Wayne R. Walters, Esq., USEPA, ORC, Region III

Response of E. I. du Pont de Nemours and Company
CERCLA §104(e) Request For Information
DuPont Newport Superfund Site
Thorium Disposal

November 30, 1993

1. **Were any forms of thorium disposed, buried, or placed in the north landfill other than thorium oxide?**

Very little, if any of other forms of thorium, were disposed of in the north landfill. From 1961 until 1968, DuPont was licensed by the U.S. Atomic Energy Commission to store and dispose of certain product and waste materials associated with its Dispersion Modified Metals Pilot Program which produced experimental quantities of thoriated nickel alloys that might be used in the manufacture of jet aircraft.

The available information indicates that either thorium nitrate or thorium oxalate were purchased as raw materials for the process. While thorium nitrate is soluble, thorium oxalate is not. But in the case of thorium nitrate, it was first converted to the insoluble oxalate by mixing it with oxalic acid. This mixture would then be heated to form the insoluble thorium oxide. In essence, all of the material used in the process (i.e. dispersed in intermediates or nickel) was the insoluble thorium oxide. Most of this material would be in the form of sludge or powders. DuPont has not been able to locate any documents or other information that would provide a more specific response to this question.

2. **Were soluble forms of thorium ever disposed, buried, or placed in the north landfill?**

To the best of DuPont's knowledge, the conversion process for thorium nitrate (salts) would have eliminated this soluble material in the process and produced only insoluble thorium oxide. Waste material from the production process therefore, would have consisted only of insoluble thorium material. While it is possible that spills occurred and material may have been disposed of in the north landfill prior to this conversion step, DuPont has no specific information that any such disposal ever occurred.

3. Your responses to Questions 1 and 2, above, should include the following information:

a) The dates of such disposal, burial, or placement;

Through interviews, DuPont has learned that thorium burial log books were maintained at the time to record each burial at the north landfill in order to document compliance with the AEC (Atomic Energy Commission) license. DuPont has been unable to locate those log books and believes they were discarded years ago after the operation ceased in 1968. At this point, DuPont can only respond that the disposal activities probably coincided with the dates of operation -- 1961 to 1968.

*Log books?
no - this
records*

b) The amount of such disposal, burial or placement;

Due to the lack of documentation as noted in the previous response, information regarding exact amounts is not available. Discussions with retirees, as well as the burial limits contained in the AEC License provided some basis for an estimate of the burial quantity. The 1979 memo from Richard J. Hubiak to P.E. Kress, dated July 5, 1979 (attached) provides some information. However, the AEC License provided for "up to" 12 burials per year. It is not clear whether the plant ever actually performed that many burials in any of the years from 1961 to 1968. Other attached documents are also responsive to this question.

c) The matrix in which the thorium was disposed, buried, or placed;

The memorandum dated July 5, 1979 mentioned in the previous response describes the matrix in which the thorium was disposed, etc.

d) The manner in which the forms of thorium were disposed, buried, or placed (i.e. how it was contained when it was disposed, buried, or placed); and;

From the information that DuPont has gathered, it appears that solid wastes, i.e. waste process materials including towels, wipes, disposable protective clothing, gloves, filter cloths etc. were placed in 55 gallon drums and placed in the north landfill. Liquids from laboratory operations were placed in pails and sealed.

The pails were then placed in the drums with the solid wastes prior to burial in the north landfill. All such containers bore the label: "Thorium Wastes". All burials, to DuPont's knowledge were carried out in accordance with the AEC procedures and the pilot plant's standard operating procedures. See attachment.

e) **The location and depth of such disposal, burial, or placement.**

Maps and drawings indicating approximate locations of burial sites are attached. To the best of DuPont's knowledge, AEC procedures included with the plant's AEC License, called for limits of not over 450kg of thorium material per burial; each burial had to be at least 4 feet deep and 6 feet from the nearest previous burial and finally, not over 12 burials were to be made in any one year. See attached documents.

