

51A-711
 Picked 40-86

2-Way Memo

Subject: RO, Region I, Close out
 Survey W.R. Grace & Co.
 Davison Chemical Division
 Pompton Plains, N.J.

DATE OF MESSAGE	Aug 6, 1974
DATE OF REPLY	
INSTRUCTIONS	
Use routing symbols whenever possible.	
SENDER: Forward original and one copy. Conserve space.	
RECEIVER: Reply below the message, keep one copy, return one copy.	

To: [A. Singer
 D. Collins]

FOLD

USE BRIEF, INFORMAL LANGUAGE

FOLD

I received a call from Gene Epstein, Inspector RO, I concerning their close-out survey of the above facility. He says the place is in poor shape and can't be released without further decontamination. It does not meet our criteria for release for unrestricted use. Epstein quoted the following examples:

1. a drain 4ft underground read 1 mpcr at the surface 2 inches above ground using a survey meter with 7 mg/cm² window.
2. smear samples taken at 57 different locations averaged 18,000 dpm/cm² of alpha, with hot spots of 74,000 dpm/cm² of alpha.

From:

[Buchanan]

ITEM # 364 B1362

2-Way Memo

Subject: *W. R. Grace*

DATE OF MESSAGE <i>08/16/74</i>
DATE OF REPLY
INSTRUCTIONS Use routing symbols whenever possible. SENDER: Forward original and one copy. Conserve space. RECEIVER: Reply below the message, keep one copy, return one copy.

To: *A. Singer*
D. Collins

FOLD USE BRIEF, INFORMAL LANGUAGE FOLD

- 3. Removable alpha contamination average 800 dpm/cm²
- 4. Soil and water samples have been taken and sent to ARCO for analysis - should have results in 2 weeks.

The inspector recommended further decontamination and suggested the licensee tear out certain areas for disposal. His report will be available in about 2 weeks.

I told him we would do nothing until we could be assured that facility was clean enough for release.

From: *Buchanan*

46-86

REGULATORY OPERATIONS

GRACE

W.R.GRACE & CO.,
CHARLES & BALTIMORE STREETS, BALTIMORE, MD. 21203 ☎ 301:727-3900

+

September 16, 1974

Mr. Bernard Singer, Chief
Materials Licensing
United States Atomic Energy Commission
Washington, D. C. 20545



Ref. License STA-422

Dear Mr. Singer:

On July 26, 1974, I sent you what turned out to be a "Draft" report from Applied Health Physics, Inc., on the decontamination work done at our Pompton Plains (Wayne Township), New Jersey, facilities. Today I received a final report from them and am forwarding it to you.

Mr. Epstein, of the Compliance Section at King of Prussia, inspected the premises on August 1-2 and found several small areas that needed further cleaning. These were corrected, and he is scheduled to return for another inspection on September 20.

As in my letter of July 26, we are requesting release of these facilities for unrestricted use and termination of our storage license.

I would again like to ask you to give priority to the release if possible. Our prospective buyer is anxious to move in. Thank you.

Very truly yours,

B. L. Mobley

B. L. Mobley
Supervisor
Environmental Control

BLM:nbs

Attachment: AHP Report

B/362

ITEM # 365 1890

U. S. ATOMIC ENERGY COMMISSION

DIRECTORATE OF REGULATORY OPERATIONS

REGION I

RO Inspection Report No: 74-01 Docket No: 40-86

Licensee: W. R. Grace License No: STA-422
Davidson Chemical Division Priority: III
P. O. Box 188 Category: E

Location: Pompton Plains, New Jersey 07444

Type of Licensee: _____

Type of Inspection: Special Closeout

Dates of Inspection: July 31, August 1, 2, 1974 and September 20, 1974

Dates of Previous Inspection: _____

Reporting Inspector: *Robert O. McClintock* for *Oct 8, 1974*
E. Epstein, Radiation Specialist Date

Accompanying Inspectors: _____ Date
_____ Date
_____ Date
_____ Date

Other Accompanying Personnel: _____ Date

Reviewed By: *Robert O. McClintock* *Oct 8, 1974*
R. McClintock, Senior Radiation Specialist Date

ITEM # 366

6 *01364*

SUMMARY OF FINDINGS

Enforcement Action

None

Scope of Inspection

- A. A special inspection was conducted on July 31, August 1, 2, 1974, at the licensee's facility at Pompton Plains, New Jersey to review the licensee's submittal to Materials Licensing requesting termination of License No. STA-422.
- B. A second inspection was conducted on September 20, 1974, to review the licensee's revised submittal to Materials Licensing and to resurvey those areas that were above guideline levels during the August inspection.

REPORT DETAILS

1. Personnel Contacted

Mr. B. L. Mobley, Supervisor, Environmental Control, W. R. Grace Company

Mr. Paul B. Klevin, Consultant to the licensee

Mr. Robert Gallegar, President of Applied Health Physics,
Bethel Park, Pennsylvania

Mr. R. Russo, State of New Jersey on September 20, 1974

2. Initial Survey

- a. The inspector learned that a decontamination effort was performed by personnel from W. R. Grace and personnel from Applied Health Physics. The decontamination job took from March 11, 1974 to July 18, 1974.
- b. During the initial visit, the inspector made 67 readings using an Eberline Model PAC 15A Scintillation alpha counter calibrated July 8, 1974, by BNL. The surveys were to determine the total alpha activity on floors and surfaces throughout the facility. Beta-gamma measurements were taken in similar areas using an Eberline model E-120 GM remote probe with a 1.4 mg/cm² window thickened to 7.2 mg/cm² by the addition of 3 layers of saran wrap. This instrument was calibrated by BNL on July 14, 1974.
- c. Forty-six swipes were taken of 100 cm² areas and later counted at RO:I for removable alpha and beta gamma activity using an Eberline PAC-4 scintillation scaler and an Eberline RD-14 beta probe in conjunction with an LCS-1 Eberline counting system. Two air samples were taken with an air sampler and were similarly counted.
- d. Two water samples were taken, one from Sheffield Brook at the licensee's property line, and one from the licensee's sump. Silt from a drain from this sump and four soil samples from the licensee's burial area were also taken. These samples were sent on August 5, 1974 to AEC, Idaho Falls for analyses. Results are attached as Appendix A.

3. Results of Initial Survey

- a. The results of alpha and beta-gamma measurements taken indicate that the guideline for "Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct Source or Special Nuclear Material" USAEC April 22, 1970 are exceeded.
- b. The average of 67 readings showed alpha activity of 18,911 dpm/100 cm².

Average for the following areas:

1 - Office Area 1-D	9,550 dpm/100 cm ²
2 - Lab Area 1-B	32,500 dpm/100 cm ²
3 - Catwalk Bldg. 1	26,500 dpm/100 cm ²
4 - Floor Sulfonation Room	21,000 dpm/100 cm ²
5 - Wall of Sulfonation Room	25,083 dpm/100 cm ²
6 - End Storage Room	6,000 dpm/100 cm ²
7 - Third Floor Lab.	6,000 dpm/100 cm ²
8 - Third Floor Library	2,000 dpm/100 cm ²
9 - Kettle Area	7,833 dpm/100 cm ²
10 - Garrett Storage Area	74,055 dpm/100 cm ²
11 - Ball Mill Bldg.	9,500 dpm/100 cm ²
12 - Grinding Bldg.	13,300 dpm/100 cm ²
13 - Old Compressor Bldg.	11,250 dpm/100 cm ²

- c. Beta-gamma readings exceeded 0.8 mrem/hr when observed at 1 cm distance with detectors having absorbers of at least 7 mg/cm².
- d. A drain duct which runs underneath the licensee's property between Buildings 2 and 3 and under Building No. 1 and which drains into Sheffield Brook was easily traced with the Eberline GM end window probe. This drain line is, according to Mobley, located under four feet of earth and two inches of blacktop. Radiation reading of 0.8 to 1.0 mrad/hr were noted at one cm above the road surface at the drain line.

- e. At one centimeter from the surface of the plywood floor in the attic, an area of 12' x 8' had radiation readings ranging from 0.5 to 2.0 mrad/hr (beta-gamma).
- f. At one centimeter from wooden pallets on which a compressor and pump was resting, beta-gamma readings of 1.2 - 1.4 mrad/hr were noted.
- g. At one centimeter distance from the concrete apron entrance to the Old Maintenance Building beta-gamma readings of 0.8 mrad/hr were noted.
- h. In non-use areas, radiation readings of 0.1 to 0.2 mrad/hr were noted. In areas of former use, beta-gamma readings of 0.2 - 0.6 mrad/hr were noted.
- i. The entire open area in the rear of the site as well as the open areas on the sides were used for burial, according to Mobley. Inspection history indicates that during production for a period of 17 years, large amounts of thorium phosphate was buried in huge pits. This waste consisted of waste concentrated sludge from a waste treatment operation. Radiation readings at one centimeter from the surface of the earth had from 0.4 - 0.5 mrad/hr in burial areas. Readings were from 0.3 - 0.35 mrad/hr at the ground surface near the drainage ditch and from 0.1 - 0.2 mrad/hr at the surface of the former sludge dumps.
- j. Air concentrations in Building No. 1, the main process building, did not exceed 7.25×10^{-13} $\mu\text{Ci/ml}$ air alpha activity and 2.1×10^{-12} $\mu\text{Ci/ml}$ air beta-gamma activity according to samples counted 104 hours after collection.
- k. The results of water and soil sampling as analyzed for natural uranium and thorium show that water discharged from the plant to unrestricted streams did not exceed thorium or uranium concentrations of 6×10^{-8} $\mu\text{Ci/ml}$. Soil samples did not exceed an activity of 9×10^{-6} $\mu\text{Ci/gm}$ uranium and 4×10^{-4} $\mu\text{Ci/gm}$ thorium.
- l. The water and air samples (see Appendix A) meet the limits expressed in Appendix B Table II for release to unrestricted areas. The uranium soil samples were below 0.05% uranium in the soil. The natural thorium, however, exceeded 0.05% in soil samples.

4. Final Survey

- a. After the initial survey, the licensee made a second decontamination effort and resubmitted a revised report to Licensing. A final closeout survey was made on September 20, 1974, to review the revised submittal and to resurvey the problem areas.

5. Results of Final Survey

- a. The inspector took smears of all the problem areas noted during the inspection of July 31, August 1 and 2, 1974. These smears were later counted at Region I for alpha and beta gamma activity and showed no more than 30 dpm/100 cm² alpha removable activity and no more than 100 dpm/100 cm² beta-gamma removable activity. Fixed activity did not exceed 1500 dpm/100 cm² alpha activity.
- b. The inspector noted that the licensee had removed all previously contaminated surfaces from the catwalk, the garrett storage area and the sulfonation room and the machine shop as well as removing the contaminated supports for the compressors and pumps. Licensee's records indicated these items were buried on the licensee's property and the burial entered on the deed describing the property.
- c. The results of the final survey showed agreement with the licensee's revised submittal for surface contamination levels in buildings and on equipment, and for air and water concentrations. Contaminated drains and ducts were removed.
- d. The licensee's submittal does not speak to the extent of the waste products buried on the property. Appendix B includes excerpts from several past inspection reports that highlight this area. Licensee has bulldozed 6 inches of dirt over the areas and is planting grass and trees to prevent erosion.

OCT 22 1974

Harold D. Thornburg, Chief, Field Support and Enforcement Branch
Directorate of Regulatory Operations, HQ

RO INSPECTION REPORT NO. 74-01
W. R. GRACE AND COMPANY
DAVIDSON CHEMICAL DIVISION
POMPTON PLAINS, NEW JERSEY 07444

Subject inspection report is enclosed for your action. Two closeout surveys were made by our inspector. The first revealed that the licensee's submittal to Licensing did not accurately reflect true conditions. The second closeout survey, taken after further cleanup and a new license submittal, concurred with the new licensee report with one significant exception.

Our review of past inspection reports and our finding on the last inspection indicate that a considerable number of radioactive waste burials have been made at this site; the location of many of these burials not identified. Attachment B of the enclosed report contains the excerpts from past inspections that highlight this situation. It is our belief that an unconditional release of this facility under these conditions would not be appropriate. We therefore recommend that prior to release, each burial be identified as to location and amount of material. In addition we recommend that appropriate licensing action be taken to insure control of these burials by the new owner.

Paul R. Nelson, Chief
Radiological and Environmental
Protection Branch

Enclosures:
As stated

RHE for
Epstein
10/21/74

EMC
McClintock
10/21/74

Nelson
Nelson
10/22/74

18
App. 1/2
B/365

ITEM # 367

U.S. ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS
REGION I

RO Inspection Report No: 74-01

Docket No: 40-86

Licensee: W. R. Grace

License No: STA-422

Davidson Chemical Division

Priority: III

P. O. Box 188

Category: E

Location: Pompton Plains, New Jersey 07444

Type of Licensee: _____

Type of Inspection: Special Closeout

Dates of Inspection: July 31, August 1, 2, 1974 and September 20, 1974

Dates of Previous Inspection: _____

Reporting Inspector: *Robert O. McClintock* for
E. Epstein, Radiation Specialist

Oct 8, 1974
Date

Accompanying Inspectors: _____

_____ Date

_____ Date

_____ Date

_____ Date

Other Accompanying Personnel: _____

_____ Date

Reviewed By: *Robert O. McClintock*
R. McClintock, Senior Radiation Specialist

Oct 8, 1974
Date

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January 12, 1960

DAVISON CHEMICAL COMPANY
DIV. OF W. R. GRACE & CO.
BOX 488
POMPTON PLAINS, NEW JERSEY

THORIUM CONTENT OF SLUDGES STORED ON PROPERTY

	<u>Tons Residue</u>	<u>Contained ThO₂ Pounds</u>	<u>Area</u>
Ore tailings (gangue)	230	8,200	G
Yttrium sludges	200	3,000	H
Reworked sludges	137	2,750	I
Waste treatment cake	105	1,300	J
In process silica sludge	30	2,700	H
In process thorium carbonate	31	3,100	L
In process thorium hydroxide	15	10,500	K
Refined yttrium concentrate	20	2,700	M

APPENDIX B (1 of 10)

January 12, 1960

WASTE TREATMENT PLANT

The waste treatment plant treats all liquid wastes issuing from the plant. The waste involved consists of wash water, floor washings and surface run-off from the adjacent plant property.

The process involves the use of an average of 35,000 gallons of water per day. All of the washes are discharged into a common 1000 gallon sump equipped with two automatically controlled force pumps which pump the waste to a retention tank. Each pump has capacity to handle the peak load and is installed so that the second pump starts in case of extreme demand or failure of the first. Signals are installed in a control house to indicate the proper function of the pumps.

The retention tank has a capacity of 50,000 gallons which provides 24 hours average retention of the wastes. In addition to the purpose of acting as a reservoir, or constant head installation, the tank provides means of diluting effluents of widely varying pH so that the automatic pH controlling equipment may function more efficiently. The incoming wastes flow through a distributing channel in the tank and effluent, after initial settling, is removed from the midpoint of the tank and flows by gravity to a mixing tank. A draw-off is provided at the bottom of the tank to pump accumulated solids to the sludge filter press.

An 8000 gallon mixing tank, equipped with a gate agitator receives effluent from the retention tank at its midpoint. a pH electrode assembly is in circuit with the mixing tank and electrically connected to a mechanically operated diaphragm valve. Two storage tanks are provided to feed either

50% sulphuric acid or 50% caustic soda solution through the automatic diaphragm valve to the mixing tank as called for by the pH controller. Again, signals are provided to indicate proper functioning of the valve and chemical supply tanks as well as a recording chart which indicates the pH of the mixing tank. The mixing tank effluent is piped to a 2000 gallon Hardinge thickener at pH 5.8-6.2.

The Hardinge thickener provides a clear overflow to a final clarification tank and adjusted to give a 20% solids underflow which is pumped to a sludge filter press in the control house.

The final clarification tank of 50,000 gallon capacity provides an average 24 hours of retention time for the effluent before discharge from the system. The main function of this tank is to provide sufficient time for post precipitation of solids after pH adjustment. A draw off is provided at the bottom of the tank to pump accumulated solids to the sludge filter press.

The sludge filter is of the plate and frame type with a capacity of 6 cubic ft. of cake. Approximately 60 cubic feet of sludges, or 3500 lbs, are removed weekly. These sludges are hauled to a dump on the property.

The system was designed to operate automatically. Twelve man hours per day are devoted to the maintenance, cleaning and control of the operation. The entire operation is under the supervision of the plant chemist who checks the performance of the equipment, and samples prepared by the shift operator.

A log is maintained which indicates satisfactory operation of the system for pH and turbidity control. Wet chemical analyses of samples of effluent meeting the turbidity standards of the Department of Health indicate

thorium levels below our limit of detection. The pH of the effluent is maintained between 5.0 and 8.0 according to the permit granted by the New Jersey State Department of Health who have approved the design and mode of operation of the system. We have found through experience that the system operates more satisfactorily at lower pH values since the precipitate formed by neutralization settles more rapidly assuring a clearer effluent.

WASTE TREATMENT PLANT

- A Clarification 50,000 gal
- B Emergency storage 14,000 gal
- C Retention 50,000 gal
- D Mixer 8000 gal
- E Thickener 2000 gal
- F Filter House

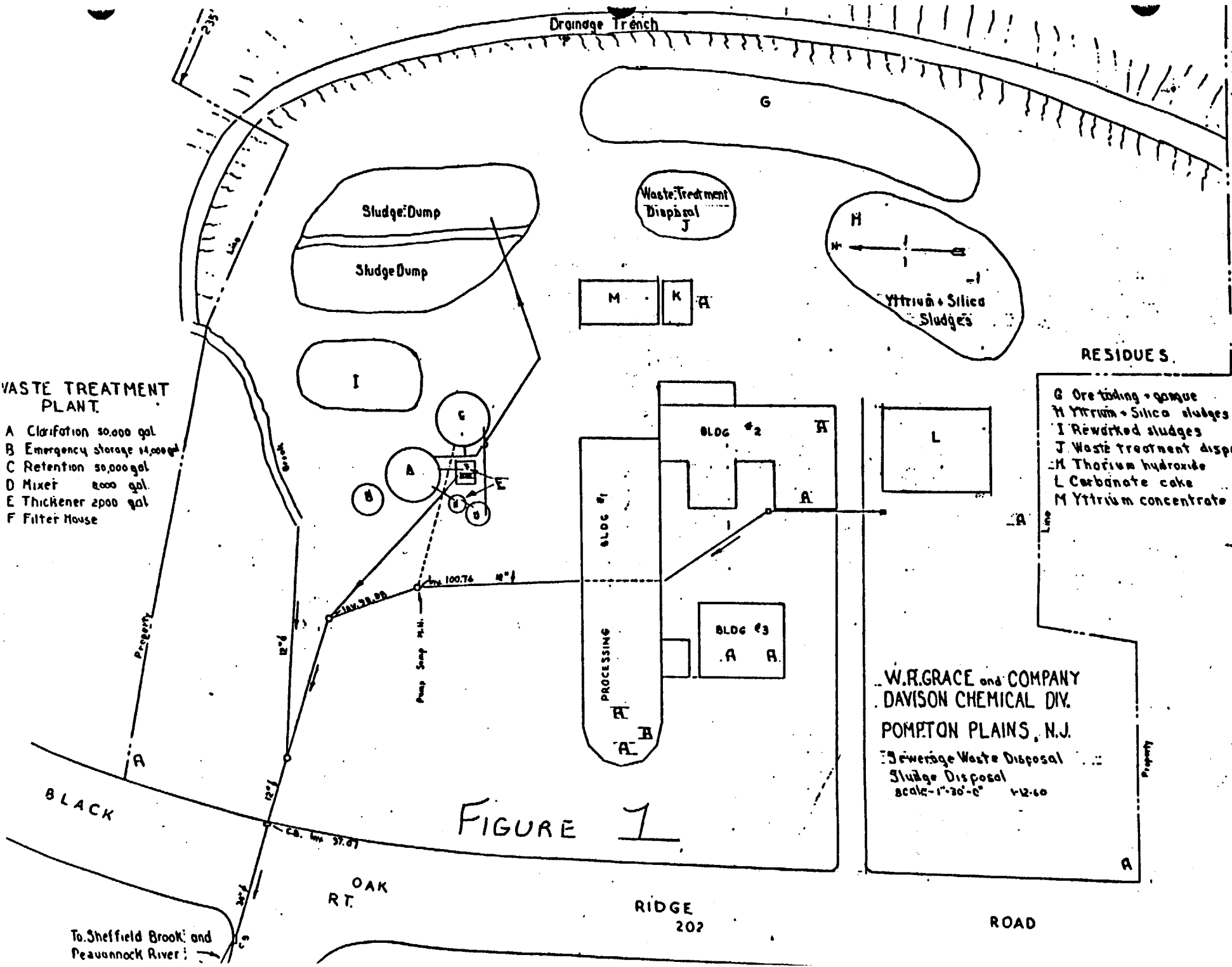


FIGURE 1

W.R.GRACE and COMPANY
 DAVISON CHEMICAL DIV.
 POMPTON PLAINS, N.J.
 Sewerage Waste Disposal
 Sludge Disposal
 scale - 1" = 30'-0" 1-12-60

- RESIDUES**
- G Ore tailing + gangue
 - H Yttrium + Silica sludges
 - I Reworkeed sludges
 - J Waste treatment disposal
 - K Thorium hydroxide
 - L Carbonate cake
 - M Yttrium concentrate

To Sheffield Brook and
 Pequannock River

December 16, 1974

To whom it may concern:

I, John J. Baum, have been asked to make a statement concerning burial of materials at W. R. Grace & Co., 868 Black Oak Ridge Road, Wayne, N. J.

I operate an excavating contracting business and have been employed at various intervals as required by Grace to excavate holes used for burials.

I recall the necessity to dig out and re-bury some material, as there was some problem with the size of the hole. This was done in or about 1964/1965 in accordance with instructions received at the cite.

John J. Baum
John J. Baum

WESTIC COUNTY
NEW JERSEY

Sworn and subscribed to
before me this

16 day of Dec. 1974

Notary Public of New Jersey

Peter Stellhorn

Notary Public Of New Jersey
My Commission Expires Apr. 3, 1975
PETER STELLHORN

B/368

ITEM # 370

REGULATORY OPERATIONS

70-56



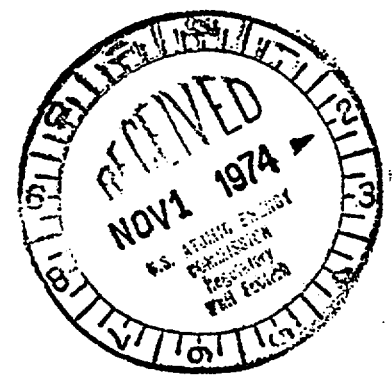
W.R.GRACE & CO., DAVISON CHEMICAL DIVISION
CHARLES & BALTIMORE STREETS, BALTIMORE, MD. 21202 ■ 301:727-3900

October 30, 1974

Mr. Bernard Singer
Chief, Materials Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Mr. Buchanan

Re: License STA-422



Gentlemen:

We have applied for a Release of our property at 868 Black Oak Ridge Road, Wayne Township, New Jersey, from AEC Storage License STA-422. This property was inspected on September 20, 1974, by Mr. Epstein, of the AEC Compliance Section at King of Prussia, Pennsylvania. I understand that he recommended approval of our application on the basis of his inspection.

On Tuesday, October 29, I called Mr. McClintock to ask him to trace our application, which seems to be lost somewhere between his office and yours. Mr. McClintock informed me that when he forwarded Mr. Epstein's report, he recommended that certain items of information, not included in Applied Health Physics' decontamination report, be developed; namely:

- (1) The total amount of radioactive materials buried on the site,
- (2) An evaluation to show that the buried material will not be washed into local streams by erosion of the surface of the burial area, and
- (3) An assurance that future owners of the property will not excavate or in any way disturb the buried material.

I submit the following in answer to these questions:

- (1) Our records show total burials of 7.7 curies of thorium or 152,350 pounds buried in accordance with 10CFR20.

B/366

ITEM # 368

2166

W.R.GRACE & CO.
DAVISON CHEMICAL DIVISION

Mr. Bernard Singer
October 30, 1974
Page 2

- (2) The burial area was graded, dressed with over 600 yards of fill dirt, and seeded. Numerous measurements of the drainage from the area failed to disclose any radio-activity of the runoff water. The area is already generating its own crop of grass and weeds. Judging by past experience, it will be further stabilized with fast-growing tree seedlings from the adjacent woods within a season or two. The grading was done so as to enhance proper drainage and minimize erosion. Retainer walls were erected where deemed necessary to further reduce any chance of erosion. Several hard rains have been experienced since completion of the job, and no significant erosion has been observed.
- (3) We expect to sell the property to Electro-Nucleonics, Inc., presently tenants renting office and storage space, as soon as the facilities are released as per our application. The conditions of sale will include a deed restriction against disturbing in any way the buried material. This restriction will be made binding on any future resale of the property.

I trust this will satisfy the questions raised by Mr. McClintock's transmittal of Mr. Epstein's compliance inspection report. If there are any further questions, please don't hesitate to call me at (301) 727-3900.

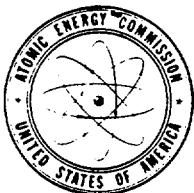
Very truly yours,



B. L. Mobley
Supervisor
Environmental Control

BLM:nbs

cc: Mr. R. McClintock
U. S. Atomic Energy Commission
Directorate of Regulatory Operations
Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406



UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

NOV 7 1974

P. R. Nelson, Chief, Radiological & Environmental Protection Branch, RO:I

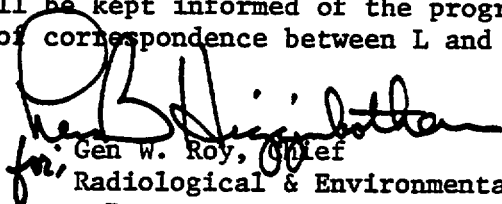
W. R. GRACE AND CO., POMPTON PLAINS, N.J. - BURIAL OF RADIOACTIVE
MATERIALS IN EXCESS OF PART 20 LIMITS

Ref: F1 8007H2 - Closeout Survey of Facilities for Release to
Unrestricted Use

As you have requested, discussions have been held with Licensing concerning the actions to be taken with respect to improper burials at the subject facility. As we understand it through discussions with you by J. R. Metzger, such improper burials took place prior to 1964 and the licensee was cited following an inspection in 1964. As you are aware, OGC's opinion is that the new owner of the facility should be licensed to possess the buried thorium or that the material be dug up and transferred to an authorized disposal site. Licensing has been informed of the facts concerning this case and it is their preliminary opinion that they will approach the licensee with the two above alternatives and further that L believes that licensing the new owner would be the most appropriate alternative.

Also, as you are aware, the licensee pursued another alternative to the burial problem which was received in writing by L on 11-5-74. This alternative stated that the land deed would include restrictions on construction and excavation at the burial sites. However, OGC has advised us that this proposal would offer essentially no controls since future owners (subsequent to the new owner mentioned above) would not be obligated to have these restrictions in the land deed.

In conclusion, you will be kept informed of the progress in this case through receipt of correspondence between L and the licensee.


for: Gen. W. Roy, Chief
Radiological & Environmental
Protection Branch, RO

cc: H. D. Thornburg
C. W. Kuhlman

B/367

115

ITEM # 369

Region I

Kulman *Kulman*

ACTION ITEM CONTROL FORM (DRAFT)

TRACK #		P	A/I	A/I DESCRIPTION		FACILITY		INT. DATE																																																								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
E180074E		2	A	W. A. GRACE AND COMPANY				10 22 74																																																								
EXP. DATE		H	M	DATE REC'D.		PERS. ASSG.		MS		ACTION		ACT. COMP		C																																																		
65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126			
10		31		74				REPA		51		RECEIVED		11-27-74		C																																																
1							MERGED		02		REFERENCE		J. Nelson memo to																																																			
2													H. Thornburg dated 10/22/74.																																																			
3													W. A. Grace & Co. Inspection																																																			
4													Report 74-01.																																																			
5													CLOSE OUT METHOD		Memo, P. Nelson,																																																	
6													ROIT, dated 11-7-74.																																																			

- CODES:
- TRACK# = THE NUMBER ASSIGNED TO THIS A/I
 - P = PRIORITY
 - A/I = TYPE OF ACTION ITEM
 - FACILITY = NAME OF FACILITY INVOLVED
 - INT. DATE = TODAY'S DATE
 - EXP. DATE = DATE OF EXPECTED COMPLETION
 - 'A' = ACKNOWLEDGEMENT
 - DATE REC'D = DATE DOCUMENTS ACTUALLY RECEIVED AT ACTION OFFICE
 - PERS. ASSG. = NAME OF PERSON ASSIGNED TO THIS A/I OR MILESTONE
 - MS = NUMBER OF MILESTONE BEING WORKED ON
 - ACTION = ACTION TAKEN TO CLOSE THE A/I
 - ACT/COMP = ACTUAL COMPLETION DATE
 - 'C' = COMPLETION

PERSON ASSIGNED REP- CLK

ACTION REQUESTED Forward report and Regional recommendation to Materials Licensing.

Please follow licensing action and keep me informed of progress.

CLK

Layan

16 AUG 1982

Docket No. 40-00086

License No. STA-422

W.R. Grace and Company
Davison Chemical Division
ATTN: Mr. Burton Mobley
Manager, Environmental Control
P.O. Box 2117
Baltimore, Maryland 21203

Gentlemen:

Subject: Radiological Surveys of Sheffield Brook, Preliminary Report

Enclosed for your information is a copy of the subject report.

We would like to stress the preliminary nature of this report. There will be changes, corrections and updating before a final report is issued. You will receive a copy of the final report.

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 and the enclosure will be placed in the Public Document Room.

No reply to this letter is required; however, should you have any questions, we will be pleased to discuss them with you.

Sincerely,

Original Signed By:

James H. Joyner, Chief
Technical Programs Branch
Division of Engineering and Technical
Programs

Enclosure:
Radiological Surveys of Sheffield Brook, Preliminary Report

cc w/encl:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
State of New Jersey

ITEM # 592

B/369
②
IEC 7

OFFICE							
SURNAME							
DATE							

OFFICIAL RECORD COPY

W.R. Grace and Company

-2-

16 AUG 1982

cc w/encl:

Township of Wayne
ATTN: Mr. Arthur Bartolozzi
Health Officer
475 Valley Road
Wayne, New Jersey 07470

Town of Lincoln Park
ATTN: Mr. Frank Grisi
Health Officer
35 Chapel Hill Road
Lincoln Park, New Jersey 07035

Township of Wayne
ATTN: Mr. Joseph DiDonato
President, Municiple Council
475 Valley Road
Wayne, New Jersey

Township of Pequannock
ATTN: Frank Fitzpatrick
Health Officer
530 Newark - Pompton Turnpike
Pompton Plains, New Jersey 07444

Environmental Protection Agency
Region II
ATTN: Joyce Feldman
Regional Radiation Representative
26 Federal Plaza
New York, New York 10278

bcc: Region I Docket Room (w/concurrences)

OFFICE	RI-DEIP	RI-DEIP					
SURNAME	Kinneman	Joyner					
DATE	8/16/82	8/14/82					



W.R.GRACE & CO., DAVISON CHEMICAL DIVISION
CHARLES & BALTIMORE STREETS, BALTIMORE, MD. 21203 ■ 301:727-3900

December 17, 1974

Mr. Bernard Singer, Chief
Materials Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Mr. Buchanan

Re: License STA-422

Dear Mr. Singer:

We have applied for a Release of Facilities for our property in Wayne Township, New Jersey (see my letter of October 30, 1974). This Release has been held up because of a citation issued July 17, 1964, for improper burial of radioactive wastes. These wastes were dug up and reburied properly according to IOCFR20 but, unfortunately, no notice was sent to the AEC at that time that the reburial had taken place. Presumably the reason for this oversight was that Mr. Richard Mandle, Plant Manager, was at that time in the process of transferring to Electronucleonics, at that time another part of the Davison Division of W. R. Grace & Co.

I have located Mr. Peter J. Garino, who was health physicist for Grace at the time of the citation and the correction of the improper burial, and Mr. John J. Baum, excavation contractor, whose brother, Norman Baum, actually did the reburial. They have voluntarily signed statements to the effect that this correction was made. I am enclosing the original and two copies of their notarized statements, hoping that these will suffice to expedite processing of our application for Release of Facilities. Needless to say, we are most anxious to have this effected before the end of the year.

Thank you for your consideration of this matter. If I can do anything further to help our application along, please call me. I'll be in the office through December 20 and at home December 23 and 24. My home phone number is [REDACTED]

Very truly yours,

B. L. Mobley

B. L. Mobley
Supervisor
Environmental Control

01370
ITEM # 372

BLM;nbs

W.R.GRACE & CO.
DAVISON CHEMICAL DIVISION

Mr. Bernard Singer
December 17, 1974
Page 2

cc: Headquarters Regulatory Operations
U.S. Atomic Energy Commission
Washington, D. C. 20545
Attn: Mr. Thornberg

Compliance Division
U.S. Atomic Energy Commission
King of Prussia, Pennsylvania
Attn: Mr. Nelson

Mr. Nelson - If these affidavits are sufficient
for your purposes, please so indicate by telephone
to Messrs. Thornberg and Buchanan. I believe
all three of you are in concurrence that this
procedure is satisfactory, "if the lawyers approve".

Timber

B.L.M.

I called Fred Decker & informed him
the affidavits were sufficient for AUE
purpose. PRW

The Honorable Marilyn L. Bouquard
U. S. House of Representatives
Washington, D.C. 20515

Dear Congresswoman Bouquard:

I am pleased to respond to your letter of August 10, 1982, to Chairman Palladino regarding an expanded radiation survey of the Wayne Township area. As you are aware, the Department of Energy (DOE) has agreed to accept responsibility for any further evaluations associated with the W. R. Grace/Rare Earths, Inc., site under their Formerly Utilized Site Remedial Action Program (see attached letter). Accordingly, we have transmitted your request to Dr. William E. Mott at DOE.

If I can be of any further assistance to you in this matter, please feel free to call.

Sincerely,

William J. Dircks
Executive Director for Operations

Enclosure:
Ltr from W. E. Mott to
R. G. Page dtd 4/21/82

cc: Dr. W. E. Mott

ITEM #

591 B/371

JAN 22 1975

Reg I

NMSS:MB:CRB
Docket 40-86
STA-422

W. R. Grace and Company
Davison Chemical Division
ATTN: Mr. B. L. Mobley
Supervisor, Environmental Control
Charles and Baltimore Streets
Baltimore, Maryland 21203

Gentlemen:

This is in reply to your request for release for unrestricted use property at 805 Black Oak Ridge Road, Wayne Township, New Jersey, formerly under Source Material License No. STA-422, Docket 40-86. Based on your survey report dated September 9, 1974, and letters dated September 16, 1974, October 30, 1974, and December 17, 1974, and a confirmatory survey performed by Region I Office of Regulatory Operations, AEC, it appears that the property meets the decontamination criteria for release of facilities for unrestricted use.

We have no objection to the release of the property provided a notation is recorded in the appropriate land records indicating radioactive material has been buried on this property pursuant to 10 CFR 20.304 (1974).

Sincerely,

151
Bernard Singer, Chief
Materials Branch
Office of Nuclear Material
Safety and Safeguards

See previous yellow

NMSE:MB NMSS:MB
CRBuchanan:bjp BSinger
1/ 175 1/ 175

ITEM # 374 ||

B/372

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Appendix A

Radiation Readings

Area	<u>DPM/100 cm² alpha</u>	<u>Beta-gamma</u>
Bld 1 Area 1-D	12,500	0.1 - .2 mrv/hr
	11,000	
	5000	
	8240	
	11000	
Bld 1 Lab Area	35000	0.1 to .35 mrv/hr
1-B	50000	
	12500	
Catwalk	25000	0.8 mrv/hr average
Bld 1	30000	
	40000	
	25000	
	25000	
	20000	
	30000	
	20000	
	15000	
Suffocation Room	10000	
Bld 1 floor	15000	0.2 - .5 mrv/hr
	18000	
	20000	

Kettle Area
BID 1

500
2500
16000

0.08-0.2 m/hr

3rd floor library
BID 1

2000

0.1 m/hr

3rd floor lab
Bldg. 1

5000
6000
9000

0.1-0.2 m/hr

2000
2500

5000
10000

0.1-0.2 m/hr

5000
12500

E11D Storage Room
Bld 1.

5000

22500

5000
50000

0.2-0.5 m/hr

55000

Bld. 1 wall of
Sulfonation Room.

3000
35000

Garret Air Storage Area 7500
Bld. 1 9000

12500

10000

12500

200000

300000

85000

30000

0.1 - 1.5 - 2.0 rev/hr.

~~Ball Mill Bldg.~~

Ball Mill Bldg.

6000

10000

12500

2500

17500

1 - 1.0 rev/hr.

Grinding Bld.

4500

500

3000

3 - 1.4 rev/hr.

~~Old Compressor Bld. 12000~~

~~2500~~

~~5000~~

~~7500~~

~~10000~~

~~15000~~

~~20000~~

~~25000~~

~~0.7 - 1.0 rev/hr.~~

OLD ~~Maintenance~~ ^{Compressor}
Bid.

12,500
25000
30000

• 3 - 1.0 m³/hr.

OLD Maintenance
Bid.

10000
7500
5000
250
1000
15000
15000

.3 - 0.8 m³/hr.

Appendix B
Removable Contamination

Area	Area 100 sqm ²	Area 100 sqm ²
Office Area	7.5	36 36
1-D Bld-1	12.5	51
	25.0	42
	40.5 22.5	53
		2.6
Laboratory	17.5	13
1-B Bld-1	20.0	84
	25.0	126
	47.5	20
	20.0	113
	35.0	69
Cartwalk	65.0	126
Bld - 1	62.5	73 73
	50.4	130
	107.5	180
Filter Press Pad	147.5	340
Bld 1	10.0	13

Sulfonation Room
Floor Bld - 1

45
35

71
402

77.5

100

40

20

37.5

20

↓ Sulfonation Room

Wall Bld - 1

165

131

0

0

~~20~~

55

END Storage Room . 24

91

Bld - 1

24

45

0

3rd Floor Lab.

42

53

Bld - 1.

12

~~124~~

25

~~208~~

Library 3rd floor
Bld - 1

42

37

Garret Storage Area

Bld - 1 - 92

58

360

595

Ball Mill Bldg - 30

0

~~20~~

62

OLD Compressor Bldg. -	242	648
	145	320

~~OLD Maintenance Bld~~

OLD Maintenance Bld -	107	262
	115	337
	197	390

Parking lot	7	0
Platform Loading Platform	15	47

Grinding Ball Mill	15	0
area	47	197.

U.S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
ANALYTICAL CHEMISTRY BRANCH
SAMPLE RECORD SHEET

LABORATORY

SERIAL NO. 59562

ROUTINE SPECIAL

SAMPLE FROM: RO:1

COLLECTED BY: *Eugene Epstein*

DATE SUBMITTED: 8/5/74

SAMPLES RECEIVED: 8/12/74

ANALYZED BY: *TRB, TF*

ANALYSIS COMPLETED: 9/9/74

SAMPLE			SAMPLE DESCRIPTION	ANAL. FOR #	INST. USED	QUANT. USED	TIME CNTD.	COUNT TIME	TOTAL COUNT	GROSS COUNT C/	BKGD. C/	NET COUNT C/	RESULTS
NO.	DATE	HOUR											
16	8/1		Soil, Burial Ground No. 1	U nat Th		1.2 (125)		1.3 x 10 ⁻³ d/s	1.0	0.4	6.6	3.2 x 10 ⁻⁷ (±25)	
17			Soil, Burial Ground No. 2	U nat Th		1.1 (125)		6.09 x 10 ⁻⁴ d/s	85.8	18.8	67.0	2.4 x 10 ⁻⁷ (±25)	
18			Soil, Burial Ground No. 3	U nat Th		1.1 (125)			32.0	0.4	31.6	1.2 x 10 ⁻⁶ (±10)	
19			Soil, Burial Ground No. 4	U nat Th		1.3 (125)			26.0	18.8	7.2	1.8 ± 0.1 x 10 ⁻⁵	
20			Soil, Burial Ground No. 5	U nat Th		1.1 (125)			32.0	0.4	31.6	1.3 x 10 ⁻⁵ (±10)	
			Soil, Burial Ground No. 4	U nat Th		1.3 (125)			88.0	18.8	69.2	6.1 ± 0.4 x 10 ⁻⁵	
			Soil, Burial Ground No. 5	U nat Th		1.1 (125)			23.0	0.4	22.6	9.3 x 10 ⁻⁵ (±10)	
			Soil, Burial Ground No. 5	U nat Th		1.1 (125)			44.2	18.8	25.4	2.0 ± 0.1 x 10 ⁻⁶	

Analyses on all 5 Samples - See 59562-A
No liquid present in samples. Bottle for No. 5 was broken but sample recovered. DP 8/12/74

NOTIFIED: *E. Epstein*

TIME: 115, 4/10/74

RESAMPLING

YES

RECOMMENDED:

NO

APPROVED:

D.P. Rios
SECTION CHIEF

both liquid and solid material

not U. curve defined as 3.7 x 10⁻¹⁰ d/s.

**U.S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
ANALYTICAL CHEMISTRY BRANCH
SAMPLE RECORD SHEET**

REFERENCE: HEALTH SERVICES
LABORATORY

ROUTINE SPECIAL

SERIAL NO. 59560

SAMPLE FROM: Eugene Epstein PC: 1
 COLLECTED BY: Epstein
 DATE SUBMITTED: 8/5/74

SAMPLES RECEIVED: 8/12/74
 ANALYSIS COMPLETED: 9/9/74

ANALYZED BY: AB, TF

SAMPLE			SAMPLE DESCRIPTION	ANAL. FOR	INST. USED	QUANT. USED	TIME CNTD.	COUNT TIME	TOTAL COUNT	GROSS COUNT C/	BKGD. C/	NET COUNT C/	RESULTS	
NO.	DATE	HOUR												
1	8/1		Water, Stream (W.P. Grace)	nat		0.1 ml					4.0	0.4	3.6	3.2×10^{-8} ($\pm 10\%$)
			Sheffield No. 1	nat		0.05					20.2	20.2	0.0	$< 3 \times 10^{-8}$
			Plant processes U and Th ores											3.7×10^{-10} dpm 1.1×10^{-7} μ Ci/mg

NOT FIED: Epstein TIME: 1115, 9/10/74 RESAMPLING YES
 RECOMMENDED: NO

APPROVED: D.R. Percival
 SECTION CHIEF

February 19, 1975

MEMO TO FILE

W. R. GRACE & CO., PEMPTON PLAINS, N.J.
License No. STA-422

Next inspector - call W. R. Grace Co. to assure that new
owner is licensed.

R. O. McClintock

6/373

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ITEM # 315

JUL 20 11 51 AM

DATE: August 22, 1978
FROM: C. P. Metzger
TO: Mr. B.L. Mobley
cc: Mr. O. A. Wunderlich
→ Mr. C. H. Bell
SUBJECT: Inspection by the N.J. State Department
of Environmental Protection

On August 22, we were visited by Mr. Pasquale Ferraro of the Bureau of Solid Waste Management. His purpose was to view the area where burials of radioactive materials have been made and to determine that no building structure enclosure had been placed on top of the burial area.

I was able to show him, in general, where the materials were buried and to assure him that nothing has been placed above this area. Also, to assure him that nothing would be placed there in the future.

I believe he is totally satisfied with the results of his inspection, therefore, no further action is required on our part, at this time.


C. P. Metzger

CPM:db

ITEM # 376

RECEIVED B1374
AUG 31 1978
ENERGY ADMIN.



ENVIRONMENTAL SAFEGUARDS DIVISION
 4 RESEARCH PLACE
 ROCKVILLE, MARYLAND 20850
 301 948-7010

cc → BCM

ESD-78-92 (R&LU)
 August 28, 1978
 File 2358-01
 Report #11

W. R. Grace P. O. 4566

W. R. Grace & Co.
 Davison Chemical Division
 10 E. Baltimore Street
 Baltimore, MD 21202

Attention: Mr. Fred V. Shaw

Dear Mr. Shaw:

The results of gross alpha and beta counting of your two water samples submitted 8/9/78 are as follows:

<u>Sample ID</u>	<u>Gross Alpha pCi/l \pm 2σ</u>	<u>Gross Beta pCi/l \pm 2σ</u>	<u>Weight of Solids g/200 ml sample</u>
1st Pit (<i>well on site</i>)	4.4 \pm 2.3	9.4 \pm 3.0	0.0533
Sump			
a) Suspended	1295 \pm 37	2087 \pm 31	0.6012
b) Dissolved	91 \pm 9	141 \pm 8	0.1252

Also enclosed is the summary of the EPA drinking water requirements for radioactivity, as we understand them.

Sincerely,

Mr. Charles Marcinkiewicz
 Marjorie S. Malmberg

Marjorie S. Malmberg, Ph.D.
 Section Leader
 Environmental Radiological
 Monitoring Services

cc: D. J. Ditunno

RECEIVED

AUG 31 1978

ENERGY ADMIN.

4
 B/325
 ITEM # 377

EPA INTERIM PRIMARY
DRINKING WATER REGULATIONS

This table is drawn from FR 41:28403-5, July 9, 1976; 40CFR 141.2, .15, .16, .25, and .26. It represents our current understanding of the National Interim Primary Drinking Water Regulations as they apply to radioanalytical requirements. We do not assume responsibility for the completeness nor accuracy of interpretation of these regulations as expressed in this table, nor do we represent that this laboratory is certified to perform these analyses for community drinking water supplies.

Marjorie S. Malmberg

Marjorie S. Malmberg, Ph.D.
Laboratory Supervisor
Radiological Laboratory
Environmental Safeguards Division

EPA DRINKING WATER

<u>Analysis/ Isotope</u>	<u>Limit of Detection</u>	<u>Maximum Contaminant Level</u>	<u>Action Level</u>
5 Ra-226/228 combined	1 pCi/l	5 pCi/l	Ann. avg. of 4 qtrs > 5pCi/l report to state & public
1 Gross alpha particle activity (incl. Ra-226, excluding U and Rn)	3 pCi/l	15 pCi/l	* >5 pCi/l, analyse for Ra-226 if Ra-226 >3 pCi/l analyse for Ra-228 (recommend 226 and/or 228 when Gross alpha >2 in areas known to have Ra-228 in drinking water.
Gross beta	4 pCi/l	50 pCi/l	If >50, identify major radicactive constituents.
a. Recommended for all	3H-1000 89Sr-10	single, or combined to give no greater than 4 mrem/yr total body or any internal organ.	
b. Required for:	90Sr-2	NBS Handbook 69 (1963)	
1. Communities >100,000 using surface water	131I-1 134Cs-10 Other 1/10 of applic. limit.	3H - 20,000 pCi/l 90Sr 8 pCi/l	
2. Others as required by state			
3. In case of nuclear facility contamination in effluent. **			>15, analyze for Sr-89, Cs-134

Notes:

- * Measured gross alpha must not exceed 5 pCi/l at a confidence level of 95% (1.65σ) (i.e. C + 1.65σ < 5)
- ** Recommend monthly Gross Beta, average quarterly; I-131 quarterly (5 day comp.)
 Sr-90 } quarterly, av. annual
 H-3 }

Monitoring requirements

Gr-*a*, Ra-226/228

Initiate by 6/24/79

Within 2 years of effective date (6/24/77)

Complete within 3 yrs. (6/24/77)

Analysis of (1) annual composite of 4 consecutive quarterly samples

or

(4) consecutive quarterly samples analyzed and averaged.

- Do this at least once every 4 years. If first year has shown Ra-226/228 < 2.5 pCi/l and gross alpha < 7.5 pCi/l, then a single sample may be analyzed instead of above procedure at discretion of the State.
- State may order more frequent sampling and analysis if cause exists (mining, etc.)
- New water source for a community water system -
Monitored 1st year as above.
More frequently if ordered by State.
- Later monitoring need not include Ra-228 if initial monitoring indicates absence and State agrees.
- If Ra-226 > 3 pCi/l annual monitoring may be required by State.
- If maximum is exceeded, supplier of water must notify State and the public and continue quarterly monitoring.

SEP 22 1978

MEMORANDUM FOR: W. R. Grace File

FROM: John D. Kinneman, Radiation Specialist
FF & MS Branch

SUBJECT: MEETING BETWEEN DOE AND W. R. GRACE ON
SEPTEMBER 5, 1978

On September 5, 1978, I attended a meeting at the Department of Energy Headquarters in Germantown, Maryland, regarding the W. R. Grace site in Curtis Bay, Maryland. Present at the meeting were:

DOE

Division of Environmental Control Engineering

R. W. Ramsey

R. E. Allen

Aerospace

A. Wallo

Office of General Council

W. L. Brown

W. R. Grace (Davidson Chemical Division)

J. W. Hardwiche, Attorney

J. Merryman, Jr., Plant Manager, Curtis Bay

F. V. Shaw, Environmental Projects

S. M. Kim, Consultant (Radiation Management Corp.)

NRC

W. T. Crow, Licensing

J. D. Kinneman, Region I IE

W. R. Grace representatives had requested the meeting because they had located an area at their Curtis Bay, Maryland facility which they believed had become contaminated with radioactive material as a result of AEC contract activities.

The W. R. Grace representatives had previously forwarded a copy of AEC Contract AT (29-6)-993 and several amendments to DOE representatives. This contract was for the extraction of thorium and rare earths from monazite sand. DOE representatives indicated

FF & MS
J. D. Kinneman

FF & MS
R.O. McClintock

9/22/78

3

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ITEM # 378

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SEP 22 1978

they had been unable to locate additional information in DOE (AEC) files regarding this contract. DOE representatives opened the meeting with a brief account of the Formerly Utilized MED/AEC Sites Remedial Action Program.

W. R. Grace representatives indicated that the plant at Curtis Bay, Maryland, presently processes rare earths for commercial purposes. No license is required for receipt of this material because of the low concentrations of source material in the rare earths. However, one part of the process produces a radioactive sludge. No data concerning the composition of this sludge was presented. This sludge had been dumped in a land fill area on W. R. Grace property over a period of years. The State of Maryland had become aware of this practice about 1 - 2 years ago and W. R. Grace removed the material by contracting with Chem Nuclear Corp. at a cost of approximately one million dollars. It was not clear whether W. R. Grace had been required to take this action or simply agreed to do it at the suggestion of the State.

Grace representatives indicated that this expensive activity had stirred the recollection of company employees who recalled that radioactive material from a previous project had been dumped at another site on the Curtis Bay property during the 1950's. An investigation by the company revealed that this activity was the processing of monazite sands under AEC contract during 1956-7.

Company representatives indicated that the processing of the sands had proceeded full time for about six months after the contract began and then intermittently for about an additional six months. The contract was then terminated by mutual agreement of the company and AEC because the extraction process was not working well and the associated AEC project was cancelled. When the process was in operation, filter cake containing gangue and other waste products was dumped in trenches at one site on the Grace property. When the contract was terminated, some equipment was also transported to the same site and buried.

Grace representatives did not offer any estimate of the quantity of radioactive material buried at the site. They did indicate that from radiological surveys, the area covers about four acres with the radioactive material extending from one to eight feet from the surface, for a total of about 500,000 cubic feet. Radiation levels are approximately one to ten millirem per hour with hot spots up to fifteen millirem per hour.

Based on a simple ratio with the size of the previous area, W. R. Grace estimated it would cost \$12 - \$25 million to remove this material.

SEP 22 1978

Grace representatives described the area as approximately one-half mile from the nearest public road within the 260 acre Grace property. No Grace employees' duties bring them to the site frequently and the site is checked once a shift by Company security.

W. R. Grace representatives indicated that to their knowledge no work had ever been done at the Curtis Bay site under the AEC/NRC license (STA-422) authorizing activities with source material at Curtis Bay, Maryland, and Pompton Plains, New Jersey.

DOE representatives indicated that it appeared that the site described by Grace representatives qualified for evaluation as part of the Formerly Utilized MED/AEC Sites Program.

W. R. Grace representatives and DOE representatives agreed to do the following:

1. By October 1, 1978, W. R. Grace will submit to DOE
 - a. a complete radiological survey of the disposal area; and
 - b. a summary or commentary of activities at the plant during the time when radioactive waste was placed at this specific site.
2. Within a month of receiving this information, DOE will have their contractor evaluate the survey and will decide on the need for a visit to the site;
3. DOE will notify W. R. Grace of the result of this evaluation and of a schedule for additional surveys if necessary (since the site is secure and not occupied, this would probably not be done for 6 - 24 months); and
4. Both W. R. Grace and DOE agreed to contact representatives of the State of Maryland and inform them concerning the results of the meeting and the status of the site.

John D. Kinneman
Radiation Specialist



ENVIRONMENTAL SAFEGUARDS DIVISION
4 RESEARCH PLACE
ROCKVILLE, MARYLAND 20850
301 948-7010

cc → BCM

ESD-78-92 (R&LU)
August 28, 1978
File 2358-01
Report #11

W. R. Grace P. O. 4566

W. R. Grace & Co.
Davison Chemical Division
10 E. Baltimore Street
Baltimore, MD 21202

Attention: Mr. Fred V. Shaw

Dear Mr. Shaw:

The results of gross alpha and beta counting of your two water samples submitted 8/9/78 are as follows:

<u>Sample ID</u>	<u>Gross Alpha pCi/l \pm .2 σ</u>	<u>Gross Beta pCi/l \pm 2 σ</u>	<u>Weight of Solids g/200 ml sample</u>
1st Pit (<i>well on site</i>)	4.4 \pm 2.3	9.4 \pm 3.0	0.0533
Sump			
a) Suspended	1295 \pm 37	2087 \pm 31	0.6012
b) Dissolved	91 \pm 9	141 \pm 8	0.1252

Also enclosed is the summary of the EPA drinking water requirements for radioactivity, as we understand them.