Newport Retirees Interviewed for Thorium Disposal 104(c) Request

Paul Reis - Research Engineer

Henry Bartolo - Research Technician

Bob Salemi - Research Director

John B. Lambert - Senior Research Engineer

DuPont Newport Documents Responsive to Thorium Disposal 104(e)

Document No.	Date	Author	Addressee	Document Title
N-1	7/5/79	R. J. Hubiak	P. E. Kress	Radioactive Thorium Waste
N-2	7/28/88	Woodward-Clyde	U. S. EPA and E. I. du Pont	Work Plan Remedial Investigation/ Feasibility Study DuPont-Newport Site
N-3	12/7/89	A.B. Palmer	Randy Sturgeon	Newport Site. Attaches Documents N-4 through N-11.
N-4	1/6/81	J. D. Kinneman	Michael Barzcz	Telephone Inquiry on Closeout of Areas Used For the Development and Manufacture of Dispersion Modified Metals.
N-5	3/18/81	M. Barscz	John D. Kinneman	Docket No. 40-6664
N-6	8/5/68	W. A. Lancaster	R. D. Nutting	No Title
N-7	8/14/68	W. A. Lancaster	R. D. Nutting	No Title
N-8	No Date	Unknown	Unknown	F. Waste Disposal
N-9	Aug-78	Unknown	Unknown	Newport Plant
N-10	No Date	Unknown	Unknown	Map of Radioactive Burials
N-11	No Date	DuPont Engineering		Layout of Newport Plant Dump
N-12	No Date	Woodward-Clyde	DuPont	3.2.6 Thoria Dispersed Modified Nickel
N-13	10/16/61	DuPont/Purchasing	Lyll Johnson	Dispersion Modified Metals. Attaches Documents N-14 and N-15.
N-14	No Date	Unknown	N/A	Newport Plant Landfill Map
N-15	7/25/68	Unknown	N/A	Newport Plant Landfill Map
N-16	No Date	Unknown	Unknown	None - Section 13(a) discusses burial of waste thorium.
N-17	10/16/61	H. J. Gorman	Lyll Johnson	Dispersion Modified Metals
N-18	7/20/62	H. J. Gorman	J. C. Delaney	License No. STB-489
N-19	7/28/88	Woodward-Clyde	U. S. EPA and DuPont	Work Plan RI/FS - Page 35.

C.02576



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898
CENTRAL RESEARCH & DEVELOPMENT DEPARTMENT

HASKELL LABORATORY
FOR
TOXICOLOGY AND INDUSTRIAL MEDICINE

July 5, 1979

P. E. KRESS
CHEMICALS, DYES, AND PIGMENTS DEPARTMENT
NEWPORT PLANT

RADIOACTIVE THORIUM WASTE
(Ref: Telecon 7/2/79)

In the alloy, thorium dioxide constituted about 2-5% by volume which is also the approximate percent by weight. The specific activity of the thorium was 2000 pCi/gm (W. Severance). It was assumed that the waste associated with this operation was 20 tons.

Range of ThO₂:

$$2\% \times 20 \text{ tons} = 0.4 \text{ tons}$$

$$5\% \times 20 \text{ tons} = 1 \text{ ton}$$

Sp. Act. = 2000 pCi/gm

$$2,000 \text{ pCi/gm} \times 907,000 \frac{\text{gm}}{\text{ton}} = \frac{1.8 \text{ mCi}}{\text{ton in the waste}}$$

... at 2% 0.7 mCi of thorium

at 5% 1.8 mCi of thorium

$$\text{Maximum specific activity of total waste} = \frac{1.8 \text{ mCi}}{20 \text{ tons}} = \frac{100 \text{ pCi}}{\text{gm}}$$

$$\text{At 2\% specific activity of total waste} = \frac{0.7 \text{ mCi}}{20 \text{ tons}} = \frac{40 \text{ pCi}}{\text{gm}}$$

DWS 1025682

The regulation that existed at the time of this operation was the Atomic Energy Act (10 CFR). The requirements regarding burial 10 CFR 20.304 (copy enclosed) limited each individual burial of thorium to 100 mCi. Each successive burial had limitation of spacing and number of disposals per year. All of these requirements were met at the time.