Sincerely,

Mr. Charles Marcinkiewicz

Marjorie S. Malmberg

Marjorie S. Malmberg, Ph.D.
Section Leader
Environmental Radiological
Monitoring Services

cc: D. J. Ditunno

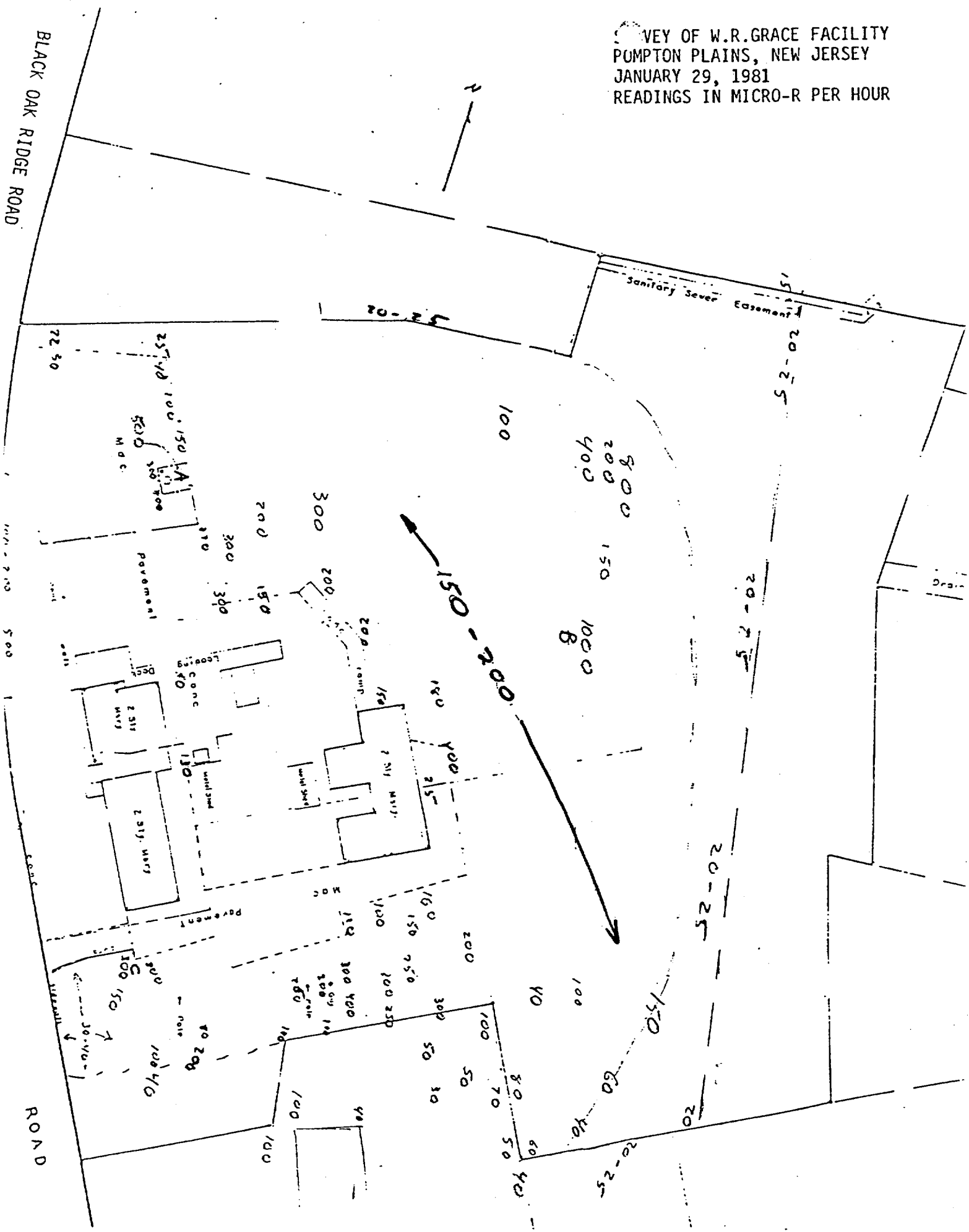
RECEIVED

AUG 31 1978

ITEM # 379

B/377

SURVEY OF W.R.GRACE FACILITY
 POMPTON PLAINS, NEW JERSEY
 JANUARY 29, 1981
 READINGS IN MICRO-R PER HOUR



EPA INTERIM PRIMARY
DRINKING WATER REGULATIONS

This table is drawn from FR 41:28403-5, July 9, 1976; 40CFR 141.2, .15, .16, .25, and .26. It represents our current understanding of the National Interim Primary Drinking Water Regulations as they apply to radioanalytical requirements. We do not assume responsibility for the completeness nor accuracy of interpretation of these regulations as expressed in this table, nor do we represent that this laboratory is certified to perform these analyses for community drinking water supplies.

Marjorie S. Malmberg

Marjorie S. Malmberg, Ph.D.
Laboratory Supervisor
Radiological Laboratory
Environmental Safeguards Division

EPA DRINKING WATER

<u>Analysis/ Isotope</u>	<u>Limit of Detection</u>	<u>Maximum Contaminant Level</u>	<u>Action Level</u>
5 Ra-226/228 combined	1 pCi/l	5 pCi/l	Ann. avg. of 4 qtrs > 5pC report to state & public
1 Gross alpha particle activity (incl. Ra-226, excluding U and Rn)	3 pCi/l	15 pCi/l	* >5 pCi/l, analyse for Ra-226 if Ra-226 >3 pCi/l analyse for Ra-228 (recommend 226 and/or 228 when Gross alpha >2 in areas known to have Ra-228 in drinking water.)
Gross beta	4 pCi/l	50 pCi/l	If >50, identify major radioactive constituents.
a. Recommended for all	3H-1000 89Sr-10	single, or combined to give no greater than 4 mrem/yr total body or any internal organ.	
b. Required for:	90Sr-2	NBS Handbook 69 (1963)	
1. Communities >100,000 using surface water	131I-1 134Cs-10	3H - 20,000 pCi/l 90Sr 8 pCi/l	
2. Others as required by state	Other 1/10 of applic. limit.		
3. In case of nuclear facility contamination in effluent. **			>15, analyze for Sr-89, Cs-134

Notes:

- * Measured gross alpha must not exceed 5 pCi/l at a confidence level of 95% (1.65σ) (i.e. $C + 1.65\sigma < 5$) .
- ** Recommend monthly Gross Beta, average quarterly; I-131 quarterly (5 day comp.

 $\left. \begin{array}{l} \text{Sr-90} \\ \text{H-3} \end{array} \right\}$
quarterly, av. annual

Monitoring requirements
Gr- α , Ra-226/228

Initiate by 6/24/79

Within 2 years of effective date (6/24/77)

Complete within 3 yrs. (6/24/77)

Analysis of (1) annual composite of 4 consecutive quarterly samples
or
(4) consecutive quarterly samples analyzed and averaged.

- Do this at least once every 4 years. If first year has shown Ra-226/228 < 2.5 pCi/l and gross alpha < 7.5 pCi/l, then a single sample may be analyzed instead of above procedure at discretion of the State.
- State may order more frequent sampling and analysis if cause exists (mining, etc.)
- New water source for a community water system -
Monitored 1st year as above.
More frequently if ordered by State.
- Later monitoring need not include Ra-228 if initial monitoring indicates absence and State agrees.
- If Ra-226 > 3 pCi/l annual monitoring may be required by State.
- If maximum is exceeded, supplier of water must notify State and the public and continue quarterly monitoring.

OCT 27 1982

Town of Lincoln Park
ATTN: Frank Grisi
Health Officer
35 Chapel Hill Road
Lincoln Park, New Jersey 07035

Gentlemen:

Subject: Radiological Surveys of Sheffield Brook, Final Report

Enclosed for your information is a copy of the subject report. This report does not contain the results of measurements made on the W. R. Grace and Company property on Black Oak Ridge Road in Wayne. These measurements will be the subject of a separate report.

If you have any questions concerning this report you may call me at (215) 337-5252.

Sincerely,

Original Signed By:

John D. Kinneman, Chief
Nuclear Materials Section A

Enclosure: As stated

bcc:
Region I Docket Room (w/concurrences)

ITEM # 590

B/378

KI:DETT
Kinneman/gwc
10/27/82

OFFICIAL RECORD COPY

ELECTRO NUCLEONICS, INC.
368 PASSAIC AVE., P.O. BOX 803
FAIRFIELD, NEW JERSEY, 07006
(201) 227-6700
CABLE: ELECTRONU
TELEX NO: 138302

ELECTRO NUCLEONICS

February 20, 1980

RECEIVED

FEB 25 1980

ENERGY ADMIN.

John W. Hardwicke, Esq.
Counsel
W.R. Grace & Co.
Davison Chemical Division
P.O. Box 2117
Baltimore, Maryland 21203

Re: Facility Lease
ENI/W.R. Grace & Co.

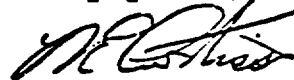
Dear John:

Enclosed is your original recorded copy of the subject lease which has been entered in the Passaic County Register's Deed Book #D105250 et seq.

I believe this satisfies your request.

Thank you again for your past cooperation.

Sincerely yours,



N.E. Curtiss
General Counsel

NEC:bf
Enclosure

cc: C.B. Kraft
R. Abajian

9
B/379
copy to H.F. Davis -
for your Pompton
Vault File

copy to Ed Heyman -
note: see para. 9
pages 3 & 4.

ITEM # 381

LEASE

F 5325

THIS LEASE effective as of this 1st day of October, 1979, by and between W. R. GRACE & CO., a Connecticut corporation, Davison Chemical Division, having an office at Charles and Baltimore Streets, Baltimore, Maryland 21202 (hereinafter called "Landlord") and ELECTRO-NUCLEONICS, INC., a New Jersey corporation, having an office at 368 Passaic Avenue, Fairfield, New Jersey 07006 (hereinafter called "Tenant").

WITNESSETH: -

WHEREAS, by Lease dated July 1, 1967 (extended by agreement of April 25, 1972) and Lease dated January 1, 1975, Landlord leased certain real property to Tenant at 868 Black Oak Ridge Road, Wayne, New Jersey; and

WHEREAS, Landlord now wishes to lease all of its real estate including the leasehold areas subject to the aforesaid leases and letter agreement of December 27, 1976, as well as other property belonging to Landlord at 868 Black Oak Ridge Road, Wayne, New Jersey.

NOW THEREFORE, the parties do hereby agree as follows:

1. Landlord does hereby lease to Tenant all of its real estate including land, buildings and appurtenances of every kind and character at 868 Black Oak Ridge Road, Wayne, New Jersey unto Tenant to have and to hold subject to the provision of this agreement without disturbance or interference. All previous leases including those referred to above are hereby cancelled and made void.

2. This Lease shall commence October 1, 1979 and shall be for a period of 4 years, terminating on September 30,

D 105.250

RECEIVED
PASSAIC CO. N.J.

1980 FEB 11 AM 11:34

BETTY M. KORDJA
REGISTER

1983. In addition, Landlord does hereby grant Tenant three one-year renewal options provided Tenant shall give Landlord notice in writing of its intention to exercise each such option at least 90 days prior to the expiration of the term then in effect.

3. The rental shall be \$28,890 for the first year, \$30,912 for the second year, \$33,076 for the third year, \$35,391 for the fourth year, and \$35,391 for each of the three one-year option periods (all aforesaid rentals are calculated by charging Tenant with the rental at the rate heretofore paid [\$30,000] less a credit for ordinary maintenance performed by it [\$3,000] multiplied by an escalation factor of 7% per annum). All rentals shall be paid in equal monthly payments on the first day of each month in advance, the first such payment to be made on October 1, 1979.

4. Landlord shall pay all real estate taxes and shall keep the property insured for fire, property damage, and extended coverage by a reputable insurance company, with the proceeds of insurance payable to Landlord and Tenant, as their interests may appear.

5. In addition to the payment of rental, Tenant shall pay all utility bills including but not limited to gas, electricity, water and sewage and any and all charges against the property save and except only those which are the responsibility of the Landlord pursuant to paragraph 4.

6. Tenant shall keep all buildings on the premises in good repair and shall be responsible for maintenance of both buildings and premises provided however, major repairs, including structural repairs or other repairs requiring substantial replacement or large capital outlays shall be the responsibility

of the Landlord, provided Landlord shall not be responsible for any repairs of any kind or nature occasioned or caused by the neglect or abuse of Tenant. Upon any termination of this Lease, Tenant shall return the premises and all improvements to Landlord in as good a condition as they were upon the commencement of this Lease, reasonable wear and tear excepted.

7. Tenant shall use the demised premises in accordance with any and all laws, rules and regulations of any and all governmental entities and agencies insofar as such laws, rules and regulations pertain to Tenant's use and occupancy of the premises.

8. Tenant does hereby agree to hold Landlord harmless from any and all claims for damages of any kind or character arising out of Tenant's use and occupancy of the premises except for any and all claims for damages caused by, due to, or directly or indirectly arising out of Landlord's negligence or contributory negligence.

9. Tenant, having occupied the demised premises for a long period of time and having employees who at one time were employed by Landlord in connection with Landlord's business at the aforesaid property, is aware that at one time there was a manufacturing operation at this site for the production of certain rare earth and radioactive products under license from the Atomic Energy Commission ("AEC"). Landlord represents to Tenant that it had "decontaminated" all buildings and structures upon the premises of radioactive residues and that it has buried any and all radioactive waste formerly upon the premises in compliance with requirements of the United States Government including the AEC. The AEC has approved the decontamination and released the premises from the condition of the license but a condition of said

release and approval is that the appropriate land records be noted to reflect this previous usage in order that subsequent users and purchasers of the property shall be notified of this previous usage. The areas of the demised premises affected by such usage are shown in crosshatch on the plat annexed hereto. It is for the purpose of such notification that this paragraph 9 is inserted in this Lease, and Tenant agrees that it will not disturb any area previously contaminated unless it shall first obtain the approval of Landlord, and that it will keep the area posted with appropriate warning signs, upon the written request of Landlord, provided however, the obligations and duties of Landlord with respect to the said area not diminished by this paragraph and provided further Tenant reserves any and all rights it has or may have had with respect to the aforesaid contamination.

10. Notwithstanding anything herein contained to the contrary, Tenant shall have the option to cancel this Lease if, during its term or any renewal period, its contract with the United States pursuant to which it uses the demised premises shall be for any reason terminated, provided however, it shall give Landlord notice of such termination at the time the United States so notifies Tenant.

11. Any and all notices to be given pursuant to this Lease shall be given, if to Landlord:

W. R. Grace & Co., Davison Chemical Division
10 East Baltimore Street
Baltimore, Maryland 21202
Attention: Vice President, Administration

if to Tenant:

Electro-Nucleonics, Inc.
368 Passaic Avenue
Caldwell, New Jersey 07006
Attention: Secretary-Treasurer.

ENR SEPT 27, 1973

W.R. GRACE & CO.
IN THE
TOWNSHIP OF WAYNE
PASSAIC CO. N.J.
POHPTON PLAINS

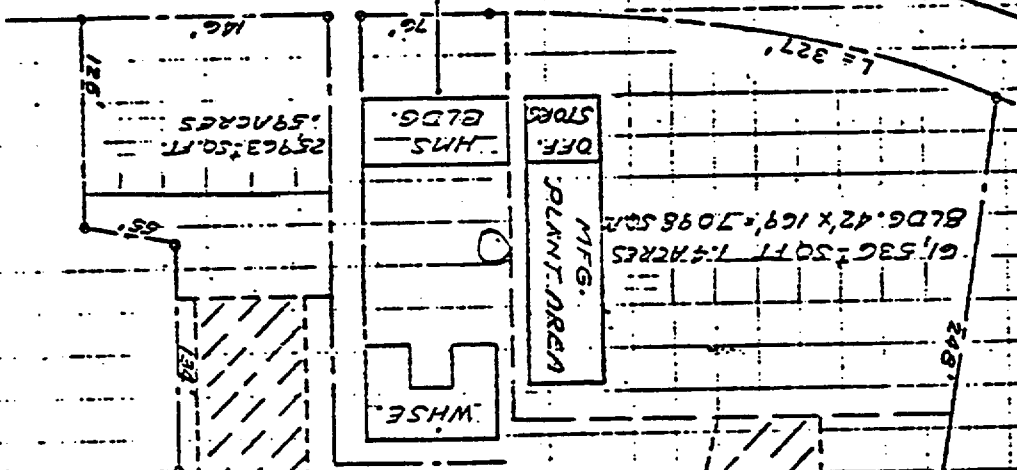
SCALE: 1"=100'

D 105,254

W.R. GRACE & CO.
IN THE
TOWNSHIP OF WAYNE
PASSAIC CO. N.J.
POHPTON PLAINS

(FARM)
(NURSING HOME)
LEASED TO ELECTRO-NUC
3206 SQ. FT. .073 ACRES
(STORE)

BLACK-OAK RIDGE ROAD



BLDG. 42' X 169' = 7098 SQ. FT.
61,536 SQ. FT. 1.4 ACRES

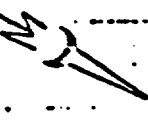
25,963 SQ. FT. .59 ACRES

7,963 SQ. FT. .187 ACRES

BLOCK C13
ZONING: R-1
TOTAL ACRES - TOTAL
56.4

RESIDENTIAL

RESIDENTIAL



BUS COMPANY

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IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed as of the day and year first above written.

W. R. GRACE & CO.
DAVISON CHEMICAL DIVISION

Attest:

Leanna Clinton
LEANNA CLINTON

By

Carlton B. Krest
CARLTON B. KREST
VP ADMINISTRATION

ELECTRO-NUCLEONICS, INC.

Attest:

Richard ABAJIAN
RICHARD ABAJIAN
Secretary

By

Alan M. Fishman
ALAN M. FISHMAN
Vice President
Nuclear Operations

STATE OF Maryland, CITY OF Baltimore, SS:

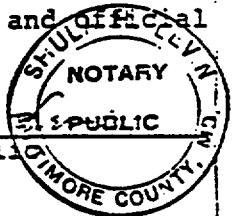
Be It Remembered, that on this 9th day of October in the City and State aforesaid, before me, the subscriber, a Notary Public authorized to take acknowledgments and proofs in said City and State, personally appeared Carlton B. Krest who, I am satisfied is the Vice President, Administration of Davison Chemical Division of W. R. Grace & Co., Lessor named in and who executed the foregoing instrument, and he did acknowledge that he signed, sealed, and delivered the same as the act and deed of the Lessor for the uses and purposes therein expressed.

In witness whereof I hereunto set my hand and official seal.

Shula H. Levin
SHULA H. LEVIN Notary Public

My Commission expires:

July 1, 1982



STATE OF NEW JERSEY , COUNTY OF ESSEX: SS:

Be It Remembered, that on this 17th day of October ,
in the County and State aforesaid, before me, the subscriber, a
Notary Public authorized to take acknowledgments and proofs in
said County and State, personally appeared Alan M. Fishman
Vice President
who, I am satisfied is the Nuclear Operations of Electro-Nucleonics,
Inc., Lessee named in and who executed the foregoing instrument,
and he did acknowledge that he signed, sealed, and delivered the
same as the act and deed of the Lessee for the uses and purposes
therein expressed.

In witness whereof I hereunto set my hand and official
seal.

Bruce D. Grigson
BRUCE D. GRIGSON Notary Public

My Commission expires: BRUCE D. GRIGSON
A NOTARY PUBLIC OF NEW JERSEY
My Commission Expires Jan. 29, 1960

Prepared by John W. Hardwicke



D 105,256

Wayne Township
OF WAYNE

475 Valley Road
Wayne, New Jersey 07470
(201) 694-1500

Arthur R. Bartolozzi, R.S., B.S., M.A.
Health Officer
Director Health & Welfare

February 29, 1980

Mr. Edward F. Heymann
General Manager
Public Relations & Advertising
W. R. Grace & Co.
P.O. Box 2117
Baltimore, Maryland 21203

Dear Mr. Heymann:

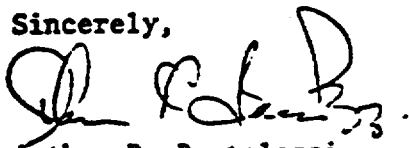
Would you please furnish me with a historical background of the radioactive dumping and burial site at 868 Black Oak Ridge Road, Wayne, N.J.

I have spoken with Leroy Zeger of Electro-Nucleonics, Inc., who advised me that you were to be contacted for information.

How often is the site monitored and by whom? Age of fill?

Thank you in advance for your cooperation and assistance.

Sincerely,



Arthur R. Bartolozzi
Health Officer

ARB/eec

B/380



ITEM # 382

GRACE

Division Chemical Division

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

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

June 10, 1980

Mr. Arthur R. Bartolozzi
Health Officer
Director Health and Welfare
Township of Wayne
475 Valley Road
Wayne, New Jersey 07470

Dear Mr. Bartolozzi:

In answer to your letter of February 29, 1980 regarding the radioactive burial site at 868 Black Oak Ridge Road, I have compiled the attached historical background.

As I explained to you per phone, your request required a search through our historical records, many of which were damaged in a fire at the site in 1977. The search took a lot of time since a very large number of file boxes were involved.

Thank you for your continued patience and if you should have any additional questions, please contact me at the above telephone number.

Sincerely,



Armin Wille
Sr. Facilities Engineer

AW/cm
Attachment

bc: Messrs: T. J. Booth
J. W. Hardwicke
E. F. Heymann
C. B. Kraft
B. L. Mobley
J. R. Smith
Vault file - Pompton Plains (Mrs. M. J. Berger)

ITEM # 383 3

B/381

HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

In December, 1973, Davison Chemical engaged the service of Applied Health Physics, Inc. (AHP) to conduct a radiological survey of the entire property. Decontamination operations were begun by AHP on March 11, 1974 and continued through July 18, 1974. The goal of the work was to attain certain radioactivity limits as specified in regulations of the A.E.C. and the New Jersey State Department of Health for unrestricted use. A certified health physicist was engaged during the decontamination work as a consultant to Davison to recommend appropriate methods of removing and disposing of radioactive wastes and to provide an expert's opinion on the progress and course of decontamination, as well as to assure compliance with the regulations of the State of New Jersey and the A.E.C. A survey report, dated September 9, 1974 was sent to the A.E.C. (then Nuclear Regulatory Commission - N.R.C.) who's Region I Office of Regulatory Operations performed a confirmatory survey. In a letter dated January 22, 1975, the N.R.C. released the facilities for unrestricted use, provided that a notation be recorded in the appropriate land records indicating radioactive material has been buried on this property. This has been recorded in the land records in Passaic County.

During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

On May 14, 1977, a fire of undetermined origin swept through the main building, heavily damaging the structure. Davison had about 2/3 of the remaining building razed and only restored the front 1/3 for office space. Some of the buildings were leased to Electro-Nucleonics, Inc. (ENI) soon after cessation of operations in July 1967, and the entire real estate was leased long-term to ENI in October 1979.

From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring. This employee is Mr. Armin Wille, Senior Facilities Engineer, W. R. Grace & Co., Davison Chemical Division, P.O. Box 2117, Baltimore, Maryland 21203. Telephone (301) 659-9093.

DAVID WAKS

COUNCILMAN

WAYNE, NEW JERSEY

RESIDENCE:

58 BRANDYWINE ROAD
WAYNE, NEW JERSEY 07470
694-5399

OFFICE:

262 MAIN STREET
PATERSON, NEW JERSEY 07505
742-5555

January 6, 1981

Nuclear Regulatory Commission
United States Government
King of Prussia, Pennsylvania

Gentlemen:

I am advised that there is nuclear waste buried on a site in Wayne Township in the area formerly occupied by the W.R. Grace Company at 868 Black Oak Ridge Road. I am informed that the nuclear waste may have been buried at the site by the W.R. Grace Company.

I would very much appreciate it if you would promptly advise me as follows:

1. Can the site be inspected for proper disposal of the waste and can the waste be removed from the site.
2. Can you furnish me with any documentation which you have pertaining to this matter.

Thank you for your attention.

Very truly yours,



DAW:eo

B/382

ITEM # 384

119

✓ Docket No. 040-0086

26 JAN 1981

W.R. Grace and Company
Davidson Chemical Division
ATTN: Mr. C.B. Kraft
Vice President of Administration
P.O. Box 2117
Baltimore, Maryland 21203

Gentlemen:

This refers to a telephone inquiry by Ms. M. Campbell of this office with Mr. A. Wille of your staff on January 20, 1981.

This inquiry was to request your cooperation regarding a request for information from Councilman David Waks of Wayne, New Jersey, concerning your facility in Wayne Township, New Jersey.

Our files of the records of the thorium processing which occurred under AEC license STA-422 do not include a record of a complete survey of the grounds of your facility. We would like to conduct a radiation survey of these grounds during the week of January 26, 1981. We would also appreciate a copy of the most recent radiation survey of this facility performed by Mr. A. Wille of your staff.

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.

Should you have any questions concerning this inquiry, please contact Ms. Campbell of my staff at (215)337-5342.

Sincerely,

John D. Kinneman, Chief
Materials Radiological Protection
Section

bcc:

IE Mail & Files (For Appropriate Distribution)
Central Files
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Region I Reading Room
State of New Jersey

Campbell/at
1/26/81

Kinneman

19/3/83

120

ITEM # 385

Let's protect our earth



NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.O. BOX 1390 TRENTON, N.J. 08625
609 292 2994

NEWS

BRENDAN BYRNE GOVERNOR
JERRY FITZGERALD ENGLISH COMMISSIONER

AERIAL RADIOLOGICAL SURVEYS SET FOR CITIES OF GLOUCESTER AND ORANGE, AND TOWNSHIP OF WAYNE

(STATEWIDE)
No. 81/ 303

Immediate release:
May 21, 1981

TRENTON--Commissioner Jerry Fitzgerald English of the Department of Environmental Protection (DEP) announced today that aerial radiological surveys of three New Jersey communities--Gloucester City, Camden County; Orange City, Essex County; and Wayne Township; Passaic County--are currently being conducted by EG & G, Inc. a Las Vegas, Nevada, contractor for the federal Department of Energy. Part of a routine U.S. Environmental Protection Agency (EPA) program to gather information on radiation levels in areas surrounding former mineral extraction and refining facilities, these surveys are being done at the request of the DEP. A previously issued DEP press release erroneously identified Pompton Plains in Pequannock Township rather than Wayne Township as the third site to be surveyed.

The helicopter survey, conducted from a blue and white helicopter flying at an altitude of 150 feet or more above the ground, will record terrestrial radiation profiles over sixteen square mile areas centered in Gloucester at a former mesothorium facility, a former radium facility in Orange, and a former rare earth's and thorium facility in Wayne Township. The survey of Gloucester is scheduled for the week of May 11-15, Orange the week of May 18-22, and Wayne Township the week of May 25-29. A special waiver of federal air regulations has been obtained from the Federal Aviation Administration (FAA) to permit low-level flying. The flights and testing will be made during daylight hours as weather conditions permit. The project at each of the sites will be completed in two or three days of flying.

Data processing for aerial radiological surveys usually requires two or three months. All analytical results will then be forwarded to the DEP for evaluation.

B/384

ITEM # 386

124

GRACE

Davison Chemical Division

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

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

June 10, 1980

Mr. Arthur R. Bartolozzi
Health Officer
Director Health and Welfare
Township of Wayne
475 Valley Road
Wayne, New Jersey 07470

Dear Mr. Bartolozzi:

In answer to your letter of February 29, 1980 regarding the radioactive burial site at 868 Black Oak Ridge Road, I have compiled the attached historical background.

As I explained to you per phone, your request required a search through our historical records, many of which were damaged in a fire at the site in 1977. The search took a lot of time since a very large number of file boxes were involved.

Thank you for your continued patience and if you should have any additional questions, please contact me at the above telephone number.

Sincerely,



Armin Wille
Sr. Facilities Engineer

AW/cm
Attachment

bc: Messrs: T. J. Booth
J. W. Hardwicke
E. F. Heymann
C. B. Kraft
B. L. Mobley
J. R. Smith
Vault file - Pompton Plains (Mrs. M. J. Berger)

ITEM # 38715

12/385

HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

In December, 1973, Davison Chemical engaged the service of Applied Health Physics, Inc. (AHP) to conduct a radiological survey of the entire property. Decontamination operations were begun by AHP on March 11, 1974 and continued through July 18, 1974. The goal of the work was to attain certain radioactivity limits as specified in regulations of the A.E.C. and the New Jersey State Department of Health for unrestricted use. A certified health physicist was engaged during the decontamination work as a consultant to Davison to recommend appropriate methods of removing and disposing of radioactive wastes and to provide an expert's opinion on the progress and course of decontamination, as well as to assure compliance with the regulations of the State of New Jersey and the A.E.C. A survey report, dated September 9, 1974 was sent to the A.E.C. (then Nuclear Regulatory Commission - N.R.C.) who's Region I Office of Regulatory Operations performed a confirmatory survey. In a letter dated January 22, 1975, the N.R.C. released the facilities for unrestricted use, provided that a notation be recorded in the appropriate land records indicating radioactive material has been buried on this property. This has been recorded in the land records in Passaic County.

During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

On May 14, 1977, a fire of undetermined origin swept through the main building, heavily damaging the structure. Davison had about 2/3 of the remaining building razed and only restored the front 1/3 for office space. Some of the buildings were leased to Electro-Nucleonics, Inc. (ENI) soon after cessation of operations in July 1967, and the entire real estate was leased long-term to ENI in October 1979.

From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring. This employee is Mr. Armin Wille, Senior Facilities Engineer, W. R. Grace & Co., Davison Chemical Division, P.O. Box 2117, Baltimore, Maryland 21203. Telephone (301) 659-9093.