As to RCRA, only radium wastes are being considered at this time. However, the background document does indicate that thorium will probably be considered at some later date. There is an indication in RCRA, Section 1006(a), that other acts, such as the Atomic Energy Act, are recognized in regard to certain waste disposal procedures.

The hazards that this waste poses to man or the environment is very minimal. The reasoning is as follows:

The thorium is tied up within the alloy matrix such that the possibility of thoron gas, the main potential radioactive hazard, being released is nil. The half-life of the thoron gas is also very low (55 seconds) so that any gas which is released would convert to another radioactive particle and its subsequent diffusion up through the overburden (10') would be unlikely. The gamma radiation hazard from the waste is also not existent because of the extensive depth of the overburden. Another factor to consider is the original isotope composition of the thorium. Thorium-232 has a half-life of 1.4×10^{10} years and thorium-228 has a half-life of 1.9 years. For the thorium-228 that was present in the original material only, 2% would be around now. So a fraction (unknown) of the original source material will have decayed to a stable material.

As long as this disposal site is undisturbed, there should be no hazard from a radioactive nature.

Richard J. Hubiak
RICHARD J. HUBIAK
CONSULTANT - INDUSTRIAL HYGIENE

RJH/egg
7/5/79

4012921
Volume 1

**Work Plan
Remedial Investigation/Feasibility Study
DuPont - Newport Site
Newport, Delaware
July 28, 1988**

for
U.S. Environmental Protection Agency
Region 3
841 Chestnut Street
Philadelphia, Pa. 19107

Prepared for

El du Pont de Nemours & Co., Inc.
Brandywine Building
Wilmington, Delaware 19898

Woodward-Clyde Consultants



Consulting Engineers, Geologists and Environmental Scientists
5120 Butler Pike, Plymouth Meeting, Pennsylvania 19462

a field operable gas chromatograph (GC) located on-site and equipped specifically for TCE and PCE analysis. Details on the method of soil gas sample collection and analysis used at the Newport Site are described in Appendix G and presented in Section 6 of QAPP.

The samples were analyzed within one-half hour of sample collection by injecting the sample directly into the gas chromatograph (GC). The GC used, a Varian 3400 series equipped with dual electron capture detectors (ECD), affords the most sensitive analysis for the chlorinated organic compounds of interest (TCE and PCE). Detection limits achieved during this survey were approximately 10 parts per billion (ppb) for the two compounds of interest (see Appendix G). The soil gas survey results are shown in Table 1-6 and discussed in Section 1.2.2.4.

1.1.6.5 GROUND RADIOMETRIC SURVEY

From 1961 to 1968, the Newport plant manufactured a thoriated nickel alloy that was used in the manufacture of supersonic jet engines. The alloy consisted mostly of nickel, some chromium and molybdenum, and small quantities of thorium (2 to 5 percent).

Solid and semi-solid waste material from this process (reportedly about 20 tons) was buried in the North Disposal site in accordance with federal regulations in effect at that time. The estimated weight of thorium dioxide disposed is between 0.4 and 1 ton. According to the Du Pont records, the thorium waste was placed in jars that were subsequently placed in 55 gallon barrels together with disposable protective clothing and debris from the waste handling operations. The barrels were placed in "holes" or small excavations which were nominally at depths up to 10 feet below the clay-capped present land surface of the landfill.

The exact number and locations of disposal "holes" at the North Disposal site are unknown. Based on existing plant records, the thorium waste was apparently buried within the area shown on Figure 1-12.

During 1979 and 1980, Du Pont conducted at least two radiometric surveys using a Victoreen 471 radiation meter (Geiger counter). The survey results in each case indicate no sustained readings above background levels measured in a city park approximately 1 mile from the disposal site.