CONFIDENTIAL

475 Valley Road
Wayne, New Jersey 07470
(201) 694-1500

Arthur R. Bartolozzi, R.S., B.S., M.A.
Health Officer
Director Health & Welfare

February 29, 1980

Mr. Edward F. Heymann
General Manager
Public Relations & Advertising
W. R. Grace & Co.
P.O. Box 2117
Baltimore, Maryland 21205

Dear Mr. Heymann:

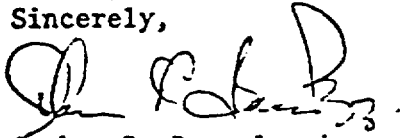
Would you please furnish me with a historical background of the radioactive dumping and burial site at 868 Black Oak Ridge Road, Wayne, N.J.

I have spoken with Leroy Zeger of Electro-Nucleonics, Inc., who advised me that you were to be contacted for information.

How often is the site monitored and by whom? Age of fill?

Thank you in advance for your cooperation and assistance.

Sincerely,



Arthur R. Bartolozzi
Health Officer

ARB/eec



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 23 1975

NMSS:MB:CRB
Docket 40-86
STA-422

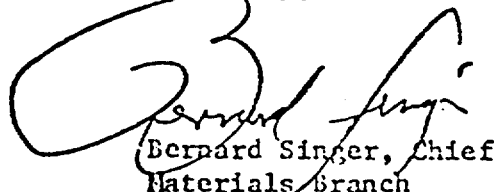
W. R. Grace and Company
Davison Chemical Division
ATTN: Mr. B. L. Mobley
Supervisor, Environmental Control
Charles and Baltimore Streets
Baltimore, Maryland 21203

Gentlemen:

This is in reply to your request for release for unrestricted use property at 868 Black Oak Ridge Road, Wayne Township, New Jersey, formerly under Source Material License No. STA-422, Docket 40-86. Based on your survey report dated September 9, 1974, and letters dated September 16, 1974, October 30, 1974, and December 17, 1974, and a confirmatory survey performed by Region I Office of Regulatory Operations, AEC, it appears that the property meets the decontamination criteria for release of facilities for unrestricted use.

We have no objection to the release of the property provided a notation is recorded in the appropriate land records indicating radioactive material has been buried on this property pursuant to 10 CFR 20.304 (1974).

Sincerely,



Bernard Singer, Chief
Materials Branch
Office of Nuclear Material
Safety and Safeguards



WTO F. SITAW

DATE: August 22, 1978
FROM: C. P. Metzger
TO: Mr. B.L. Mobley
cc: Mr. O. A. Wunderlich
→ Mr. C. H. Bell
SUBJECT: Inspection by the N.J. State Department
of Environmental Protection

On August 22, we were visited by Mr. Pasquale Ferraro of the Bureau of Solid Waste Management. His purpose was to view the area where burials of radioactive materials have been made and to determine that no building structure enclosure had been placed on top of the burial area.

I was able to show him, in general, where the materials were buried and to assure him that nothing has been placed above this area. Also, to assure him that nothing would be placed there in the future.

I believe he is totally satisfied with the results of his inspection, therefore, no further action is required on our part, at this time.


C. P. Metzger

CPM:db

RECEIVED
AUG 31 1978
ENERGY ADMIN.

File 1402

ELECTRO NUCLEONICS, INC.
368 PASSAIC AVE., P.O. BOX 803
FAIRFIELD, NEW JERSEY, 07006
(201) 227-8700
CABLE: ELECTRONU
TELEX NO: 138302

ELECTRO NUCLEONICS

February 20, 1980

RECEIVED

FEB 25 1980

ENERGY ADMIN.

John W. Hardwicke, Esq.
Counsel
W.R. Grace & Co.
Davison Chemical Division
P.O. Box 2117
Baltimore, Maryland 21203

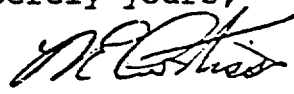
Re: Facility Lease
ENI/W.R. Grace & Co.

Dear John:

Enclosed is your original recorded copy of the subject lease which has been entered in the Passaic County Register's Deed Book #D105250 et seq.

I believe this satisfies your request.

Thank you again for your past cooperation.

Sincerely yours,


N.E. Curtiss
General Counsel

NEC:bf
Enclosure

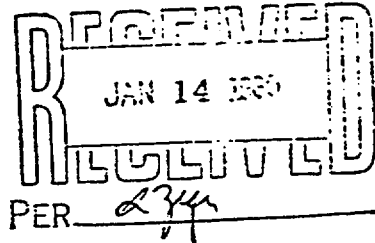
cc: C.B. Kraft
R. Abajian

*copy to H.F. Davis -
for your Pompton
Vault File*

*Copy to Ed Heyman -
note: see paragraph
9 pages 3 & 4.*



Department of Energy
Oak Ridge Operations
P.O. Box E
Oak Ridge, Tennessee 37830



JAN 09 1980

Mr. Leroy Zeger, P. E.
Program Manager
Electro-Nucleonics, Inc.
P. O. Box 106
Pompton Plains, New Jersey 07444

Gentlemen:

FACILITY LEASE ENI/W. R. GRACE & COMPANY - CONTRACT NO.
DE-AC05-76OR03685

We have reviewed the subject lease which was transmitted to us with your letter dated October 25, 1979. The proposed lease with W. R. Grace & Company, covering the lease of facilities used for contract work, which are located at 868 Black Oak Ridge Road, Wayne, New Jersey, is hereby approved subject to the following conditions. A cost estimate, together with a justification of need for any individual improvement, replacement, or maintenance job estimated to cost \$5,000 or more, shall be submitted to the Contracting Officer for review and approval prior to the initiation of the job.

Your letter dated October 25, 1979, stated that you were submitting the lease for review and approval under Article IV.4.i., of the original contract dated September 22, 1967. Please note that Modification No. 5 to the contract, which was entered into on August 22, 1972, deletes paragraph 4 of Article IV in its entirety and substitutes new provisions in lieu thereof.

Sincerely,

John D. Wagoner
Director, Procurement
and Contracts Division

AD-43:DLR

cc: R. E. Leed, AMEEO&D, ORO

LEASE

F 5325

THIS LEASE effective as of this 1st day of October, 1979, by and between W. R. GRACE & CO., a Connecticut corporation, Davison Chemical Division, having an office at Charles and Baltimore Streets, Baltimore, Maryland 21202 (hereinafter called "Landlord") and ELECTRO-NUCLEONICS, INC., a New Jersey corporation, having an office at 368 Passaic Avenue, Fairfield, New Jersey 07006 (hereinafter called "Tenant").

WITNESSETH: -

WHEREAS, by Lease dated July 1, 1967 (extended by agreement of April 25, 1972) and Lease dated January 1, 1975, Landlord leased certain real property to Tenant at 868 Black Oak Ridge Road, Wayne, New Jersey; and

WHEREAS, Landlord now wishes to lease all of its real estate including the leasehold areas subject to the aforesaid leases and letter agreement of December 27, 1976, as well as other property belonging to Landlord at 868 Black Oak Ridge Road, Wayne, New Jersey.

NOW THEREFORE, the parties do hereby agree as follows:

1. Landlord does hereby lease to Tenant all of its real estate including land, buildings and appurtenances of every kind and character at 868 Black Oak Ridge Road, Wayne, New Jersey unto Tenant to have and to hold subject to the provision of this agreement without disturbance or interference. All previous leases including those referred to above are hereby cancelled and made void.

2. This Lease shall commence October 1, 1979 and shall be for a period of 4 years, terminating on September 30,

D 105,250

RECEIVED
PASSAIC CO. N.J.
1980 FEB 11 AM 11:34
BETTY M. KORDJA
REGISTER

1983. In addition, Landlord does hereby grant Tenant three one-year renewal options provided Tenant shall give Landlord notice in writing of its intention to exercise each such option at least 90 days prior to the expiration of the term then in effect.

3. The rental shall be \$28,890 for the first year, \$30,912 for the second year, \$33,076 for the third year, \$35,391 for the fourth year, and \$35,391 for each of the three one-year option periods (all aforesaid rentals are calculated by charging Tenant with the rental at the rate heretofore paid [\$30,000] less a credit for ordinary maintenance performed by it [\$3,000] multiplied by an escalation factor of 7% per annum). All rentals shall be paid in equal monthly payments on the first day of each month in advance, the first such payment to be made on October 1, 1979.

4. Landlord shall pay all real estate taxes and shall keep the property insured for fire, property damage, and extended coverage by a reputable insurance company, with the proceeds of insurance payable to Landlord and Tenant, as their interests may appear.

5. In addition to the payment of rental, Tenant shall pay all utility bills including but not limited to gas, electricity, water and sewage and any and all charges against the property save and except only those which are the responsibility of the Landlord pursuant to paragraph 4.

6. Tenant shall keep all buildings on the premises in good repair and shall be responsible for maintenance of both buildings and premises provided however, major repairs, including structural repairs or other repairs requiring substantial replacement or large capital outlays shall be the responsibility

of the Landlord, provided Landlord shall not be responsible for any repairs of any kind or nature occasioned or caused by the neglect or abuse of Tenant. Upon any termination of this Lease, Tenant shall return the premises and all improvements to Landlord in as good a condition as they were upon the commencement of this Lease, reasonable wear and tear excepted.

7. Tenant shall use the demised premises in accordance with any and all laws, rules and regulations of any and all governmental entities and agencies insofar as such laws, rules and regulations pertain to Tenant's use and occupancy of the premises.

8. Tenant does hereby agree to hold Landlord harmless from any and all claims for damages of any kind or character arising out of Tenant's use and occupancy of the premises except for any and all claims for damages caused by, due to, or directly or indirectly arising out of Landlord's negligence or contributory negligence.

9. Tenant, having occupied the demised premises for a long period of time and having employees who at one time were employed by Landlord in connection with Landlord's business at the aforesaid property, is aware that at one time there was a manufacturing operation at this site for the production of certain rare earth and radioactive products under license from the Atomic Energy Commission ("AEC"). Landlord represents to Tenant that it had "decontaminated" all buildings and structures upon the premises of radioactive residues and that it has buried any and all radioactive waste formerly upon the premises in compliance with requirements of the United States Government including the AEC. The AEC has approved the decontamination and released the premises from the condition of the license but a condition of said

release and approval is that the appropriate land records be noted to reflect this previous usage in order that subsequent users and purchasers of the property shall be notified of this previous usage. The areas of the demised premises affected by such usage are shown in crosshatch on the plat annexed hereto. It is for the purpose of such notification that this paragraph 9 is inserted in this Lease, and Tenant agrees that it will not disturb any area previously contaminated unless it shall first obtain the approval of Landlord, and that it will keep the area posted with appropriate warning signs, upon the written request of Landlord, provided however, the obligations and duties of Landlord with respect to the said area not diminished by this paragraph and provided further Tenant reserves any and all rights it has or may have had with respect to the aforesaid contamination.

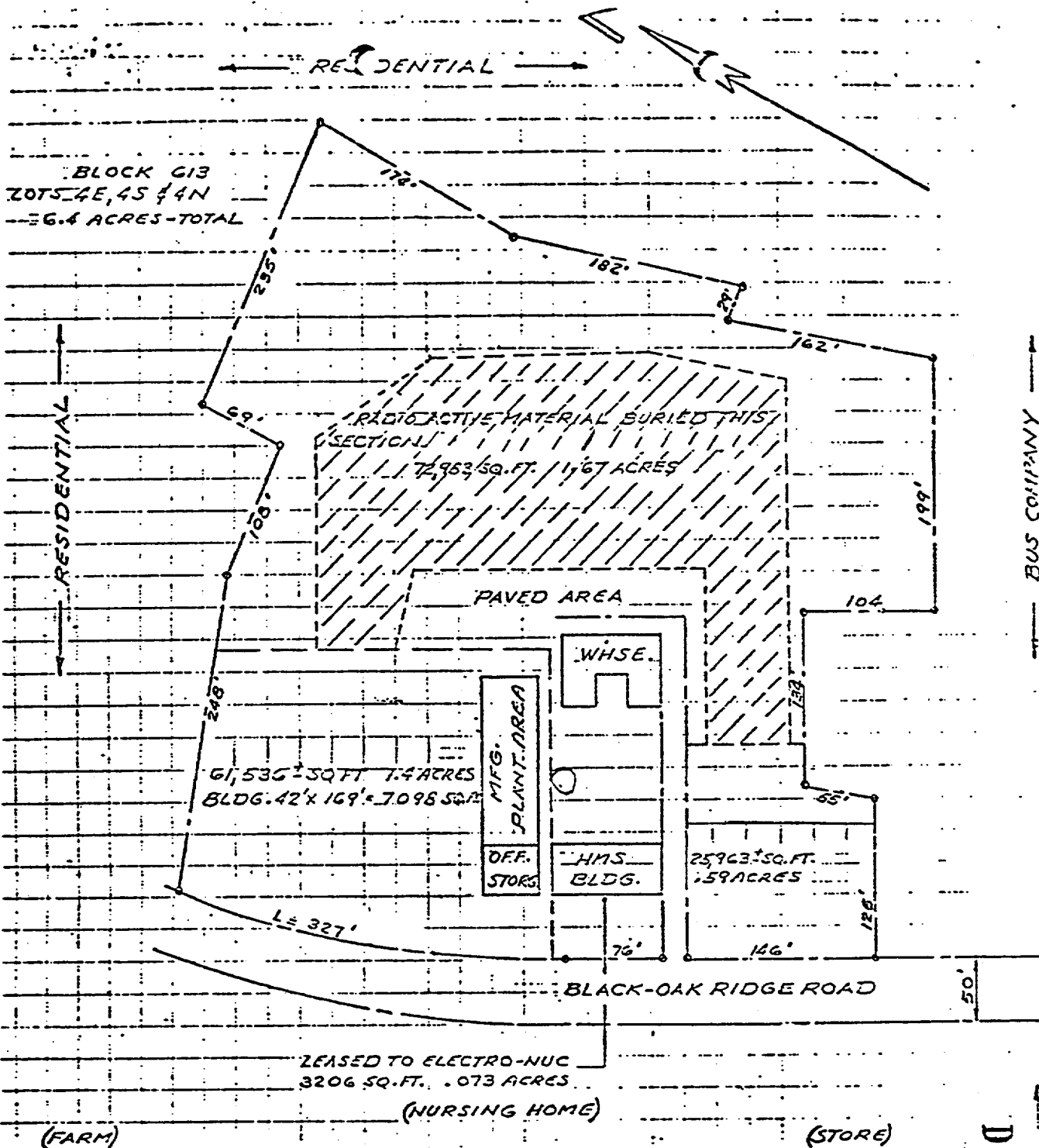
10. Notwithstanding anything herein contained to the contrary, Tenant shall have the option to cancel this Lease if, during its term or any renewal period, its contract with the United States pursuant to which it uses the demised premises shall be for any reason terminated, provided however, it shall give Landlord notice of such termination at the time the United States so notifies Tenant.

11. Any and all notices to be given pursuant to this Lease shall be given, if to Landlord:

W. R. Grace & Co., Davison Chemical Division
10 East Baltimore Street
Baltimore, Maryland 21202
Attention: Vice President, Administration

if to Tenant:

Electro-Nucleonics, Inc.
368 Passaic Avenue
Caldwell, New Jersey 07006
Attention: Secretary-Treasurer.



PLOT PLAN
W. R. GRACE & CO.
 IN THE
 TOWNSHIP OF WAYNE
 PASSAIC CO. N. J.
 POMPTON PLAINS

3HB SEPT. 27, 1973

SCALE: 1" = 100'

D 1051254

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed as of the day and year first above written.

W. R. GRACE & CO.
DAVISON CHEMICAL DIVISION

Attest:
Leanna Clinton
LEANNA CLINTON

By Captan B. Kraft Jwd
CAPTAN B. KRAFT
VP ADMINISTRATION

ELECTRO-NUCLEONICS, INC.

Attest:
Richard Abajian
RICHARD ABAJIAN
Secretary

By Alan M. Fishman YEC
ALAN M. FISHMAN
Vice President
Nuclear Operations

STATE OF Maryland, CITY OF Baltimore; SS:

Be It Remembered, that on this 9th day of October in the City and State aforesaid, before me, the subscriber, a Notary Public authorized to take acknowledgments and proofs in said City and State, personally appeared Captan B. Kraft who, I am satisfied is the Vice President, Administration of Davison Chemical Division of W. R. Grace & Co., Lessor named in and who executed the foregoing instrument, and he did acknowledge that he signed, sealed, and delivered the same as the act and deed of the Lessor for the uses and purposes therein expressed.

In witness whereof I hereunto set my hand and official seal.

Shula H. Levin
SHULA H. LEVIN Notary Public
NOTARY PUBLIC
BALTIMORE COUNTY, MARYLAND

My Commission expires: July 1, 1982

STATE OF NEW JERSEY , COUNTY OF ESSEX: SS:

Be It Remembered, that on this 17th day of October, in the County and State aforesaid, before me, the subscriber, a Notary Public authorized to take acknowledgments and proofs in said County and State, personally appeared Alan M. Fishman Vice President who, I am satisfied is the Nuclear Operations of Electro-Nucleonics, Inc., Lessee named in and who executed the foregoing instrument, and he did acknowledge that he signed, sealed, and delivered the same as the act and deed of the Lessee for the uses and purposes therein expressed.

In witness whereof I hereunto set my hand and official seal.

Bruce D. Grigson
BRUCE D. GRIGSON Notary Public

My Commission expires: BRUCE D. GRIGSON
A NOTARY PUBLIC OF NEW JERSEY
My Commission Expires Jan. 29, 1980

Prepared by John W. Hardwicke



D 105-256

Seventh Site for
Radiological Survey by ORAU

7. W. R. Grace Company (formerly Rare Earths, Inc.)
Pompton Plains, New Jersey

Contact: W. T. Crow, NRC
NMSS/FC

Site Identification:

This site was used for a monazite sand processing facility as authorized by License No. STA-422. The license was terminated and the site was released for unrestricted use in January 1975. The site is still owned by W. R. Grace Company. Buildings on the site are being leased by Electro Nucleonics, Inc. for use as office, warehouse and possibly laboratory space.

General Survey Requirements:

A preliminary survey of this site was conducted by NRC, Region I, in January 1981. Preliminary evaluations indicate that this site may not meet current NRC criteria for release for unrestricted use. The site is to be surveyed to determine surface radiation levels and concentrations of naturally occurring radionuclides, thorium-232 and uranium-238 series, in soil and water.

An estimated date for the preliminary site visit shall be provided by ORAU in the next monthly report. A schedule for completion of the survey shall be provided subsequent to the site visit.

Arrangements for site visits should be made through W. T. Crow.

B/386

12

Enclosure
SOEW 50-82-05

ITEM # 388

STATEMENT OF WORK (SOW) FOR
RADIOLOGICAL EVALUATION ASSISTANCE
FIN A 9093-0
B&R 50-19-01-01

1.0 Background

In a letter dated September 19, 1976, from Mr. Monte Canfield, Jr., Director, GAO, to Marcus E. Rowden, Chairman, NRC, Mr. Canfield mentioned GAO's survey of federal programs for disposing of obsolete and unused nuclear facilities and a related program by ERDA to evaluate former Government-owned and AEC contract sites that previously handled radioactive materials. Also discussed was a GAO concern about sites formerly licensed by AEC's regulatory body. Because of this concern, the GAO reviewed some records of licenses that have been terminated. This review indicated that licenses which were recently terminated contained adequate assurance of proper decontamination; however, the files on licenses terminated in the late 1950's and early 1960's did not contain evidence of decontamination in many cases. The GAO asked if NRC could provide assurance that no radiation safety problems exist at sites previously operated under an AEC license.

The NRC reply to Mr. Canfield's letter (L. V. Gossick to Mr. Canfield, dated October 15, 1976) indicated that we would reexamine our files - of licenses terminated prior to 1965. The Oak Ridge National Laboratory was retained to evaluate docket files to determine which sites, if any, would need additional on-site evaluation to determine if proper decontamination had been effected. To date, a number of sites formerly used for processing source material have been identified for further evaluation.

In addition to the sites identified through the docket search, radiological evaluation assistance may be required to confirm that currently licensed sites are properly decontaminated prior to license termination.

The NRC's Office of Nuclear Material Safety and Safeguards (NMSS) requires technical assistance for the evaluation of sites to determine if they have been properly decontaminated. The objective of the assistance for each site would be to:

1. Determine if radionuclides are present, or believed to be present, above allowable limits.
2. If radionuclides are present, or are believed to be present, above allowable limits to:
 - a. Determine the radionuclides present.
 - b. Determine the spatial distribution of the radionuclides above background.
 - c. Provide an estimate of the hazards involved.

2.0 Work Required

Technical support will be provided in the areas described below. When specific work requirements are identified, the NRC will issue task orders in the form of Standard Orders for DOE Work (NRC Forms 173). The task orders will describe the work to be performed, the type of report(s) that are to be prepared, and the desired completion date. The performing organization shall provide a cost estimate and milestone schedule for these tasks in the monthly letter status report (see paragraph 3.1 below). Approximately four task orders per year are anticipated, each of which will require an estimated one to two man-years of effort to complete. The work required in the task orders will fall within the following areas of work:

2.1 Preliminary Site Visit

The performing organization shall make a preliminary visit to the sites specified by the NMSS Project Manager (PM). The purpose of the visit is two-fold: first, to review the known history of the site with the licensee or local officials and to inspect the property and make exploratory radiation measurements in areas identified as housing licensed or previously licensed materials; and second, to evaluate the results of these discussions and measurements.

2.2 Development of Radiological Survey Plans

A radiological survey plan shall be developed for sites specified by the NMSS PM, and submitted to NRC for approval. Because of the wide variety of past operational activities as well as radioactive materials present at each site, it may not be possible to conduct formal surveys in accordance with a uniform survey plan. Just as any assessment activity is highly site specific, such is the case for radiation measurements and the collection of environmental samples.

The following list of activities is typical of those which will usually be included in a formal radiological survey and should be considered in the development of a radiological survey plan. This list is not intended to be either all inclusive or restrictive.

A. Gamma-ray exposure rates at 1 m above the ground outside buildings

A grid pattern is posted on plan views of the entire site. Measurements of gamma-ray exposure rate are made 1 m above the ground at the intersection of each grid line. These grid lines are normally spaced 10 to 50 feet apart and include points within property boundaries and points on surrounding property.

B. Beta-gamma dose rates at the ground surface

Detailed measurements are made of the beta-gamma levels at 1 cm above outside ground (natural, paved, or otherwise covered) surfaces in accordance with the above grid pattern. Open window and closed window G-M readings are made at each grid point.

C. Measurements of radionuclide concentrations in water

Water samples are taken from surface collections both on and off the site. In addition, samples shall be taken from any flowing streams which border each site both upstream and downstream as dictated by radiation measurements. Groundwater which may be found in core holes will be sampled and included with the above samples and analyzed for appropriate radionuclides.

D. Investigation of underground drains and surface drainageways

Because radioactive wastes and residues may have been stored on the surface or in on-site holding ponds, all known and suspected drainageways on each site and those leading away from each site should receive careful attention. Samples of scale are taken from all accessible drain lines. In surface drainageways leading away from the property, samples are collected in order to determine both downward and lateral movement of radioactivity. The location of these drains and drainageways are recorded on drawings. Since surface drainageways represent points of public access, sediment samples collected in these areas are analyzed for appropriate radionuclides.

E. Investigation of surface deposits of radioactivity

Samples of soil are collected on the ground surface both on and off the site in order to determine the location and quantities of surface deposits of radioactivity. The location of these samples normally corresponds to grid points where surface beta-gamma measurements were made.

F. Investigation of subsurface deposits of radioactivity

Extensive monitoring and sampling may be required in order to determine the magnitude of subsurface contamination. Areas of principal concern include sites where solid and liquid radionuclides were stored or buried. It is sometimes necessary to investigate the site of demolished buildings and also sites where residues and wastes have been moved for either temporary or permanent storage. Drilling and coring operations in these areas may be needed to define quantities and boundaries of underground deposits of radionuclides. Core samples shall be collected for analysis and each core hole shall be "logged" using collimated gamma-ray detector to verify the spatial distribution of radioactivity below the surface.

G. Radionuclide concentrations in air

Residues may exist which contain ^{226}Ra , ^{224}Ra , and ^{223}Ra resulting in the emanation from the residues of ^{222}Rn , ^{220}Rn , and ^{219}Rn . Measurements shall be made in order to establish instantaneous concentrations of these radon isotopes and their progeny.

H. Vegetation samples

A limited selection of vegetation samples of several species may need to be collected from areas representing the observed range of surface radioactivity. Analyses of the radionuclide concentrations in vegetation samples are determined after a determination has been made of the radionuclide concentrations in host soil.

I. Determination of background gamma radiation levels, concentration or radionuclides in soil and water, and concentrations of radon in air

A series of soil and water samples shall be collected in the area around each site in order to establish the background concentrations of radionuclides of interest. Gamma radiation levels at 3 ft. above the ground are also measured at each sampling point. In areas where radium bearing residues exist, a limited number of measurements are made to determine typical radon concentrations in areas far enough removed from the site so as not be influenced by radon emanating from the site.

J. Documentation of radiological survey

It will be necessary throughout the survey to maintain accurate records pertaining to such activities as: (1) instrument calibration, (2) location of individual survey measurements, (3) analytical procedures, (4) recording of data and results of sample analyses, (5) computer calculations, (6) assumptions made with regard to boundary conditions in evaluating radiological data, and (7) preparation of the final report of each formal survey. These records are needed in order to provide an element of quality assurance to the survey and to serve as the foundation for any future audit which may be necessary.

2.3 Conducting Formal Radiological Surveys

Once a radiological survey plan for a site is reviewed and approved by the NMSS PM, an appropriately staffed radiological survey team shall be mobilized and moved to the site. The objective of conducting formal radiological surveys at the sites is to characterize the current radiological status of the property. In order to accomplish this, the performing organization shall have available a modern, well-equipped mobile laboratory to serve as the established (on-site) survey headquarters station (see Section 5 below).

2.4 Preparation of Radiological Survey Reports

A radiological survey report should be prepared which summarizes the results of all survey activities performed under the radiological survey plan. In addition, the radiological survey report will include a description of the site and an evaluation of radiological conditions at the site.

The site description should include the location of the site and a description of its topography in sufficient detail to support an engineering evaluation, scaled maps of the site and the surrounding area, a discussion of the present physical condition of the site and, for background purposes, a brief description and history of the licensee operations conducted at the site.

The section of the report which evaluates the radiological conditions should describe the radiological conditions existing at the site and, based on those conditions, the potential routes or exposure pathways to mankind.

3.0 Reporting Requirements

Recognizing the complexities in the scheduling of site visits, radiological surveys and report preparation for a project of this type which may have to be responsive to everchanging priorities, it is intended and should be understood that all schedules and due dates will be discussed and mutually agreed upon by the performing organization's representative and the NMSS PM.

3.1 Monthly Letter Report

Each month, the performing organization shall submit three copies of a brief letter report which summarizes: (1) the work performed during the previous month, (2) personnel time expenditures during the previous month; and (3) costs: (a) current period, (b) cumulative to date, and (c) cost projection by month to completion of the work effort covered by this statement of work. The first monthly report shall provide the initial cost projection and subsequent reports shall either provide revised projections or indicate "no change in the cost projection." The monthly reports shall also include cost estimates and milestone schedules for tasks as specified by the NMSS PM. The reports shall be due by the 15th of each month with distribution as follows: Project Manager, NMSS (2 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

3.2 Technical Reports

A. Preliminary Site Visit Reports

Upon written notification by the NMSS PM that a preliminary site visit is to be made according to the schedule specified by the NMSS PM, the performing organization shall: (1) visit the site, and (2) submit a letter report describing the known history of the site, summarizing exploratory measurements, and evaluating these aspects of the site visit.

Six copies of each preliminary site visit report will be required with the following distribution: Project Manager, NMSS (5 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

B. Radiological Survey Plans

Upon written notification by the NMSS PM that a radiological survey plan is to be developed, the performing organization shall submit a radiological survey plan for the identified site according to the schedule specified by the NMSS PM. The survey plan shall be first submitted in draft form with the following distribution: Project Manager (5 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

The NMSS PM shall, within two weeks of receipt of the draft survey plan, submit his comments on the plan to the performing organization. Such comments are not intended to prejudice the performing organization's technical judgments, but are made to assure that the plan adequately addresses the work needed.

Within two weeks after receipt of the NMSS PM's comments, the performing organization shall submit a corrected and revised survey plan which reflects the NMSS PM's comments, with distribution as follows: Project Manager (8 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

C. Radiological Survey Report

As soon as is reasonable after completion of the on-site radiological survey, which will be authorized in writing by the NMSS PM, the performing organization shall submit a radiological survey report which summarizes the results of all survey activities performed under the radiological survey plan. The report shall be first submitted in draft form with the following distribution: Project Manager (5 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

The NMSS PM shall, within one month of receipt of the draft report, submit his comments on the report to the performing organization. Such comments are not intended to prejudice the performing organization's technical judgment, but are made to assure that the report adequately and clearly reports the work done and results obtained.

Within three weeks after receipt of the NMSS PM's comments, the performing organization shall submit a final survey report which reflects the NMSS PM's comments, with the following distribution: Project Manager (8 copies, 1 camera ready copy); Office of the Director, NMSS (Attn.: Program Support) (1 copy). The format of the final report shall be as specified for formal contractor reports in paragraph 12 of the Terms and Conditions for the Standard Order for DOE Work (SOEW).

4.0 Meetings and Travel

The performing organization will be required to visit each site for: (1) preliminary site evaluation and the preparation of radiological survey plans, and (2) radiological survey activities. Visits by the performing organization to NRC offices in Silver Spring, Maryland, may be required to discuss draft radiological survey plans and draft radiological survey reports.

5.0 NRC Furnished Material

NRC will provide the performing organization with copies of existing records including the docket file, if available, for each specified site. NRC will secure appropriate permission for all required site visits and also will notify the owners or operators of planned visits.

The mobile laboratory provided by NRC and outfitted under FIN A9090 will be used to the maximum extent possible in performing radiological surveys. If an additional mobile laboratory is required to perform the work required, the performing organization shall provide an estimate of the cost of acquiring and outfitting the mobile laboratory when such a determination is made.

6.0 Period of Performance

The work specified herein shall commence Sept. 25, 1980, and continue through fiscal year 1983.

7.0 Technical Direction

Mr. Ralph M. Wilde (FTS 427-4155) is designated the NMSS Project Manager (PM) for the purpose of assuring that the services required under this SOW are delivered in accordance herewith. All technical instructions to the DOE performing organization shall be issued through the NMSS PM. As used herein, technical instructions are those which provide details, suggest possible lines of inquiry, or otherwise complete the general scope of work set forth herein. Technical instructions shall not constitute new assignments of work or changes of such nature as to justify an adjustment in cost or period of performance. Directions for changes in cost or period of performance will be provided by the DOE Operations Office after receipt of an appropriate Standard Order for DOE Work (SOEW) (NRC Form 173) from the Director of the Office of Nuclear Material Safety and Safeguards (NMSS).

If the DOE performing organization receives guidance from the NMSS PM which is believed to be invalid under the criteria cited above, the performing organization shall immediately notify the NMSS PM. If the NMSS PM and the performing organization are not able to resolve the questions within five (5) days, the performing organization shall notify the DOE Operations Office.

8.0 Disposal of Property ,

Upon completion or termination of the program, a reconciled report will be developed jointly by DOE and NRC to record available material purchased with NRC funds. This report should be developed as soon as possible after program completion or termination decision has been made, but not later than sixty days after work termination date. The report should be submitted to the Property and Supply Branch, NRC.

FIN 9093
Priority List of Facilities for
Radiological Surveys

1. Vesical Chemical Corporation (formerly Michigan Chemical Corporation)
341 East Ohio Street
Chicago, Illinois 60611
License No. SMB-833 Terminated April 23, 1971

Contact: David B. Graham, Esq.
Deputy General Council
(Note: Initial contact should be through
NRC, W. T. Crow)

Site Identification:

The formerly licensed disposal site at the intersection of Madison Road and Bush Creek, approximately five miles east northeast of St. Louis, Michigan. The site is also known as the Breckenridge site. The legal description is, Sec. 23, T.12 N, R.2 W, Bethany Township, Gratiot County, Michigan.

General Survey Requirements:

The site is to be surveyed to determine the location of radioactive material, the quantities of material buried and the composition of the buried material. In addition, information should be obtained on the adequacy of coverage of buried material and on waste material migration. The radionuclides on site may include natural uranium, natural thorium, and their daughter products. Site survey to be completed by September 30, 1981.

2. Babcock & Wilcox Company
Nuclear Materials Division
609 North Warren Avenue
Appollo, Pennsylvania 15613
License No. SNM-414 Docket No. 70-364

Contact: Mr. Michael A. Austin
Manager, Technical Control
(Note: Initial contact should be through
NRC, L. C. Rouse)

Site Identification:

Licensee's Parks Township site near Leechburg, Pennsylvania; Site is occupied by licensee's plutonium fuel fabrication facility, now undergoing decommissioning, and a decommissioned high enriched uranium fuel processing facility.

General Survey Requirements:

Physical surveys of the "Parks Township Site Burial Ground" are required with appropriate analyses and evaluations. The referenced burial ground consists of a number of trenches on the site that were used for burial of radioactive material from 1960 to 1970 by the predecessors of the firm that presently holds the NRC license for site activities. Basically, the physical surveys should confirm the exact location of the trenches, perhaps by subsurface radar imaging, following by soil and aquifer sampling to determine what, if any, migration may be occurring. Site survey to be completed by September 30, 1981.

3. United Nuclear Corporation
Uranium Recovery Plant
One Narragansett Trail
Wood River Junction, Rhode Island 02894
License No. SNM-777 Docket No. 70-820

Contact: Mr. C. E. Bowers, President
UNC Recovery Systems
(Note: Initial contact should be through
NRC, W. T. Crow)

Site Identification:

The 1100 acre site is located in Southwestern Rhode Island in Washington County. The site is 31 miles south southwest of Providence, R.I. The recovery facility occupies 5.6 acres in the approximate center of the western half of the site property, and is located about 1.3 miles (by road) southeast of the village of Wood River Junction.

General Survey Requirements:

The licensee is decontaminating the facility and the site prior to requesting termination of the license. These activities are currently scheduled to be completed in April 1981. A complete survey to confirm the adequacy of decontamination is required prior to decommissioning. The confirmatory survey should be completed by December 31, 1981.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 27, 1981

W. R. Grace & Co.
Davison Chemical Division
ATTN: Mr. John Hardwicke
General Council
Charles and Baltimore Streets
Baltimore, MD 21203

Dear Mr. Hardwicke:

This is to confirm our conversation of November 25, 1981 regarding the radiological survey the Nuclear Regulatory Commission (NRC) plans to make at the W. R. Grace site in Pompton Plains, New Jersey. The NRC contractor, Oak Ridge Associated Universities (ORAU), plans to make a preliminary visit to the site during the week of December 7, 1981. After this site visit, ORAU will draft a survey plan and submit it to the NRC for comment. At the same time, the NRC will transmit the draft plan to you for comment. After all comments have been resolved, ORAU will prepare a final comprehensive survey plan and provide a tentative schedule for the survey. This plan and schedule will also be transmitted to you.

Members of the NRC's Office of Inspection and Enforcement will accompany the ORAU staff on the preliminary visit during the week of December 7.

Thank you for your cooperation in this matter. If you have any questions, please contact me at (301)427-4510.

Sincerely,

for 

W. T. Crow, Section Leader
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

DAVID WAKS

COUNCILMAN
WAYNE, NEW JERSEY

RESIDENCE:
58 BRANDYWINE ROAD
WAYNE, NEW JERSEY 07470
694-5399

OFFICE:
262 MAIN STREET
PATERSON, NEW JERSEY 07505
742-5555

January 6, 1981

Nuclear Regulatory Commission
United States Government
King of Prussia, Pennsylvania

Gentlemen:


I am advised that there is nuclear waste buried on a site in Wayne Township in the area formerly occupied by the W.R. Grace Company at 868 Black Oak Ridge Road. I am informed that the nuclear waste may have been buried at the site by the W.R. Grace Company.

I would very much appreciate it if you would promptly advise me as follows:

1. Can the site be inspected for proper disposal of the waste and can the waste be removed from the site.
2. Can you furnish me with any documentation which you have pertaining to this matter.

Thank you for your attention.

Very truly yours,



DAW:eo

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ITEM # 389

B/387

Docket No. 40-00086

OCT 27 1982

License No. STA-422

W. R. Grace and Company
Davison Chemical Division
ATTN: Mr. Burton Mobley
Manager, Environmental Control
P.O. Box 2117
Baltimore, Maryland 21203

Gentlemen:

Subject: Radiological Surveys of Sheffield Brook, Final Report

Enclosed for your information are three (3) copies of the subject report. This report does not include the results of measurements made on your property on Black Oak Ridge Road in Wayne, New Jersey. Those results will be contained in a separate report.

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 and the enclosure will be placed in the Public Document Room.

No reply to this letter is required; however, should you have any questions, we will be pleased to discuss them with you.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman
Thomas T. Martin, Director
Division of Engineering and
Technical Programs

Enclosure:
Radiological Surveys of Sheffield Brook, Final Report (3 copies)

cc w/encl:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
State of New Jersey

bcc w/encl:
Region I Docket Room (with concurrences)

John D. Kinneman
RI:DETP
Kinneman/lp
10/27/82

~~OFFICIAL RECORD COPY~~

ITEM # 589

1E:07

B/390



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

Docket No. 040-0086

26 JAN 1981

W.R. Grace and Company
Davidson Chemical Division
ATTN: Mr. C.B. Kraft
Vice President of Administration
P.O. Box 2117
Baltimore, Maryland 21203

Gentlemen:

This refers to a telephone inquiry by Ms. M. Campbell of this office with Mr. A. Wille of your staff on January 20, 1981.


This inquiry was to request your cooperation regarding a request for information from Councilman David Waks of Wayne, New Jersey, concerning your facility in Wayne Township, New Jersey.

Our files of the records of the thorium processing which occurred under AEC license STA-422 do not include a record of a complete survey of the grounds of your facility. We would like to conduct a radiation survey of these grounds during the week of January 26, 1981. We would also appreciate a copy of the most recent radiation survey of this facility performed by Mr. A. Wille of your staff.

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.

Should you have any questions concerning this inquiry, please contact Ms. Campbell of my staff at (215)337-5342.

Sincerely,



John D. Kinneman, Chief
Materials Radiological Protection
Section

bcc:

IE Mail & Files (For Appropriate Distribution)
Central Files
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Region I Reading Room
State of New Jersey

ITEM # 390

12/3/88



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL QUALITY
BUREAU OF RADIATION PROTECTION
380 SCOTCH ROAD, TRENTON, N. J. 03628

February 11, 1981

Dr. William E. Mott
U. S. Department of Energy
Mail Stop E-201
Washington, D. C. 20545

Dear Dr. Mott:

Recently, the attached information was provided to me
by Mr. Armin Wille of W. R. Grace. Could you check your
records and determine whether or not this site was or
should be evaluated by the DOE under FUSRAP?

Sincerely,

Jeanette Eng, Director
Radiation Decontamination Assessment
Bureau of Radiation Protection

J:cab
Enclosure: Document

Jpg

ITEM # 391

B/389

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2 JUL 1981

✓ Docket No. 40-00086

U. S. Department of Energy
ATTN: Dr. William Mott, Director
Environmental and Safety
Engineering Division

EP-141
Washington, D. C. 20545

Gentlemen:

Subject: W. R. Grace Facility, Pompton Plains, New Jersey

A copy of the license file for the W. R. Grace & Company facility in Pompton Plains, New Jersey, which was formerly licensed under NRC License No. STA-442, is enclosed for your information. Our recent surveys indicate that thorium contamination is present on this facility. An aerial survey of this facility was conducted during the week of May 25, 1981 by EG&G, Inc. at the request of the State of New Jersey.

Your cooperation with us is appreciated.

Sincerely,

T. T. Martin, Acting Director
Division of Engineering and
Technical Inspection

Enclosure: As Stated

bcc w/o encl:
Document Management Branch, TIDC (For Distribution)
Reg:I Reading Room
State of New Jersey

B/ 391

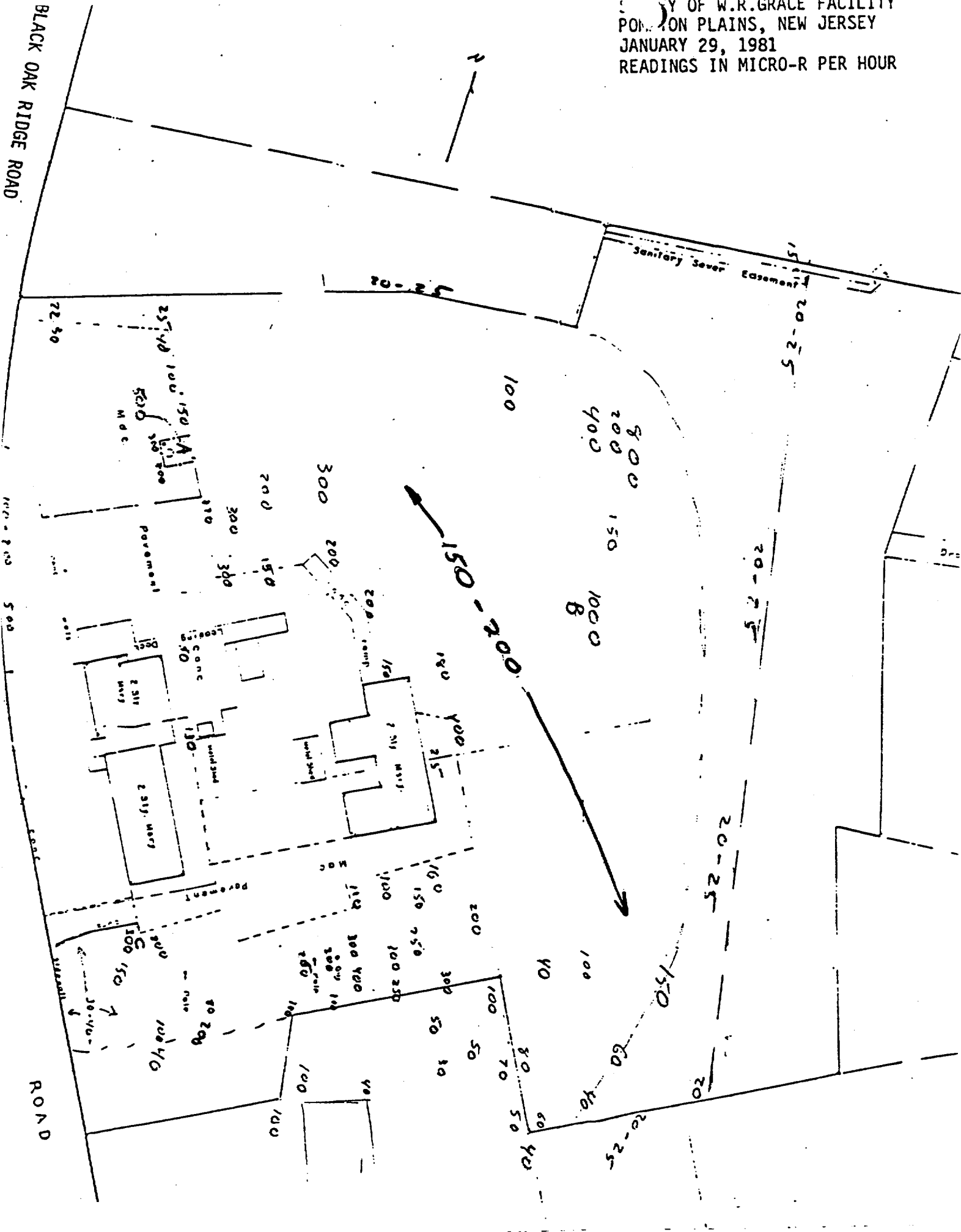
ITEM # 393

2

OFFICE	E&TI TIB	TIB	TIB	E&TI		
SURNAME	Campbell:ny	Kinneman	Joyner	T. Martin		
DATE	6/27/81	6-29-81	7/1/81	7/1/81		

25

CITY OF W.R. GRALE FACILITY
 POMERON PLAINS, NEW JERSEY
 JANUARY 29, 1981
 READINGS IN MICRO-R PER HOUR



30 JUL 1981

MEMORANDUM FOR: Leo Higginbotham, Chief, Radiological Safety Branch
FROM: James H. Joyner, Chief, Technical Inspection Branch, RI
SUBJECT: REVIEW OF FORMERLY USED SITES, TI-2690

One of the sites in Region I which was included for review in TI-2690 is the W.R. Grace Company (formerly Rare Earths, Inc.) site in Pompton Plains, New Jersey. This site was used for a monazite sand processing facility, as authorized by License No. STA-422, until it was released for unrestricted use in January 1975. The site is still owned by the W.R. Grace Company. Buildings on the site are being leased by Electro Nucleonics, Inc. for use as office, warehouse, and possibly laboratory space.

A preliminary survey of the facility was conducted by this office on January 29, 1981. This survey indicates that the property has surface radiation levels of up to 1 millirem per hour. Soil samples contain up to 1200 picocuries per gram thorium-232 and 60 picocuries per gram radium-226. There is one spot where radiation levels of 0.1 millirem per hour exist which appears to be outside the property line of the W.R. Grace Company. A water sample of the onsite well, analyzed by a contractor (NUS) to the W.R. Grace Company, indicated elevated levels of alpha contamination. A copy of our survey and NUS' water sample results are enclosed.

Our preliminary evaluation is that this site does not meet the current NRC criteria for release for unrestricted use. We recommend that the site be scheduled for further radiological evaluation by an NRC contractor. An ARMS flight has already been performed by EG&G at the request of the State of New Jersey.

In addition, we recommend that the release of this site be reviewed by OELD to determine who is responsible for remedial action at this site and offsite in the event that the ARMS flight identifies offsite contamination.

James H. Joyner
James H. Joyner, Chief, Technical
Inspection Branch, Division of
Engineering and Technical Inspection

Enclosure: As Stated

[Signature]
1: DETI
Campbell/wb
7/7/81

[Signature]
1: DETI
Kinneman
7/16/81

[Signature]
1: DETI
Joyner
7/28/81

B/392

OFFICIAL RECORD COPY

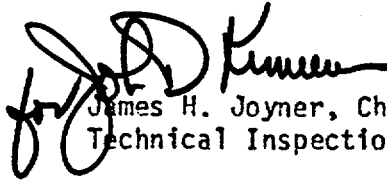
ITEM # 394

25 AUG 1981

Docket No. 40-0086

MEMORANDUM FOR: William T. Crow, Chief, (FCUF) Branch, NMSS
FROM: James H. Joyner, Chief, Technical Inspection Branch, Region I
SUBJECT: W. R. GRACE CO., POMPTON PLAINS, NJ (STA-422)

Enclosed is a copy of the Region I file for license No. STA-422. This includes several inspection reports which you indicated are not in your files.


James H. Joyner, Chief
Technical Inspection Branch

cc w/o encl:
R. Meyer, IE:HQ

MC
RI:DETI
Campbell/grd
8/25/81

Kinneman
RI:DETI
Kinneman
8/25/81

Joyner
RI:DETI
Joyner
8/25/81

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B/393

ITEM # 395



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 18 1981

MEMORANDUM FOR. G. H. Cunningham, Director & Chief Counsel, Regulations
Division, Office of Executive Legal Director

FROM: Leo B. Higginbotham, Chief, Radiological Safety Branch, IE

SUBJECT: LEGAL RESPONSIBILITY FOR REMEDIAL ACTION AT W.R. GRACE
SITE - POMPTON PLAINS, N.J.

Please provide a review of the subject site to determine the legal responsibility for remedial action. Jim Joyner of Region I may be contacted for specific details of the history of the site and as it now exists.

A handwritten signature in cursive script, reading "Leo B. Higginbotham", is written over the typed name.

Leo B. Higginbotham
Chief
Radiological Safety Branch, IE

Enclosure: July 30 Memo

cc: J. Joyner, RI

CONTACT: D. K. Sly
49-29896



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 18 1981

MEMORANDUM FOR: J. H. Joyner, Chief, Technical Inspection Branch, Region I
FROM: Leo B. Higginbotham, Chief, Radiological Safety Branch, IE
SUBJECT: REVIEW OF FORMERLY USED SITES TI-2690 W.R. GRACE CO.

As recommended by your July 30, 1981 memorandum on the subject OELD has been asked to provide a legal interpretation of the responsibility for remedial action at the W.R. Grace, Pompton Plains, N.J. site. In addition, NMSS has been requested to perform the survey you recommended, if possible. Both OELD and NMSS may be in touch with you to make arrangements for the survey or gather specific data on the site.

A handwritten signature in cursive script, appearing to read "Leo B. Higginbotham".

Leo B. Higginbotham
Chief
Radiological Safety Branch, IE

Enclosures:

1. Memo to Page
2. Memo to Cunningham

CONTACT: D. K. Sly
49-29896

encl



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MEMORANDUM FOR. G. H. Cunningham, Director & Chief Counsel, Regulations
Division, Office of Executive Legal Director

FROM: Leo B. Higginbotham, Chief, Radiological Safety Branch, IE

SUBJECT: LEGAL RESPONSIBILITY FOR REMEDIAL ACTION AT W.R. GRACE
SITE - POMPTON PLAINS, N.J.

Please provide a review of the subject site to determine the legal responsibility for remedial action. Jim Joyner of Region I may be contacted for specific details of the history of the site and as it now exists.

A handwritten signature in cursive script, appearing to read "Leo B. Higginbotham".

Leo B. Higginbotham
Chief
Radiological Safety Branch, IE

Enclosure: July 30 Memo

cc: J. Joyner, RI

CONTACT: D. K. Sly
49-29896

encl



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MEMORANDUM FOR: R. G. Page, Chief, Uranium Fuel Licensing Branch
Division of Fuel Cycle & Material Safety, NMSS

FROM: Leo B. Higginbotham, Chief, Radiological Safety Branch, IE

SUBJECT: RADIOLOGICAL SURVEY OF W.R. GRACE SITE

As recommended in the enclosed memorandum from Region I, we are requesting a survey of the Pompton Plains site by ORAU or other contractor. Please let me and Jim Joyner of Region I know if such a survey can be performed with your existing funds and, if so, a tentative date for its completion.

A handwritten signature in black ink, appearing to read "Leo B. Higginbotham".

Leo B. Higginbotham
Chief
Radiological Safety Branch, IE

Enclosure: July 30 Memo

cc: J. Joyner, RI

CONTACT: D. K. Sly
49-29896



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MEMORANDUM FOR: R. G. Page, Chief, Uranium Fuel Licensing Branch
Division of Fuel Cycle & Material Safety, NMSS

FROM: Leo B. Higginbotham, Chief, Radiological Safety Branch, IE

SUBJECT: RADIOLOGICAL SURVEY OF W.R. GRACE SITE

As recommended in the enclosed memorandum from Region I, we are requesting a survey of the Pompton Plains site by ORAU or other contractor. Please let me and Jim Joyner of Region I know if such a survey can be performed with your existing funds and, if so, a tentative date for its completion.

A handwritten signature in black ink, appearing to read "L. B. Higginbotham".

Leo B. Higginbotham
Chief
Radiological Safety Branch, IE

Enclosure: July 30 Memo

cc: J. Joyner, RI

CONTACT: D. K. Sly
49-29896

ITEM # 397

B/394

3



NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.O. BOX 1390 TRENTON, N.J. 08625
609-321-2700

NEWS

BRENDAN BYRNE, GOVERNOR

JERRY FITZGERALD ENGLISH, COMMISSIONER

(STATEWIDE)
No. 81/ 303

AERIAL RADIOLOGICAL SURVEYS SET FOR CITIES OF GLOUCESTER AND ORANGE, AND TOWNSHIP OF WAYNE

Immediate release:
May 21, 1981

TRENTON--Commissioner Jerry Fitzgerald English of the Department of Environmental Protection (DEP) announced today that aerial radiological surveys of three New Jersey communities--Gloucester City, Camden County; Orange City, Essex County; and Wayne Township; Passaic County--are currently being conducted by EG & G, Inc. a Las Vegas, Nevada, contractor for the federal Department of Energy. Part of a routine U.S. Environmental Protection Agency (EPA) program to gather information on radiation levels in areas surrounding former mineral extraction and refining facilities, these surveys are being done at the request of the DEP. A previously issued DEP press release erroneously identified Pompton Plains in Pequannock Township rather than Wayne Township as the third site to be surveyed.

The helicopter survey, conducted from a blue and white helicopter flying at an altitude of 150 feet or more above the ground, will record terrestrial radiation profiles over sixteen square mile areas centered in Gloucester at a former mesothorium facility, a former radium facility in Orange, and a former rare earth's and thorium facility in Wayne Township. The survey of Gloucester is scheduled for the week of May 11-15, Orange the week of May 18-22, and Wayne Township the week of May 25-29. A special waiver of federal air regulations has been obtained from the Federal Aviation Administration (FAA) to permit low-level flying. The flights and testing will be made during daylight hours as weather conditions permit. The project at each of the sites will be completed in two or three days of flying.

Data processing for aerial radiological surveys usually requires two or three months. All analytical results will then be forwarded to the DEP for evaluation.

Further information concerning the aerial surveys can be obtained by contacting Jeanette Eng at the DEP's Bureau of Radiation Protection at (609) 292-5586.

-dep-

Seventh Site for

Radiological Survey by ORAU

7. W. R. Grace Company (formerly Rare Earths, Inc.)
Pompton Plains, New Jersey

Contact: W. T. Crow, NRC
NMSS/FC

Site Identification:

This site was used for a monazite sand processing facility as authorized by License No. STA-422. The license was terminated and the site was released for unrestricted use in January 1975. The site is still owned by W. R. Grace Company. Buildings on the site are being leased by Electro Nucleonics, Inc. for use as office, warehouse and possibly laboratory space.

General Survey Requirements:

A preliminary survey of this site was conducted by NRC, Region I, in January 1981. Preliminary evaluations indicate that this site may not meet current NRC criteria for release for unrestricted use. The site is to be surveyed to determine surface radiation levels and concentrations of naturally occurring radionuclides, thorium-232 and uranium-238 series, in soil and water.

An estimated date for the preliminary site visit shall be provided by ORAU in the next monthly report. A schedule for completion of the survey shall be provided subsequent to the site visit.

Arrangements for site visits should be made through W. T. Crow.

B/395

Enclosure
SOEW 50-82-05

ITEM # 398

STATEMENT OF WORK (SOW) FOR
RADIOLOGICAL EVALUATION ASSISTANCE
FIN A 9093-0
B&R 50-19-01-01

1.0 Background

In a letter dated September 19, 1976, from Mr. Monte Canfield, Jr., Director, GAO, to Marcus E. Rowden, Chairman, NRC, Mr. Canfield mentioned GAO's survey of federal programs for disposing of obsolete and unused nuclear facilities and a related program by ERDA to evaluate former Government-owned and AEC contract sites that previously handled radioactive materials. Also discussed was a GAO concern about sites formerly licensed by AEC's regulatory body. Because of this concern, the GAO reviewed some records of licenses that have been terminated. This review indicated that licenses which were recently terminated contained adequate assurance of proper decontamination; however, the files on licenses terminated in the late 1950's and early 1960's did not contain evidence of decontamination in many cases. The GAO asked if NRC could provide assurance that no radiation safety problems exist at sites previously operated under an AEC license.

The NRC reply to Mr. Canfield's letter (L. V. Gossick to Mr. Canfield, dated October 15, 1976) indicated that we would reexamine our files - of licenses terminated prior to 1965. The Oak Ridge National Laboratory was retained to evaluate docket files to determine which sites, if any, would need additional on-site evaluation to determine if proper decontamination had been effected. To date, a number of sites formerly used for processing source material have been identified for further evaluation.

In addition to the sites identified through the docket search, radiological evaluation assistance may be required to confirm that currently licensed sites are properly decontaminated prior to license termination.