Recent chemical analyses of groundwater from a depth of 20 to 25 feet in monitoring well SM-4 yielded Radium-228 and gross alpha concentrations slightly above drinking water standards (40 CFR Part 141.15). Radium 228 is a daughter isotope from the decay of thorium-232.

The background information previously discussed indicates that records showing accurate locations of buried thorium waste are lacking. Past reconnaissance surveys of radioactivity emanating through overburden did not indicate radioactivity levels elevated above background, and thus it was not possible to determine the specific source areas from these data.

A ground radiometric survey using gamma spectrometry was conducted by WCC in June 1987 during Phase I of the Remedial Investigation. The objective of this survey was to verify that anomalously high levels of gamma radiation from the buried thorium waste sources are not emanating from the North Disposal site.

At the time, the available information suggested the waste was buried between grid coordinates E6:E7 and G6:G7 (Figure 1-12). Information from plant records following completion of the survey indicated that the waste was buried as shown on Figure 1-12. Due to field conditions at the time, the survey was conducted along the grid lines as marked in the field. Although the radiometric survey did not cover the entire stippled area on Figure 1-12, a portion of it was covered, and there appears to be a high probability that thorium waste was buried beneath the area covered by the survey.



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

CHEMICALS AND PIGMENTS DEPARTMENT

December 7, 1989

Mr. Randy Sturgeon (3HW16)
U.S. Environmental Protection Agency
841 Chestnut Building
Philadelphia, Pennsylvania 19107

Dear Mr. Sturgeon:

Re: Newport Site

Per your request, I am providing:

- Persons interviewed for information on disposal practices at the Newport site particularly those associated with thorium containing wastes.

Robert M. Salemi - retired
John M. Stivens - retired
Franklin R. Baker - Du Pont employee
Dale M. Hiller - Du Pont employee

- Copies of correspondence with the Nuclear Regulatory Commission on their closeout inspections at the site. Note that these were previously supplied to the EPA in response to its initial request for information on the site.
- A copy of the sketch showing burial locations for the thorium containing wastes. I have also provided another drawing that locates the sodium pad in relation to plant landmarks. (Note that the pad shown in the drawing was never built.) This sketch was also included in material originally supplied.

The aerial photographs will be sent to you by Roger Gresh. He is also preparing a map of the active operations area showing the extent of paving on both the Du Pont and Ciba-Geigy property.

Sincerely,

A. B. Palmer
Safety, Health and
Environmental Manager

ABP:map
Attachment

cc: R. M. Gresh, Woodward-Clyde
C. Trmal, Du Pont



January 6, 1981

70.30

Docket No. 40-6664

E. I. DuPont de Nemours & Company, Inc.
ATTN: Mr. Michael Barzcz
Safety, Health and Environmental Supervisor
James and Water Streets
Newport, Delaware 19804

Gentlemen:

Subject: Telephone inquiry on Closeout of Areas Used For the Development
and Manufacture of Dispersion Modified Metals

This refers to a telephone inquiry by Ms. M. Campbell of this office with yourself on November 5, 1980. This inquiry was to follow up activities authorized by License No. STB-489, as they relate to the closeout surveys performed by Mr. Lancaster of your staff at the time this license expired in 1968. As Ms. Campbell explained during the telephone conversation, we are reviewing a number of old licenses to ensure that adequate surveys were conducted at the time the license expired or was terminated.

From this discussion, it is our understanding: 1) that you will attempt to locate your records of the surveys performed of your Newport, Delaware, facility prior to the release for unrestricted use of the areas involved in the development and manufacture of dispersion modified metals; 2) that you will attempt to locate the records of the disposal of the waste materials resulting from this processing; and 3) that you will contact us to let us know when these records will be available for inspection.

If your understanding differs from our understandings, please inform us.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the Public Document Room.

Your cooperation with us is appreciated.

Sincerely,

John D. Kinneman, Chief
Materials Radiological Protection
Section

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