The NRC's Office of Nuclear Material Safety and Safeguards (NMSS) requires technical assistance for the evaluation of sites to determine if they have been properly decontaminated. The objective of the assistance for each site would be to:

1. Determine if radionuclides are present, or believed to be present, above allowable limits.
2. If radionuclides are present, or are believed to be present, above allowable limits to:
 - a. Determine the radionuclides present.
 - b. Determine the spatial distribution of the radionuclides above background.
 - c. Provide an estimate of the hazards involved.

ITEM # 399

Enclosure 1
SOEW 50-80-92

31396 8

2.0 Work Required

Technical support will be provided in the areas described below. When specific work requirements are identified, the NRC will issue task orders in the form of Standard Orders for DOE Work (NRC Forms 173). The task orders will describe the work to be performed, the type of report(s) that are to be prepared, and the desired completion date. The performing organization shall provide a cost estimate and milestone schedule for these tasks in the monthly letter status report (see paragraph 3.1 below). Approximately four task orders per year are anticipated, each of which will require an estimated one to two man-years of effort to complete. The work required in the task orders will fall within the following areas of work:

2.1 Preliminary Site Visit

The performing organization shall make a preliminary visit to the sites specified by the NMSS Project Manager (PM). The purpose of the visit is two-fold: first, to review the known history of the site with the licensee or local officials and to inspect the property and make exploratory radiation measurements in areas identified as housing licensed or previously licensed materials; and second, to evaluate the results of these discussions and measurements.

2.2 Development of Radiological Survey Plans

A radiological survey plan shall be developed for sites specified by the NMSS PM, and submitted to NRC for approval. Because of the wide variety of past operational activities as well as radioactive materials present at each site, it may not be possible to conduct formal surveys in accordance with a uniform survey plan. Just as any assessment activity is highly site specific, such is the case for radiation measurements and the collection of environmental samples.

The following list of activities is typical of those which will usually be included in a formal radiological survey and should be considered in the development of a radiological survey plan. This list is not intended to be either all inclusive or restrictive.

A. Gamma-ray exposure rates at 1 m above the ground outside buildings

A grid pattern is posted on plan views of the entire site. Measurements of gamma-ray exposure rate are made 1 m above the ground at the intersection of each grid line. These grid lines are normally spaced 10 to 50 feet apart and include points within property boundaries and points on surrounding property.

B. Beta-gamma dose rates at the ground surface

Detailed measurements are made of the beta-gamma levels at 1 cm above outside ground (natural, paved, or otherwise covered) surfaces in accordance with the above grid pattern. Open window and closed window G-M readings are made at each grid point.

C. Measurements of radionuclide concentrations in water

Water samples are taken from surface collections both on and off the site. In addition, samples shall be taken from any flowing streams which border each site both upstream and downstream as dictated by radiation measurements. Groundwater which may be found in core holes will be sampled and included with the above samples and analyzed for appropriate radionuclides.

D. Investigation of underground drains and surface drainageways

Because radioactive wastes and residues may have been stored on the surface or in on-site holding ponds, all known and suspected drainageways on each site and those leading away from each site should receive careful attention. Samples of scale are taken from all accessible drain lines. In surface drainageways leading away from the property, samples are collected in order to determine both downward and lateral movement of radioactivity. The location of these drains and drainageways are recorded on drawings. Since surface drainageways represent points of public access, sediment samples collected in these areas are analyzed for appropriate radionuclides.

E. Investigation of surface deposits of radioactivity

Samples of soil are collected on the ground surface both on and off the site in order to determine the location and quantities of surface deposits of radioactivity. The location of these samples normally corresponds to grid points where surface beta-gamma measurements were made.

F. Investigation of subsurface deposits of radioactivity

Extensive monitoring and sampling may be required in order to determine the magnitude of subsurface contamination. Areas of principal concern include sites where solid and liquid radionuclides were stored or buried. It is sometimes necessary to investigate the site of demolished buildings and also sites where residues and wastes have been moved for either temporary or permanent storage. Drilling and coring operations in these areas may be needed to define quantities and boundaries of underground deposits of radionuclides. Core samples shall be collected for analysis and each core hole shall be "logged" using collimated gamma-ray detector to verify the spatial distribution of radioactivity below the surface.

G. Radionuclide concentrations in air

Residues may exist which contain ^{226}Ra , ^{224}Ra , and ^{223}Ra resulting in the emanation from the residues of ^{222}Rn , ^{220}Rn , and ^{219}Rn . Measurements shall be made in order to establish instantaneous concentrations of these radon isotopes and their progeny.

H. Vegetation samples

A limited selection of vegetation samples of several species may need to be collected from areas representing the observed range of surface radioactivity. Analyses of the radionuclide concentrations in vegetation samples are determined after a determination has been made of the radionuclide concentrations in host soil.

I. Determination of background gamma radiation levels, concentration or radionuclides in soil and water, and concentrations of radon in air

A series of soil and water samples shall be collected in the area around each site in order to establish the background concentrations of radionuclides of interest. Gamma radiation levels at 3 ft. above the ground are also measured at each sampling point. In areas where radium bearing residues exist, a limited number of measurements are made to determine typical radon concentrations in areas far enough removed from the site so as not be influenced by radon emanating from the site.

J. Documentation of radiological survey

It will be necessary throughout the survey to maintain accurate records pertaining to such activities as: (1) instrument calibration, (2) location of individual survey measurements, (3) analytical procedures, (4) recording of data and results of sample analyses, (5) computer calculations, (6) assumptions made with regard to boundary conditions in evaluating radiological data, and (7) preparation of the final report of each formal survey. These records are needed in order to provide an element of quality assurance to the survey and to serve as the foundation for any future audit which may be necessary.

2.3 Conducting Formal Radiological Surveys

Once a radiological survey plan for a site is reviewed and approved by the NMSS PM, an appropriately staffed radiological survey team shall be mobilized and moved to the site. The objective of conducting formal radiological surveys at the sites is to characterize the current radiological status of the property. In order to accomplish this, the performing organization shall have available a modern, well-equipped mobile laboratory to serve as the established (on-site) survey headquarters station (see Section 5 below).

2.4 Preparation of Radiological Survey Reports

A radiological survey report should be prepared which summarizes the results of all survey activities performed under the radiological survey plan. In addition, the radiological survey report will include a description of the site and an evaluation of radiological conditions at the site.

The site description should include the location of the site and a description of its topography in sufficient detail to support an engineering evaluation, scaled maps of the site and the surrounding area, a discussion of the present physical condition of the site and, for background purposes, a brief description and history of the licensee operations conducted at the site.

The section of the report which evaluates the radiological conditions should describe the radiological conditions existing at the site and, based on those conditions, the potential routes or exposure pathways to mankind.

3.0 Reporting Requirements

Recognizing the complexities in the scheduling of site visits, radiological surveys and report preparation for a project of this type which may have to be responsive to everchanging priorities, it is intended and should be understood that all schedules and due dates will be discussed and mutually agreed upon by the performing organization's representative and the NMSS PM.

3.1 Monthly Letter Report

Each month, the performing organization shall submit three copies of a brief letter report which summarizes: (1) the work performed during the previous month, (2) personnel time expenditures during the previous month; and (3) costs: (a) current period, (b) cumulative to date, and (c) cost projection by month to completion of the work effort covered by this statement of work. The first monthly report shall provide the initial cost projection and subsequent reports shall either provide revised projections or indicate "no change in the cost projection." The monthly reports shall also include cost estimates and milestone schedules for tasks as specified by the NMSS PM. The reports shall be due by the 15th of each month with distribution as follows: Project Manager, NMSS (2 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

3.2 Technical Reports

A. Preliminary Site Visit Reports

Upon written notification by the NMSS PM that a preliminary site visit is to be made according to the schedule specified by the NMSS PM, the performing organization shall: (1) visit the site, and (2) submit a letter report describing the known history of the site, summarizing exploratory measurements, and evaluating these aspects of the site visit.

Six copies of each preliminary site visit report will be required with the following distribution: Project Manager, NMSS (5 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

B. Radiological Survey Plans

Upon written notification by the NMSS PM that a radiological survey plan is to be developed, the performing organization shall submit a radiological survey plan for the identified site according to the schedule specified by the NMSS PM. The survey plan shall be first submitted in draft form with the following distribution: Project Manager (5 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

The NMSS PM shall, within two weeks of receipt of the draft survey plan, submit his comments on the plan to the performing organization. Such comments are not intended to prejudice the performing organization's technical judgments, but are made to assure that the plan adequately addresses the work needed.

Within two weeks after receipt of the NMSS PM's comments, the performing organization shall submit a corrected and revised survey plan which reflects the NMSS PM's comments, with distribution as follows: Project Manager (8 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

C. Radiological Survey Report

As soon as is reasonable after completion of the on-site radiological survey, which will be authorized in writing by the NMSS PM, the performing organization shall submit a radiological survey report which summarizes the results of all survey activities performed under the radiological survey plan. The report shall be first submitted in draft form with the following distribution: Project Manager (5 copies); Office of the Director, NMSS (Attn.: Program Support) (1 copy).

The NMSS PM shall, within one month of receipt of the draft report, submit his comments on the report to the performing organization. Such comments are not intended to prejudice the performing organization's technical judgment, but are made to assure that the report adequately and clearly reports the work done and results obtained.

Within three weeks after receipt of the NMSS PM's comments, the performing organization shall submit a final survey report which reflects the NMSS PM's comments, with the following distribution: Project Manager (8 copies, 1 camera ready copy); Office of the Director, NMSS (Attn.: Program Support) (1 copy). The format of the final report shall be as specified for formal contractor reports in paragraph 12 of the Terms and Conditions for the Standard Order for DOE Work (SOEW).

4.0 Meetings and Travel

The performing organization will be required to visit each site for: (1) preliminary site evaluation and the preparation of radiological survey plans, and (2) radiological survey activities. Visits by the performing organization to NRC offices in Silver Spring, Maryland, may be required to discuss draft radiological survey plans and draft radiological survey reports.

5.0 NRC Furnished Material

NRC will provide the performing organization with copies of existing records including the docket file, if available, for each specified site. NRC will secure appropriate permission for all required site visits and also will notify the owners or operators of planned visits.

The mobile laboratory provided by NRC and outfitted under FIN A9090 will be used to the maximum extent possible in performing radiological surveys. If an additional mobile laboratory is required to perform the work required, the performing organization shall provide an estimate of the cost of acquiring and outfitting the mobile laboratory when such a determination is made.

6.0 Period of Performance

The work specified herein shall commence Sept. 25, 1980, and continue through fiscal year 1983.

7.0 Technical Direction

Mr. Ralph M. Wilde (FTS 427-4155) is designated the NMSS Project Manager (PM) for the purpose of assuring that the services required under this SOW are delivered in accordance herewith. All technical instructions to the DOE performing organization shall be issued through the NMSS PM. As used herein, technical instructions are those which provide details, suggest possible lines of inquiry, or otherwise complete the general scope of work set forth herein. Technical instructions shall not constitute new assignments of work or changes of such nature as to justify an adjustment in cost or period of performance. Directions for changes in cost or period of performance will be provided by the DOE Operations Office after receipt of an appropriate Standard Order for DOE Work (SOEW) (NRC Form 173) from the Director of the Office of Nuclear Material Safety and Safeguards (NMSS).

If the DOE performing organization receives guidance from the NMSS PM which is believed to be invalid under the criteria cited above, the performing organization shall immediately notify the NMSS PM. If the NMSS PM and the performing organization are not able to resolve the questions within five (5) days, the performing organization shall notify the DOE Operations Office.

8.0 Disposal of Property ,

Upon completion or termination of the program, a reconciled report will be developed jointly by DOE and NRC to record available material purchased with NRC funds. This report should be developed as soon as possible after program completion or termination decision has been made, but not later than sixty days after work termination date. The report should be submitted to the Property and Supply Branch, NRC.

FIN 9093
Priority List of Facilities for
Radiological Surveys

1. Vesical Chemical Corporation (formerly Michigan Chemical Corporation)
341 East Ohio Street
Chicago, Illinois 60611
License No. SMB-833 Terminated April 23, 1971

Contact: David B. Graham, Esq.
Deputy General Council
(Note: Initial contact should be through
NRC, W. T. Crow)

Site Identification:

The formerly licensed disposal site at the intersection of Madison Road and Bush Creek, approximately five miles east northeast of St. Louis, Michigan. The site is also known as the Breckenridge site. The legal description is, Sec. 23, T.12 N, R.2 W, Bethany Township, Gratiot County, Michigan.

General Survey Requirements:

The site is to be surveyed to determine the location of radioactive material, the quantities of material buried and the composition of the buried material. In addition, information should be obtained on the adequacy of coverage of buried material and on waste material migration. The radionuclides on site may include natural uranium, natural thorium, and their daughter products. Site survey to be completed by September 30, 1981.

2. Babcock & Wilcox Company
Nuclear Materials Division
609 North Warren Avenue
Appollo, Pennsylvania 15613
License No. SNM-414 Docket No. 70-364

Contact: Mr. Michael A. Austin
Manager, Technical Control
(Note: Initial contact should be through
NRC, L. C. Rouse)

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B/ 397

ITEM # 400

Site Identification:

Licensee's Parks Township site near Leechburg, Pennsylvania; Site is occupied by licensee's plutonium fuel fabrication facility, now undergoing decommissioning, and a decommissioned high enriched uranium fuel processing facility.

General Survey Requirements:

Physical surveys of the "Parks Township Site Burial Ground" are required with appropriate analyses and evaluations. The referenced burial ground consists of a number of trenches on the site that were used for burial of radioactive material from 1960 to 1970 by the predecessors of the firm that presently holds the NRC license for site activities. Basically, the physical surveys should confirm the exact location of the trenches, perhaps by subsurface radar imaging, following by soil and aquifer sampling to determine what, if any, migration may be occurring. Site survey to be completed by September 30, 1981.

3. United Nuclear Corporation
Uranium Recovery Plant
One Narragansett Trail
Wood River Junction, Rhode Island 02894
License No. SNM-777 Docket No. 70-820

Contact: Mr. C. E. Bowers, President
UNC Recovery Systems
(Note: Initial contact should be through
NRC, W. T. Crow)

Site Identification:

The 1100 acre site is located in Southwestern Rhode Island in Washington County. The site is 31 miles south southwest of Providence, R.I. The recovery facility occupies 5.6 acres in the approximate center of the western half of the site property, and is located about 1.3 miles (by road) southeast of the village of Wood River Junction.

General Survey Requirements:

The licensee is decontaminating the facility and the site prior to requesting termination of the license. These activities are currently scheduled to be completed in April 1981. A complete survey to confirm the adequacy of decontamination is required prior to decommissioning. The confirmatory survey should be completed by December 31, 1981.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Bill
Doug
pls send CY to
R-I

OCT 8 1981

MEMORANDUM FOR: Leo B. Higginbotham, Chief
Radiological Safety Branch, IE

FROM: R. G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

SUBJECT: RADIOLOGICAL SURVEY OF W. R. GRACE SITE

As requested in your memorandum of September 18, 1981, we are arranging to have ORAU make a radiological survey of the W. R. Grace site in Pompton Plains, New Jersey. The enclosed memorandum was written concerning this matter.

R.G. Page
R. G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Enclosure: Wilde to Gresham memo
dtd 10/8/81

3

ITEM # 401

B1398

130

October 8, 1981

MEMORANDUM FOR: John R. Gresham, Contract Assistant
Program Support Branch, NMSS

FROM: Ralph M. Wilde, Program Assistant
Division of Fuel Cycle and Material Safety

SUBJECT: FIN A9093 - TASK ORDER

Please prepare an NRC Form 173 for FIN A9093 to request that ORAU make a preliminary site visit, develop a radiological survey plan and conduct a radiological survey at the W. R. Grace Company (formerly Rare Earths, Inc.) site in Pompton Plains, New Jersey, as specified in the enclosure to this memorandum.

Original signed by

Ralph M. Wilde, Program Assistant
Division of Fuel Cycle and
Material Safety

Enclosure: As stated

DISTRIBUTION:
FC Central File
NMSS r/f
FC File
RMWilde
WTCrow
RGPage

CE	FC <i>RMW</i>					
CE	RMWilde/cj					
CE	10/8/81					

FIN A9093

Seventh Site for
Radiological Survey by ORAU

7. W. R. Grace Company (formerly Rare Earths, Inc.)
Pompton Plains, New Jersey

Contact: W. T. Crow, NRC
NMSS/FC

Site Identification:

This site was used for a monazite sand processing facility as authorized by License No. STA-422. The license was terminated and the site was released for unrestricted use in January 1975. The site is still owned by W. R. Grace Company. Buildings on the site are being leased by Electro Nucleonics, Inc. for use as office, warehouse and possibly laboratory space.

General Survey Requirements:

A preliminary survey of this site was conducted by NRC, Region I, in January 1981. Preliminary evaluations indicates that this site may not meet current NRC criteria for release for unrestricted use. The site is to be surveyed to determine surface radiation levels and concentrations of naturally occurring radionuclides, thorium-232 and uranium-238 series, in soil and water.

An estimated date for the preliminary site visit shall be provided by ORAU in the next monthly report. A schedule for completion of the survey shall be provided subsequent to the site visit.

Arrangements for site visits should be made through W. T. Crow.

October 8, 1981

MEMORANDUM FOR: John R. Gresham, Contract Assistant
Program Support Branch, NMSS

FROM: Ralph M. Wilde, Program Assistant
Division of Fuel Cycle and Material Safety

SUBJECT: FIN A9093 - TASK ORDER

Please prepare an NRC Form 173 for FIN A9093 to request that ORAU make a preliminary site visit, develop a radiological survey plan and conduct a radiological survey at the W. R. Grace Company (formerly Rare Earths, Inc.) site in Pompton Plains, New Jersey, as specified in the enclosure to this memorandum.

Original signed by

Ralph M. Wilde, Program Assistant
Division of Fuel Cycle and
Material Safety

Enclosure: As stated

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ITEM # 402

B/ 399

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AME	RMWilde/cj					
ATE	10/8/81					



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

10/14

Jim:

Info. on W.R. Grace Survey
Are the lawyers working on the
legal end with your staff?

Doug Sk

11/4/44

- ① Answer Doug question
by phone
- ② What is status of C66
overflight analysis?
- ③ What is status of
Stipan picture (overflight)
Commission briefing coming up?

10

B/400

ITEM # 403



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

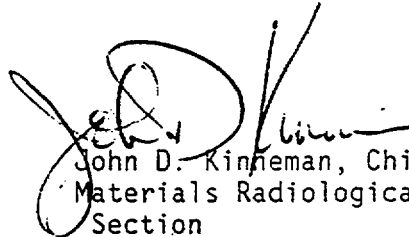
27 OCT 1981

Docket No. 40-0086

MEMORANDUM FOR: Robert Fonner, Attorney, OELD
FROM: John D. Kinneman, Chief, Materials Radiological
Protection Section
SUBJECT: W.R. GRACE & COMPANY, POMPTON PLAINS, NEW JERSEY

As you requested, enclosed is a summary licensing history for this facility, as well as a history of site use provided by Mr. Willie of W.R. Grace & Company. The Region I file for License No. STA-422 is also enclosed.

If you have any questions regarding this material, please contact Ms. Campbell of my staff.


John D. Kinneman, Chief,
Materials Radiological Protection
Section

Enclosures: As stated

cc w/encls except file
L. Higginbotham

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ITEM # 404

W.R. GRACE & COMPANY
Licensing History
Pompton Plains, New Jersey

April 1, 1954	License R-132 issued to Rare Earths, Inc., Pompton Plains, New Jersey for possession and processing of unlimited quantities of source material in monazite sand.
January 24, 1957	License R-196 issued to the Davison Chemical Division of W.R. Grace & Company for possession of unlimited quantities of thorium-containing materials at both the Pompton Plains, New Jersey and Curtis Bay, Maryland sites.
November 22, 1961	License No. STA-422 issued to the W.R. Grace & Company to possess unlimited quantities of thorium at the Pompton, New Jersey site.
April 8, 1971	License application states that all processing of thorium materials had ceased.
February 28, 1973	License No. STA-422 expired.
July 31, August 1, 2, and September 20, 1974	Closeout inspection of License No. STA-422 indicates that an unknown quantity of waste products were buried on the property.
January 22, 1975	Property formerly licensed under License No. STA-422 released for unrestricted use.

HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

In December, 1973, Davison Chemical engaged the service of Applied Health Physics, Inc. (AHP) to conduct a radiological survey of the entire property. Decontamination operations were begun by AHP on March 11, 1974 and continued through July 18, 1974. The goal of the work was to attain certain radioactivity limits as specified in regulations of the A.E.C. and the New Jersey State Department of Health for unrestricted use. A certified health physicist was engaged during the decontamination work as a consultant to Davison to recommend appropriate methods of removing and disposing of radioactive wastes and to provide an expert's opinion on the progress and course of decontamination, as well as to assure compliance with the regulations of the State of New Jersey and the A.E.C. A survey report, dated September 9, 1974 was sent to the A.E.C. (then Nuclear Regulatory Commission - N.R.C.) who's Region I Office of Regulatory Operations performed a confirmatory survey. In a letter dated January 22, 1975, the N.R.C. released the facilities for unrestricted use, provided that a notation be recorded in the appropriate land records indicating radioactive material has been buried on this property. This has been recorded in the land records in Passaic County.

During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

On May 14, 1977, a fire of undetermined origin swept through the main building, heavily damaging the structure. Davison had about 2/3 of the remaining building razed and only restored the front 1/3 for office space. Some of the buildings were leased to Electro-Nucleonics, Inc. (ENI) soon after cessation of operations in July 1967, and the entire real estate was leased long-term to ENI in October 1979.

From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring. This employee is Mr. Armin Wille, Senior Facilities Engineer, W. R. Grace & Co., Davison Chemical Division, P.O. Box 2117, Baltimore, Maryland 21203. Telephone (301) 659-9093.

ITEM # 405

81 4096

GRACE

Devision Chemical Division

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

(301) 659-9000
Direct Dial (301) 659-9058

November 19, 1981

Mr. Bernadette Rocco
Oak Ridge Associated Universities
P. O. Box 117
Oak Ridge, Tennessee 37830

Dear Ms. Rocco:

Mr. Ron Mace has informed me that you would like to visit our Pompton Plains, New Jersey, site sometime early in December. He also said you had agreed to provide us with a copy, or abstract, of your contract with the NRC as evidence of your authorization and legal justification for inspecting our property. There are four other items we must ask of you:

- (1) Please review the AEC/NRC files on our Pompton Plains facility and its operations over the years. I'm sure the NRC must have a considerable file on the subject since we have worked with them and the AEC for many years during operation of the facilities and during the 1974 decontamination. In 1974, we decontaminated the buildings that were formerly on the site, covered some old settling ponds with earth, and removed certain outbuildings and tanks. After inspection and approval by the NRC, the facility was "released for unrestricted use" by the NRC. This release was duly executed by NRC and is in our files.

During the 1974 cleanup, our contractor, with my approval, consulted our AEC files in Washington. Should you need approval, despite your NRC contract, I will be glad to authorize your perusal of our files. I believe you will find that the buried radioactive wastes at the Pompton site are the responsibility of the NRC because the manufacturing operation that generated these wastes was done under an AEC contract in which the AEC assumed such responsibility. The wastes were buried according to AEC regulations

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GRACE

Ms. Bernadette Rocco

November 19, 1981

Page 2

then in force and were inspected from time to time by AEC inspectors. One of these inspectors was Mr. Paul Klevin, who later (in 1974) provided us with consulting service during the cleanup and decontamination of the property.

- (2) We would like a brief statement in writing as to the nature of your proposed early-December survey.
- (3) Please also give us some idea of the probable scope of tests you might propose to the NRC. We are much concerned about the possible drilling of wells for core samples, lest the drilling penetrate the clay underneath the waste and permit leaching of radioactive wastes into the water table. We must have assurances that this will not happen. We went to considerable expense to cover, grade, and seed the burial area and now have a good cover of vegetation, including some fairly good-sized trees. We do not want the trees removed, as we believe they help stabilize the topsoil against erosion. Another concern is for protection of the surface soil against rutting by heavy trucks or drilling equipment. Any drilling must be done when the soil is quite dry. When wet, it is very soft.
- (4) In the event further action may be taken, we would expect the development of an appropriate proposal, hold-harmless and other definitive and appropriate provisions protecting this company from injury, claims and damages arising from the work to be done. This work would, of course, be agreed upon in detail, both with regard to its nature and objectives.

We must have a reply to the first three of these requests before any inspection of our property can be allowed.

I feel strongly that after an examination of our files and a consideration of the possibility of environmental damage by any drilling program, you will come to the same conclusion we have that the AEC inspection and clearance in 1974 was adequate for

81 4096

GRACE

Ms. Bernadette Rocco
November 19, 1981
Page 3

all legitimate purposes and that any further inspections, tests, or, particularly, drilling would not prove beneficial and would not justify the expenditure of taxpayers' monies.

Very truly yours,

Burton L. Mobley

Burton L. Mobley
Manager
Environmental Control

BLM:nbs

cc: Mr. Robert Barber, Chief
Nuclear Technologies Branch
Environmental & Safety
Engineering Division
Department of Energy
Washington, D. C. 20545

Dr. William Mott, Director
Division of Environmental
Control Technology
Department of Energy
Washington, D. C. 20545

40-86



NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 27, 1981

W. R. Grace & Co.
Davison Chemical Division
ATTN: Mr. John Hardwicke
General Council
Charles and Baltimore Streets
Baltimore, MD 21203

Dear Mr. Hardwicke:

This is to confirm our conversation of November 25, 1981 regarding the radiological survey the Nuclear Regulatory Commission (NRC) plans to make at the W. R. Grace site in Pompton Plains, New Jersey. The NRC contractor, Oak Ridge Associated Universities (ORAU), plans to make a preliminary visit to the site during the week of December 7, 1981. After this site visit, ORAU will draft a survey plan and submit it to the NRC for comment. At the same time, the NRC will transmit the draft plan to you for comment. After all comments have been resolved, ORAU will prepare a final comprehensive survey plan and provide a tentative schedule for the survey. This plan and schedule will also be transmitted to you.

Members of the NRC's Office of Inspection and Enforcement will accompany the ORAU staff on the preliminary visit during the week of December 7.

Thank you for your cooperation in this matter. If you have any questions, please contact me at (301)427-4510.

Sincerely,

for

W. T. Crow, Section Leader
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

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ITEM # 406



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

2 JUL 1981

Docket No. 40-00086

U. S. Department of Energy
ATTN: Dr. William Mott, Director
Environmental and Safety
Engineering Division

EP-141
Washington, D. C. 20545

Gentlemen:

Subject: W. R. Grace Facility, Pompton Plains, New Jersey

A copy of the license file for the W. R. Grace & Company facility in Pompton Plains, New Jersey, which was formerly licensed under NRC License No. STA-442, is enclosed for your information. Our recent surveys indicate that thorium contamination is present on this facility. An aerial survey of this facility was conducted during the week of May 25, 1981 by EG&G, Inc. at the request of the State of New Jersey.

Your cooperation with us is appreciated.

Sincerely,

James H. Mott
for T. T. Martin, Acting Director
Division of Engineering and
Technical Inspection

Enclosure: As Stated

bcc w/o encl:
Document Management Branch, TIDC (For Distribution)
Reg:I Reading Room
State of New Jersey

ITEM # 407

B/404



NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket No. 40-86

NOV 30 1981

NOTE TO: Files

FROM: W. T. Crow, Section Leader
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

SUBJECT: W. R. GRACE COMPANY - POMPTON PLAINS, NEW JERSEY

On November 24, 1981, I spoke with Mr. Burton Mobley of the W. R. Grace Chemical Company about his letter to Oak Ridge Associated Universities (ORAU) which questioned the necessity of ORAU's forthcoming survey of the W. R. Grace property in Pompton Plains, New Jersey. Copies of the letter were transmitted to Dr. Mott and Mr. Barber of the Department of Energy (DOE) but no copies were transmitted to the NRC. I informed him that, in the future, contacts with our contractor should be made through this office (NMSS); however, I did not see any problems with him keeping Dr. Mott of DOE informed since DOE may become involved. We agreed that formal contacts between the NRC and W. R. Grace concerning the Pompton Plains site should be made addressed to him (Burton Mobley). Mr. Mobley stated that there were some people in W. R. Grace who feel that the NRC should be forced to get a court order to get onsite. I informed him that I would check with legal council for an opinion. Today, November 25, 1981, I spoke with Mr. Mobley and Mr. Hardwicke (W. R. Grace General Council) and they informed me that W. R. Grace wishes to cooperate with the NRC in every way possible. They stated that it was not necessary to have a court order to gain access to the property and they would like to work with us on the radiological survey. They would, however, like a letter from me stating when our contractor was coming and what they plan to do. I told them that I would prepare a letter to Mr. Hardwicke. (The letter, copy attached, was mailed on November 27, 1981.) They also requested that a opportunity to see any public notice concerning this site prior to release of the notice. I informed him that we would send them a copy of any press releases prior to release for comment; however, I could not guarantee that his comments would be addressed. I also informed him that ORAU would like to make a preliminary visit the week of December 7, 1981. After which they would draw up and transmit to NRC a draft comprehensive radiological survey plan. This plan would also be submitted to W. R. Grace for their information and comment. In conclusion, it was agreed that both groups would work together during the survey and try to resolve any problems as or if any should arise.

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NOV 30 1981

Mr. Burton Mobley can be reached at 301-659-9058 and Mr. John Hardwicke at 301-685-1717.



W. T. Crow, Section Leader
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

4870

FACSIMILE REQUEST

Date 11/30/81

MESSAGE TO: Doug Sly IE HQ

TELECOPY NUMBER: _____

NUMBER OF PAGES: 4 INCLUDING THIS REQUEST FORM

MESSAGE FROM: M Campbell

U.S.N.R.C. REGION I KING OF PRUSSIA, PENNA.

TRANSMITTED BY: Manni

DATE & TIME: 11/30/81 - 9:32

VERIFIED BY: Doug Sly

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W.R. GRACE & COMPANY
Licensing History
Pompton Plains, New Jersey

April 1, 1954

License R-132 issued to Rare Earths, Inc., Pompton Plains, New Jersey for possession and processing of unlimited quantities of source material in monazite sand.

January 24, 1957

License R-196 issued to the Davison Chemical Division of W.R. Grace & Company for possession of unlimited quantities of thorium-containing materials at both the Pompton Plains, New Jersey and Curtis Bay, Maryland sites.

November 22, 1961

License No. STA-422 issued to the W.R. Grace & Company to possess unlimited quantities of thorium at the Pompton, New Jersey site.

April 8, 1971

License application states that all processing of thorium materials had ceased.

February 28, 1973

License No. STA-422 expired.

July 31, August 1, 2, and September 20, 1974

Closeout inspection of License No. STA-422 indicates that an unknown quantity of waste products were buried on the property.

January 22, 1975

Property formerly licensed under License No. STA-422 released for unrestricted use.

HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

In December, 1973, Davison Chemical engaged the service of Applied Health Physics, Inc. (AHP) to conduct a radiological survey of the entire property. Decontamination operations were begun by AHP on March 11, 1974 and continued through July 18, 1974. The goal of the work was to attain certain radioactivity limits as specified in regulations of the A.E.C. and the New Jersey State Department of Health for unrestricted use. A certified health physicist was engaged during the decontamination work as a consultant to Davison to recommend appropriate methods of removing and disposing of radioactive wastes and to provide an expert's opinion on the progress and course of decontamination, as well as to assure compliance with the regulations of the State of New Jersey and the A.E.C. A survey report, dated September 9, 1974 was sent to the A.E.C. (then Nuclear Regulatory Commission - N.R.C.) who's Region I Office of Regulatory Operations performed a confirmatory survey. In a letter dated January 22, 1975, the N.R.C. released the facilities for unrestricted use, provided that a notation be recorded in the appropriate land records indicating radioactive material has been buried on this property. This has been recorded in the land records in Passaic County.

During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

On May 14, 1977, a fire of undetermined origin swept through the main building, heavily damaging the structure. Davison had about 2/3 of the remaining building razed and only restored the front 1/3 for office space. Some of the buildings were leased to Electro-Nucleonics, Inc. (ENI) soon after cessation of operations in July 1967, and the entire real estate was leased long-term to ENI in October 1979.

From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring. This employee is Mr. Armin Wille, Senior Facilities Engineer, W. R. Grace & Co., Davison Chemical Division, P.O. Box 2117, Baltimore, Maryland 21203. Telephone (301) 659-9093.

FACSIMILE REQUEST

Date 11/30/81

MESSAGE TO: V. Stello, Deputy Executive Director
for Regional Operations and Generic
Requirements

TELECOPY NUMBER: _____

NUMBER OF PAGES: 27 INCLUDING THIS REQUEST FORM

MESSAGE FROM: R. Haynes, Regional Administrator
U.S.N.R.C. REGION I KING OF PRUSSIA, PENNA.

TRANSMITTED BY: _____

DATE & TIME: _____

VERIFIED BY: _____

*Note: This is being retransmitted because
a few small changes have been
made to the report.*

26

B/407

ITEM # 410

Docket No. 40-00086

MEMORANDUM FOR: Victor Stello, Deputy Executive
Director for Regional Operations
and Generic Requirements

FROM: Ronald C. Haynes, Regional Administrator,
Region I

SUBJECT: W. R. Grace and Co., Wayne, New Jersey

As you requested on November 25, 1981, enclosed is Report No. 99990001/81-21 for the W. R. Grace and Co., Wayne (Pompton Plains), New Jersey.

Ronald C. Haynes
Regional Administrator,
Region I

cc w/encl: Richard C. DeYoung, Director,
Office of Inspection and
Enforcement

John G. Davis, Director,
Office of Nuclear Materials Safety
and Safeguards

an NRC inspector in this offsite area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 99990001/81-21
Docket No. 40-00086
License No. STA-422 Priority IV Category E
Licensee: W. R. Grace and Co.
Davison Chemical Division
P.O. Box 2117
Baltimore, Maryland 21203

Facility Name: W. R. Grace and Co.

Inspection at: 868 Black Oak Ridge Road, Wayne, New Jersey 07470

Inspection conducted: January 29, September 10, and November 23, 1981

Inspectors: *M. Campbell* 12/1/81
M. Campbell, Radiation Specialist date signed

Francis M. Costello 12/1/81
F. Costello, Radiation Specialist date signed

Approved by: *J. D. Kinneman* 12/1/81
J. D. Kinneman, Chief, Materials Radiological date signed
Protection Section

Inspection Summary:

Inspection Conducted on January 29, September 10, and November 23, 1981
(Report No. 99990001/81-21).

Areas Inspected: - Special safety inspection to determine current radiological condition of formerly licensed site used to process thorium and rare earths. This included a review of site historical background, independent measurements of levels of radiation and concentrations of radioactive materials, and review of an aerial radiological survey. The inspection involved 12 inspector-hours by two regionally-based NRC inspectors.

Results: Buildings on the site meet current criteria for release for unrestricted use. Some areas around the buildings and offsite may not meet current criteria for release for unrestricted use. Additional surveys will be required to completely characterize the site at 868 Black Oak Ridge Road, Wayne, New Jersey and surrounding areas.

DETAILS

1. Persons Contacted

Armin Wille, P.E., Senior Facilities Engineer
Edward Heyman, General Manager, Public Relations
Leroy Zeeger, Director of Research, Electro-Nucleonics, Inc.,
(Tenant company)
Jeanette Eng, Director, Radiation Decontamination Assessment Section,
Bureau of Radiation Protection, State of New Jersey

2. Historical Background and Summary of W. R. Grace Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was reportedly conducted under contract with the AEC. In 1954, the AEC issued a license authorizing the possession, transfer and use of source material (thorium) by Rare Earths, Inc. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removeable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was one of the specified sites.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels, greater than current criteria for release for unrestricted use, and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No

radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected, which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by an NRC inspector in this offsite area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

3. Independent Measurements

a. Grounds

On January 29, 1981, an inspector surveyed the grounds of the facility, including the areas where waste containing thorium had been buried. The survey was performed with a Ludlum Model 12S micro-R-meter. The results of the survey indicated radiation levels ranging from 0.010 to 1.0 millirem per hour on the site. The survey results are included as Attachment 2 to this report.

Soil samples were taken at several locations onsite. The locations and results of the analyses of these samples are included as Attachment 3 to this report. Concentrations as high as 1200 picocuries of thorium-232 per gram of soil were found.

The inspector observed that areas of the grounds are posted with "Caution Radioactive Materials" signs, but access to these areas is not restricted.

b. Buildings

On September 10, 1981 an inspector surveyed the interior of all buildings on the W. R. Grace property. The surveys consisted of radiation level measurements made with a Ludlum Model 12S micro-R meter and smears taken on all floors to detect removable contamination. Three buildings were surveyed. With the exception of two areas, all areas surveyed had radiation levels less than 0.020 millirem per hour. A seldom used

storage area in the "North Building" had radiation levels which ranged from 0.02 to 0.1 millirem per hour. This was also the only area inside where removable contamination was detected. The amount detected was less than 100 disintegrations per minute of alpha contamination per 100 square centimeters. The radiation levels appeared to be due to the presence of a few containers of the rare earth products which were once produced at the facility. An area of the "Plastics Production Laboratory" had radiation levels as high as 0.050 millirem per hour, but this appeared to be the result of waste material buried outside the building.

4. Exit Interview

On January 29, 1981 the inspector met with the individuals listed in paragraph 1 and summarized the scope and findings of the inspection. The inspector informed the W. R. Grace representatives that it was likely that more surveys would be performed at this facility at a future date to further evaluate the radiological status of the facility. The W. R. Grace representatives provided the inspector a summary of the history of activities at this facility (Attachment 1).

5. Review of Aerial Survey

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The results of this survey are documented in the report enclosed as Attachment 4. The aerial survey identified one offsite area west of the W. R. Grace property which exhibited higher than normal background radiation levels.

On November 23, 1981, a preliminary ground survey of this off-site area was performed by an NRC inspector. The survey found radiation levels in excess of background along the stream which runs from the W. R. Grace property towards the Pompton River. The measured radiation levels ranged from 0.01 to 0.2 millirem per hour; normal background radiation levels in this area of New Jersey ranges from 0.006 to 0.016 millirem per hour. The results of this survey are documented in Attachment 5.

PAGE 1

**HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.**

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

In December, 1973, Davison Chemical engaged the service of Applied Health Physics, Inc. (AHP) to conduct a radiological survey of the entire property. Decontamination operations were begun by AHP on March 11, 1974 and continued through July 18, 1974. The goal of the work was to attain certain radioactivity limits as specified in regulations of the A.E.C. and the New Jersey State Department of Health for unrestricted use. A certified health physicist was engaged during the decontamination work as a consultant to Davison to recommend appropriate methods of removing and disposing of radioactive wastes and to provide an expert's opinion on the progress and course of decontamination, as well as to assure compliance with the regulations of the State of New Jersey and the A.E.C. A survey report, dated September 9, 1974 was sent to the A.E.C. (then Nuclear Regulatory Commission - N.R.C.) who's Region I Office of Regulatory Operations performed a confirmatory survey. In a letter dated January 22, 1975, the N.R.C. released the facilities for unrestricted use, provided that a notation be recorded in the appropriate land records indicating radioactive material has been buried on this property. This has been recorded in the land records in Passaic County.

During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

On May 14, 1977, a fire of undetermined origin swept through the main building, heavily damaging the structure. Davison had about 2/3 of the remaining building razed and only restored the front 1/3 for office space. Some of the buildings were leased to Electro-Nucleonics, Inc. (ENI) soon after cessation of operations in July 1967, and the entire real estate was leased long-term to ENI in October 1979.

From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring.

ATTACHMENT 3 REPORT NO. 99990001/81-21

PAGE 1

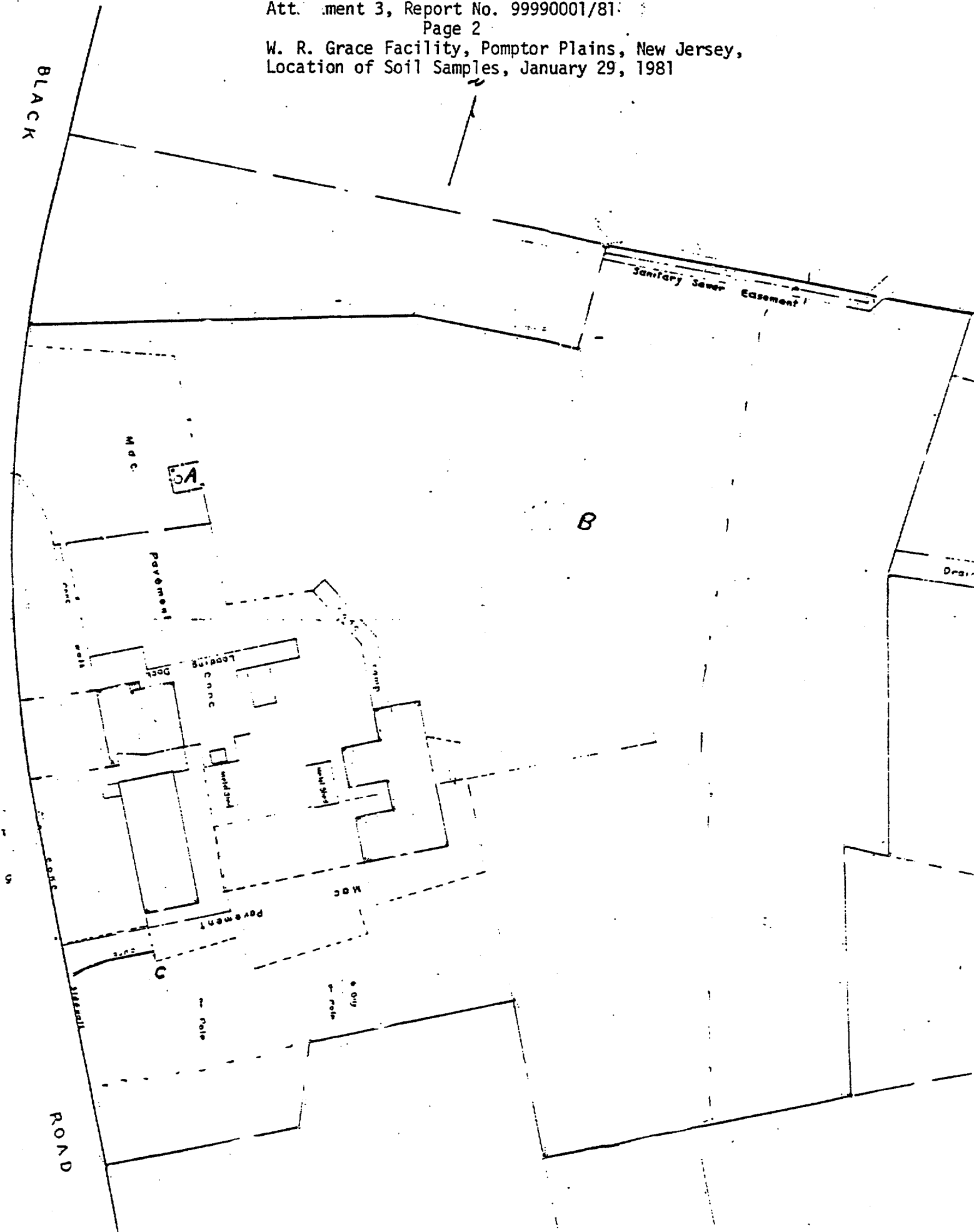
RESULTS OF SOIL SAMPLES

Sample	Thorium-232 picocuries per gram	Uranium-238 picocuries per gram
A	30 ± 4	23 ± 1
B	1230 ± 64	60 ± 17
C	221 ± 27	39 ± 6

The samples were analyzed using GeLi detector and a computer based multichannel analyzer in the Region I Laboratory.

The most conservative current NRC criteria for release of facilities for unrestricted use requires that concentrations of thorium-232 in soil not exceed 5 picocuries per gram. (This is equivalent to a total thorium concentration of 10 picocuries per gram.)

W. R. Grace Facility, Pompton Plains, New Jersey,
Location of Soil Samples, January 29, 1981



EG&G SURVEY REPORT
NRC-8113
NOVEMBER 1981

THE
REMOTE
SENSING
LABORATORY
OF THE UNITED STATES
DEPARTMENT OF ENERGY

AN AERIAL RADIOLOGICAL SURVEY OF THE

W. R. GRACE PROPERTY

WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

DISCLAIMER

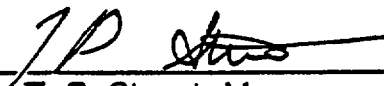
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AN AERIAL RADIOLOGICAL SURVEY OF THE
W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

T. S. Dahlstrom
Project Scientist

REVIEWED BY



T. P. Stuart, Manager
Nuclear Radiation Department

This Document is UNCLASSIFIED



G. P. Stobie
Classification Officer

ABSTRACT

During the week of 24 May 1981, an aerial radiological survey was performed over the W. R. Grace property in Wayne Township, New Jersey. The facility is occupied by a firm known as Electronucleonics, Inc. An isoradiation map was generated from the aerial data which shows increased levels of ^{208}Tl , a thorium daughter, over the burial grounds and in an area to the west believed to have resulted from subsurface water erosion of material from the burial grounds.

CONTENTS

3 **Abstract**

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7 **1.0 Summary**

7 **2.0 Introduction**

7 **3.0 Background**

8 **4.0 Discussion and Results**

Figures

9 **1 Exposure Rate Isoradiation Contours**

12 **A-1 Gamma Pulse-Height Spectrum of Typical Background Area**

12 **A-2 Net Spectrum of Elevated Activity Over the Burial Ground**

Appendix

9 **A Survey Method, Data Analysis Equipment, Data Processing Methods and Results**

11 *References*

1.0 SUMMARY

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The aerial survey data also suggests there had been some subsurface contamination to the west along a stream running adjacent to the property. The maximum levels in this area were inferred to be 60 to $120 \mu\text{R/h}$ at the one meter level. The average background levels were 8 to $12 \mu\text{R/h}$ including $3.7 \mu\text{R/h}$ cosmic radiation contribution.

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Natural background radiation originates from radioactive elements present in the earth and cosmic rays entering the earth's atmosphere from space. The terrestrial gamma rays originate primarily from the uranium decay chain, the thorium decay chain, and radioactive potassium. Local concentrations of these nuclides produce radiation levels at the surface of the earth in the range of 1 to $15 \mu\text{R/h}$ (9 to 130 mrem/y). Some areas with high uranium and thorium concentrations in surface minerals exhibit even higher radiation levels, especially in the western states. For example, in the Colorado Plateau area the average radiation level is above 200 mrem/y. At some locations in Brazil and India, the natural radiation level is above 1000 mrem/y. One member of each of the uranium and thorium decay chains is an isotope of the noble gas, radon, which can diffuse through soil and be borne by air to other locations. Thus, the level of this airborne radiation depends on the meteorological conditions, the mineral content of the soil, the soil permeability, and other conditions existing at each location at any particular time. The airborne radiation contributes from 1 to 10% of the natural background radiation levels.

Cosmic rays (the space component) interact in a complicated manner with the elements of the earth's atmosphere and the soil. These interactions produce an additional natural source of gamma radiation. Radiation levels due to cosmic rays vary with altitude and geomagnetic

latitude: they range from 3.7 to 23 $\mu\text{R}/\text{h}$ (up to 200 mrem/y).¹ The cosmic ray contribution in Wayne Township is estimated to 3.7 $\mu\text{R}/\text{h}$.

4.0 DISCUSSION AND RESULTS

The results of the aerial survey are shown in Figure 1 as exposure rate isoradiation contours. These contours are derived from gross gamma count rates at survey altitude. The contours are overlaid on a combination of an aerial photograph and a USGS map (a single photograph of the entire survey area was unavailable). Data analysis details are given in Appendix A.

As shown in Figure 1, the natural background radiation levels generally ranged from 8 to 12 $\mu\text{R}/\text{h}$. Lower radiation levels are evident over large bodies of water where cosmic radiation dominates the background levels.

Radiation levels higher than background were found over the burial ground and over an area west of the property. These contours are shown in blue in Figure 1.

The highest radiation levels inferred from the gross gamma count rates from the aerial survey data were above 120 $\mu\text{R}/\text{h}$. However, these numbers represent levels averaged over the total field-of-view of the detector system and do not reflect small localized hot spots. Measurements taken on the ground with hand-held survey meters gave exposure rates from 800 to 1000 $\mu\text{R}/\text{h}$ in one area (about two feet in diameter) on the western boundary of the burial ground.

The spread of contamination to the west of the plant is most likely due to subsurface erosion

along the outer boundaries of a stream which runs along the eastern and southern boundaries of the property and then flows west on the opposite side of Black Oak Ridge road. The highest levels in this region (inferred from the aerial survey data) were 60 to 120 $\mu\text{R}/\text{h}$.

The blue E level contour surrounding the burial ground and the area to the west does not accurately define the boundaries of the higher radiation levels at ground level. Because the burial ground and stream exhibit relatively high level activity and are concentrated in small areas, the detectors "see" the radiation from these areas, both before the helicopter reaches them and after it has passed them.

There are additional E level contours to the west and south of the contaminated areas. However, these are most likely due to natural radiation anomalies and are not associated with the burial grounds.

A gamma ray energy spectrum was extracted from the aerial data taken over the burial ground (see appendix A). The photopeaks of the ^{208}Tl and other isotopes in the thorium decay chain dominated the spectrum.

The survey data were also processed by another method to identify those areas that contained ^{208}Tl in excess of its natural abundance. The results showed only the area contained within the blue contours. The existence of ^{208}Tl identifies the presence of thorium, which was expected to be present in the residue of monzanite sands used in the production of rare earths and thorium compounds at this facility.

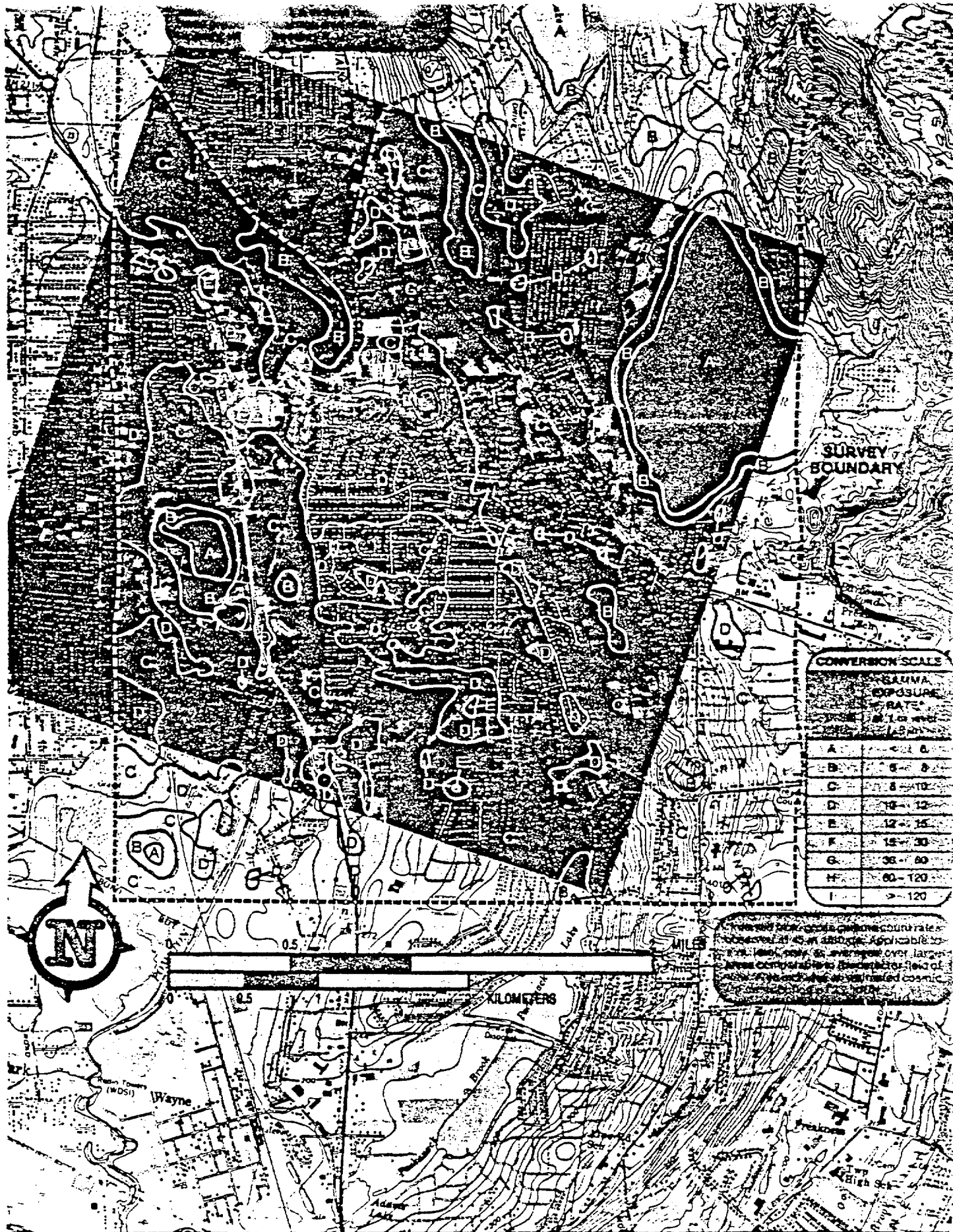


Figure 1. EXPOSURE RATE ISORADIATION CONTOURS

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The gamma ray energy spectrum measured during this survey covers the range between 0.05 million electron volts (MeV) and 3 MeV. This spectrum is useful for identifying specific nuclides contributing to the total activity. The most active areas in Figure 1 were singled out for spectral examination. The nuclides responsible for the increased activity were sought by comparing background spectral data with spectral data accumulated while the aircraft was over the anomalous area. The background was taken from data gathered at positions just before or just after the anomaly (Figure 1). A typical background spectrum is shown in Figure A-1. Figure A-2 presents channel-by-channel differences between anomalous and background data. The predominant peaks are due to ^{208}Tl , a daughter of thorium.

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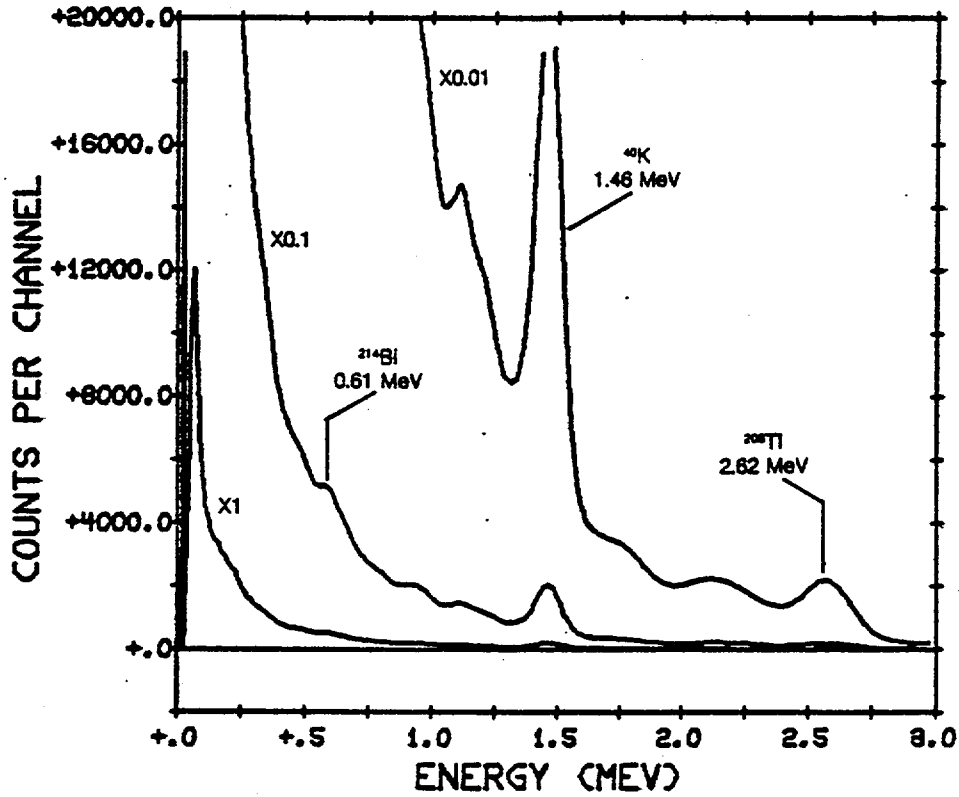


Figure A-1. GAMMA PULSE-HEIGHT SPECTRUM OF TYPICAL BACKGROUND AREA

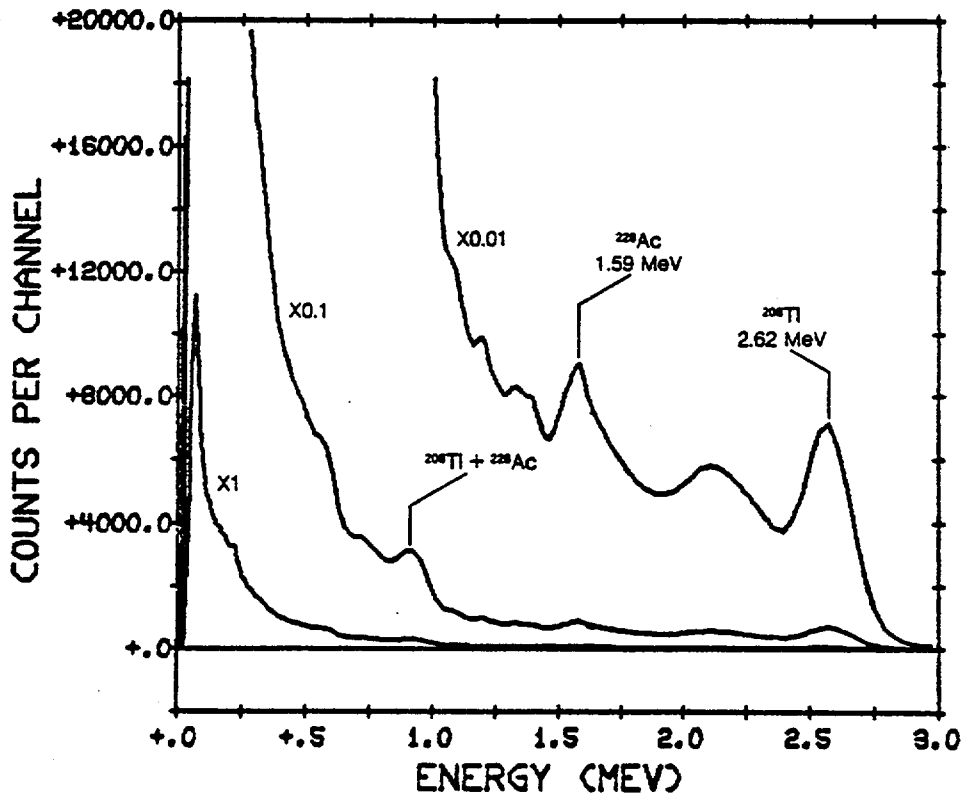


Figure A-2. NET SPECTRUM OF ELEVATED ACTIVITY OVER THE BURIAL GROUND

REFERENCES

1. Klement, A. W.; Miller, C. R.; Min, R. P.; Shleren, B. August 1972. *Estimate of Ionizing Radiation Doses in the United States 1960-2000*. U.S. EPA Report ORP/CD72-1. Washington, D.C.: Environmental Protection Agency.
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W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY
NRC-8113
DATES OF SURVEY: MAY 1981
DATE OF REPORT: NOVEMBER 1981

ATTACHMENT 5, REPORT NO. 99990001/81-21

Page 1

Sample Results - Area West of W. R. Grace

SAMPLE	RESULTS
Water from Stream	<200 pCi thorium-232 per liter*
Sediment from Stream	12 \pm 6 pCi thorium-232 per gram

The samples were analyzed on a GeLi crystal attached to a computer based multichannel analyzer in the Region I Laboratory.

*This is the Region I Laboratory's minimum detectable activity for this sample which means there was no thorium in the water to the best of our ability to measure it.

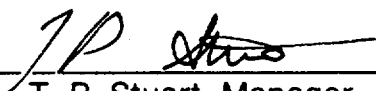
The most conservative current NRC criterial for release of facilities for unrestricted use requires that concentrations of thorium-232 in soil not exceed 5 picocuries per gram. (This is equivalent to a total thorium concentration of 10 picocuries per gram).

AN AERIAL RADIOLOGICAL SURVEY OF THE
W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

T. S. Dahlstrom
Project Scientist

REVIEWED BY



T. P. Stuart, Manager
Nuclear Radiation Department

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G. P. Stobie
Classification Officer

B/408

This work was performed by EG&G for the Environmental Protection Agency and The United States Nuclear Regulatory Commission through an EAO transfer of funds to Contract Number DE-AC08-76NV01183 with the United States Department of Energy.

ITEM # 411

ABSTRACT

During the week of 24 May 1981, an aerial radiological survey was performed over the W. R. Grace property in Wayne Township, New Jersey. The facility is occupied by a firm known as Electronucleonics, Inc. An isoradiation map was generated from the aerial data which shows increased levels of ^{208}Tl , a thorium daughter, over the burial grounds and in an area to the west believed to have resulted from subsurface water erosion of material from the burial grounds.

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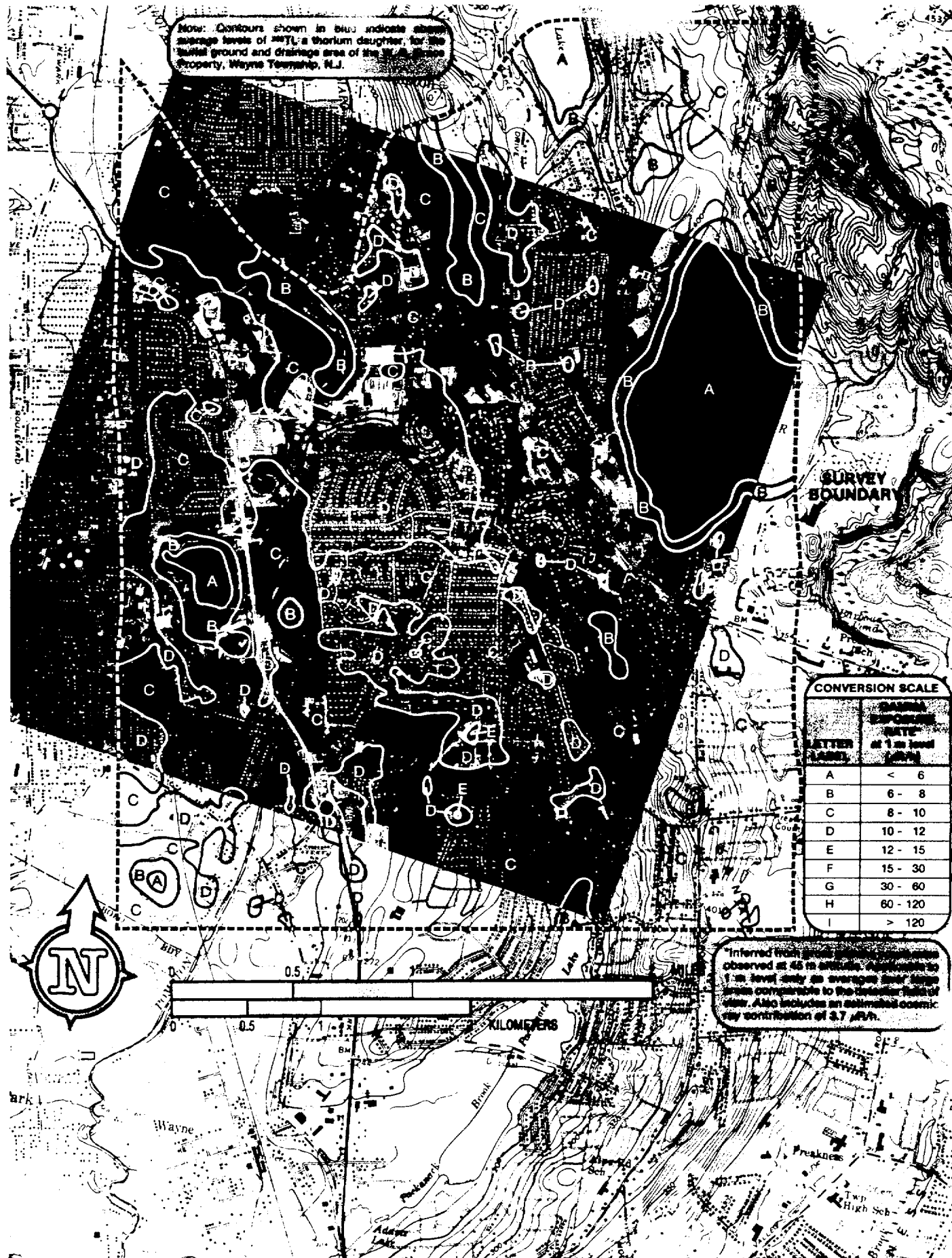


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EG&G SURVEY REPORT
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THE
**REMOTE
SENSING
LABORATORY**
OF THE UNITED STATES
DEPARTMENT OF ENERGY

AN AERIAL RADIOLOGICAL SURVEY OF THE
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WAYNE TOWNSHIP, NEW JERSEY

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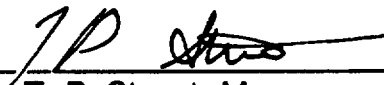
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latitude: they range from 3.7 to 23 $\mu\text{R}/\text{h}$ (up to 200 mrem/y).¹ The cosmic ray contribution in Wayne Township is estimated to 3.7 $\mu\text{R}/\text{h}$.

4.0 DISCUSSION AND RESULTS

The results of the aerial survey are shown in Figure 1 as exposure rate isoradiation contours. These contours are derived from gross gamma count rates at survey altitude. The contours are overlaid on a combination of an aerial photograph and a USGS map (a single photograph of the entire survey area was unavailable). Data analysis details are given in Appendix A.

As shown in Figure 1, the natural background radiation levels generally ranged from 8 to 12 $\mu\text{R}/\text{h}$. Lower radiation levels are evident over large bodies of water where cosmic radiation dominates the background levels.

Radiation levels higher than background were found over the burial ground and over an area west of the property. These contours are shown in blue in Figure 1.

The highest radiation levels inferred from the gross gamma count rates from the aerial survey data were above 120 $\mu\text{R}/\text{h}$. However, these numbers represent levels averaged over the total field-of-view of the detector system and do not reflect small localized hot spots. Measurements taken on the ground with hand-held survey meters gave exposure rates from 800 to 1000 $\mu\text{R}/\text{h}$ in one area (about two feet in diameter) on the western boundary of the burial ground.

The spread of contamination to the west of the plant is most likely due to subsurface erosion

along the outer boundaries of a stream which runs along the eastern and southern boundaries of the property and then flows west on the opposite side of Black Oak Ridge road. The highest levels in this region (inferred from the aerial survey data) were 60 to 120 $\mu\text{R}/\text{h}$.

The blue E level contour surrounding the burial ground and the area to the west does not accurately define the boundaries of the higher radiation levels at ground level. Because the burial ground and stream exhibit relatively high level activity and are concentrated in small areas, the detectors "see" the radiation from these areas, both before the helicopter reaches them and after it has passed them.

There are additional E level contours to the west and south of the contaminated areas. However, these are most likely due to natural radiation anomalies and are not associated with the burial grounds.

A gamma ray energy spectrum was extracted from the aerial data taken over the burial ground (see appendix A). The photopeaks of the ^{208}Tl and other isotopes in the thorium decay chain dominated the spectrum.

The survey data were also processed by another method to identify those areas that contained ^{208}Tl in excess of its natural abundance. The results showed only the area contained within the blue contours. The existence of ^{208}Tl identifies the presence of thorium, which was expected to be present in the residue of monzanite sands used in the production of rare earths and thorium compounds at this facility.

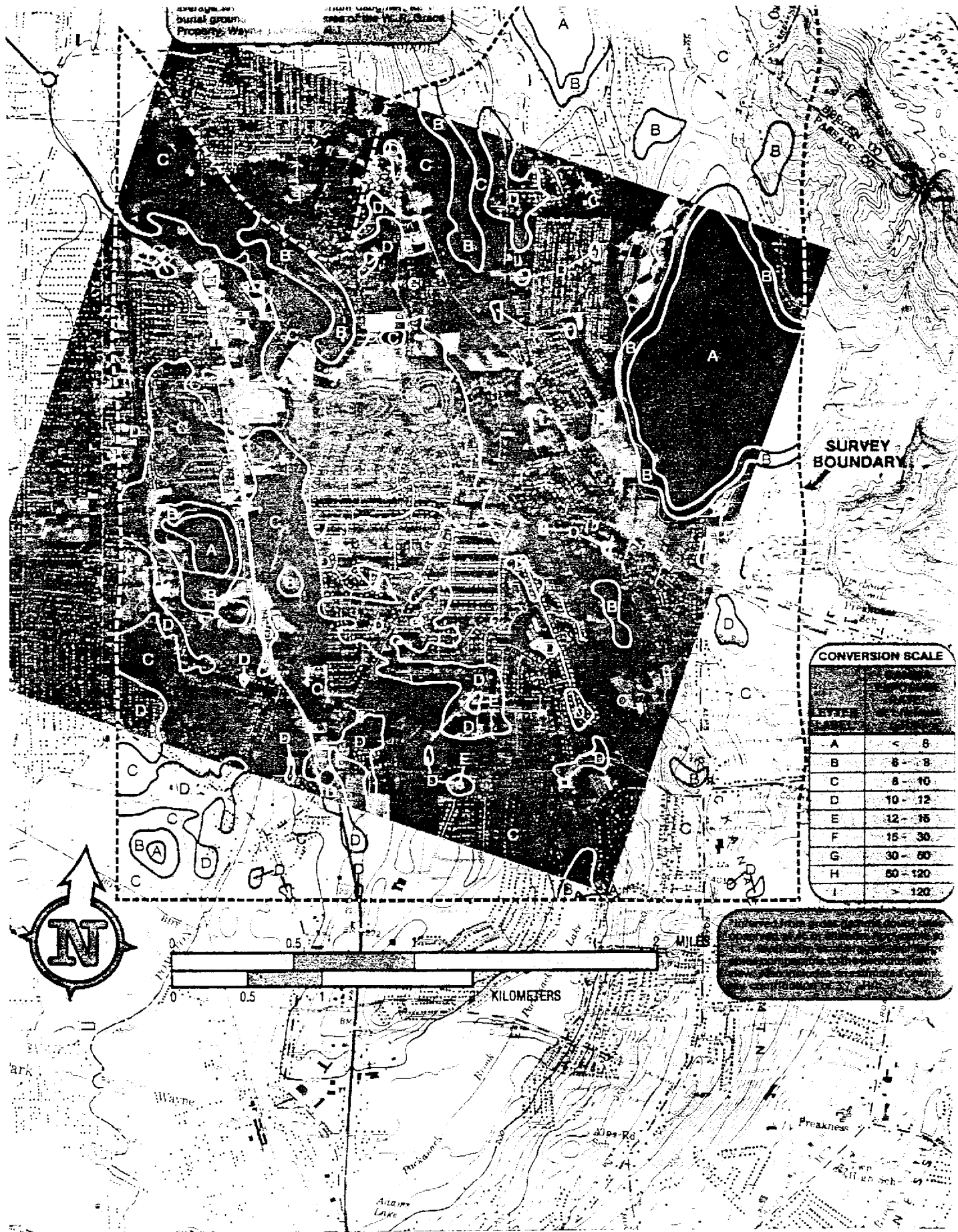


Figure 1. EXPOSURE RATE ISORADIATION CONTOURS

APPENDIX A. SURVEY METHOD, DATA ANALYSIS EQUIPMENT, DATA PROCESSING METHODS AND RESULTS

The data reported here were generated from measurements taken with an airborne system during the week of 24 May 1981. Gamma rays were detected in 12.7-cm diameter by 5.1-cm thick NaI (Tl) crystals arranged in two arrays of ten crystals each. To cover the area of interest the system was flown in a BO-105 helicopter at 45 m altitude along a series of parallel lines. Position information from a microwave ranging system was recorded on magnetic tape along with the radiation data. Correlations between the two and extractions of specific types of nuclides were effected with a computer data processing system. A description of the equipment and operating procedures can be found in References 2 and 3.

Gross Counting Rates

The gamma ray energy spectrum measured during this survey covers the range between 0.05 million electron volts (MeV) and 3 MeV. This spectrum is useful for identifying specific nuclides contributing to the total activity. The most active areas in Figure 1 were singled out for spectral examination. The nuclides responsible for the increased activity were sought by comparing background spectral data with spectral data accumulated while the aircraft was over the anomalous area. The background was taken from data gathered at positions just before or just after the anomaly (Figure 1). A typical background spectrum is shown in Figure A-1. Figure A-2 presents channel-by-channel differences between anomalous and background data. The predominant peaks are due to ^{208}Tl , a daughter of thorium.

The gross count rate isopleths (Figure 1) are based on the sum of all counts in that portion of the gamma ray energy spectrum between 0.05 MeV and 3 MeV. The terrestrial component of gross count rate and the sum of exposure rates due to soil and cosmic ray activity were produced as follows:

1. Overflight of a body of water at the survey altitude to measure the sum of count rates due to aircraft background, cosmic rays, and airborne radon daughter radionuclides.

2. Measurement of count rate over the survey area.
3. Subtraction of Item 1 from Item 2.
4. A predetermined factor obtained over a calibration range near Lake Mead was then applied to convert Item 3 above to exposure rate.

Dependent on (a) the proximity of the survey area to the body of water overflowed in Step 2, (b) the differences in topography and meteorological conditions between the areas, and (c) the differences in time between execution of the two flights, the counts resulting from Step 3 and the isopleths shown in Figure 1 may be either rich or poor in airborne radon daughter content. Daily variations in airborne radon daughter concentrations can lead to discontinuities in isopleths across boundaries between areas flown on different days. When necessary, corrections were made for this effect. The correction, based on data from a single cross-track flight, adjusted counting rates to a constant component due to the airborne radon daughter levels. Although not precisely known, this airborne radon daughter component is estimated to contribute an uncertainty of no more than 10% to the exposure rate.

The calibration described in Step 4 was done over an area containing a typical mix of naturally occurring radionuclides. The conversion factor will be in error where the mix is atypical, where man-made nuclides exist, or when airborne radon daughter contributions are not completely subtracted. The conversion factor used was 987 counts per second per $\mu\text{R}/\text{h}$ one meter above the ground.

It should be stressed that inherent spatial resolution in any remote sensing survey that uses uncollimated detectors (such as the airborne system) is one to two times the distance between the surveyed surface and the detector. Therefore, ground surveys using detectors at the one meter level will not compare well with an aerial survey over areas that contain sources whose lateral dimensions are small relative to the aircraft altitude. Isopleths constructed from a ground survey over a point source will indicate a source width of one to two meters, whereas aerial survey isopleths over the same source will indicate a source width of at least several tens of meters.

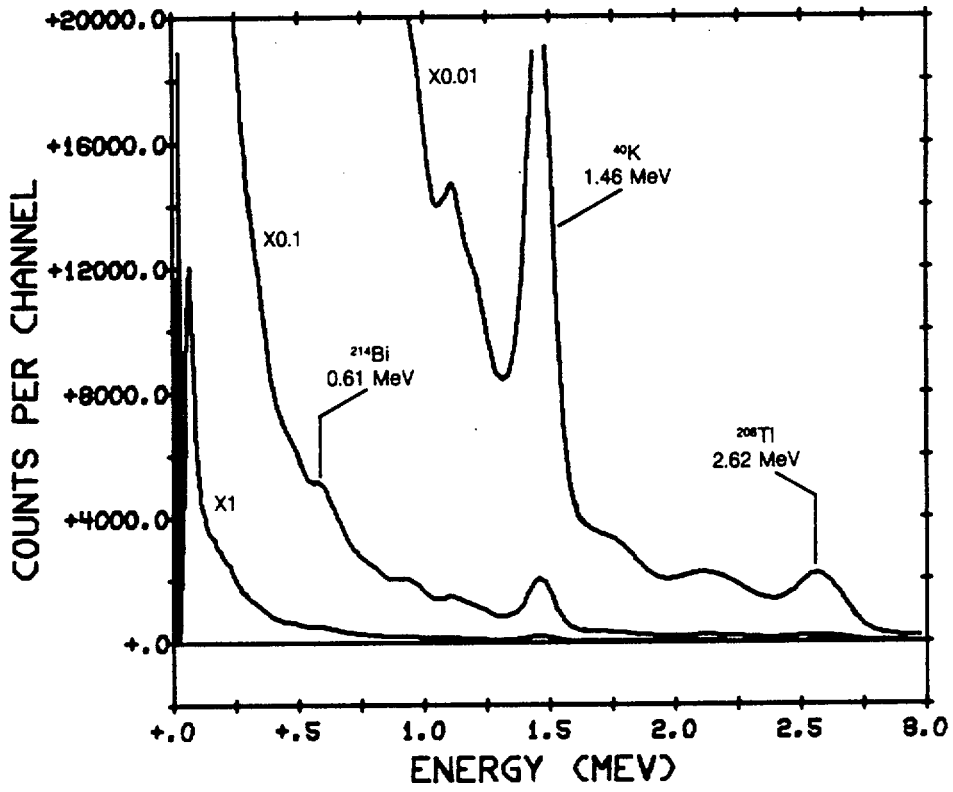


Figure A-1. GAMMA PULSE-HEIGHT SPECTRUM OF TYPICAL BACKGROUND AREA

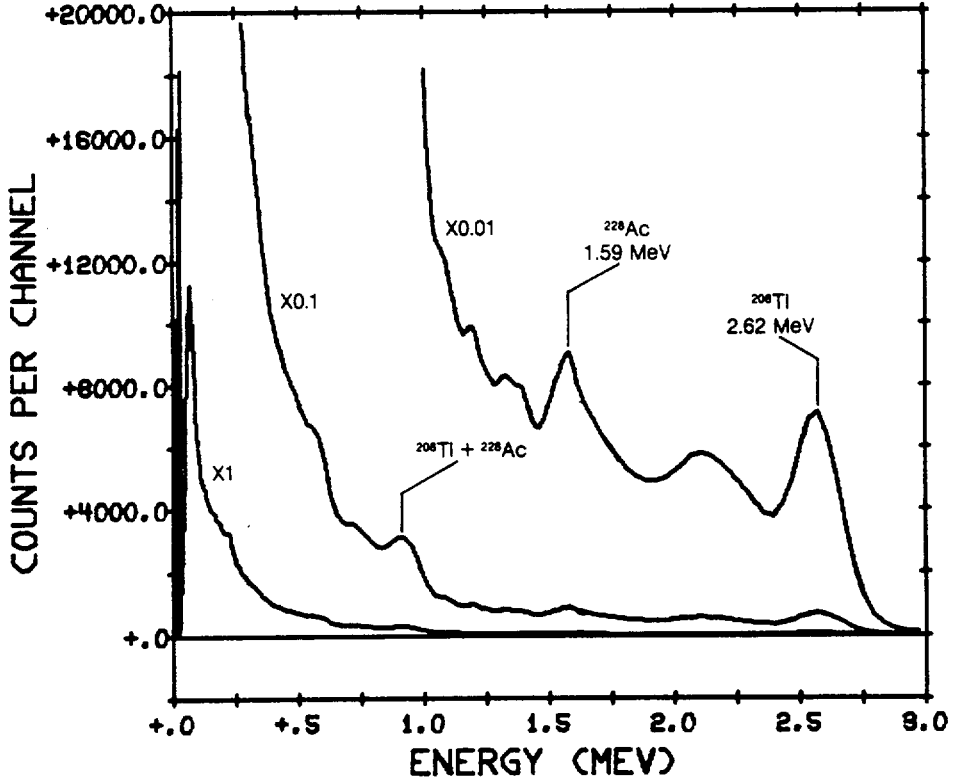


Figure A-2. NET SPECTRUM OF ELEVATED ACTIVITY OVER THE BURIAL GROUND

REFERENCES

1. Klement, A. W.; Miller, C. R.; Min, R. P.; Shleren, B. August 1972. *Estimate of Ionizing Radiation Doses in the United States 1960-2000*. U.S. EPA Report ORP/CD72-1. Washington, D.C.: Environmental Protection Agency.
2. Boyns, P. K. July 1976. *The Aerial Radiological Measuring System (ARMS): Systems, Procedures and Sensitivity (1976)*. Report No. EGG-1183-1691. Las Vegas, NV: EG&G.
3. Jobst, J. E. 1979. "The Aerial Radiological Measuring Systems Program." *Nuclear Safety* 20: 136-47.

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W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY
NRC-8113
DATES OF SURVEY: MAY 1981
DATE OF REPORT: NOVEMBER 1981

Docket No. 40-00086

MEMORANDUM FOR: Victor Stello, Deputy Executive
Director for Regional Operations
and Generic Requirements

FROM: Ronald C. Haynes, Regional Administrator,
Region I

SUBJECT: W. R. Grace and Co., Wayne, New Jersey

As you requested on November 25, 1981, enclosed is Report No. 99990001/81-21 for the W. R. Grace and Co., Wayne (Pompton Plains), New Jersey.

Ronald C. Haynes
Regional Administrator,
Region I

cc w/encl: Richard C. DeYoung, Director,
Office of Inspection and
Enforcement

John G. Davis, Director,
Office of Nuclear Materials Safety
and Safeguards

Historical Background and Summary of W. R. Grace Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was probably conducted under contract with the AEC and was licensed by the AEC in 1954. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was on the list.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels greater than current criteria for release for unrestricted use and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by an NRC inspector in this area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 99990001/81-21
Docket No. 40-00086
License No. STA-422 Priority IV Category E
Licensee: W. R. Grace and Co.
Davison Chemical Division
P.O. Box 2117
Baltimore, Maryland 21203

Facility Name: W. R. Grace and Co.

Inspection at: 868 Black Oak Ridge Road, Wayne, New Jersey 07470

Inspection conducted: January 29, September 10, and November 23, 1981

Inspectors: *M Campbell* 11/30/81
M. Campbell, Radiation Specialist date signed

F Costello 11/30/81
F. Costello, Radiation Specialist date signed

Approved by: *J D Kinneman* 11/30/81
J. D. Kinneman, Chief, Materials Radiological Protection Section date signed

Inspection Summary:

Inspection Conducted on January 29, September 10, and November 23, 1981
(Report No. 99990001/81-21).

Areas Inspected: Special safety inspection of formerly licensed site used to process thorium and rare earths to determine current radiological condition of the site. This included a review of site historical background, independent measurements of levels of radiation and concentrations of radioactive materials, and review of an aerial radiological survey. The inspection involved 12 inspector-hours by two regionally-based NRC inspectors.

Results: Buildings on the site meet current criteria for release for unrestricted use. Some areas around the buildings and offsite may not meet current criteria for release for unrestricted use. Additional surveys will be required to completely characterize the site at 868 Black Oak Ridge Road, Wayne, New Jersey and surrounding areas.

DETAILS

1. Persons Contacted

Armin Wille, P.E., Senior Facilities Engineer
Edward Heyman, General Manager, Public Relations
Leroy Zeeger, Director of Research, Electro-Nucleonics, Inc.,
(Tenant company)
Jeanette Eng, Director, Radiation Decontamination Assessment Section,
Bureau of Radiation Protection, State of New Jersey

2. Historical Background and Summary of W. R. Grace, Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was probably conducted under contract with the AEC and was licensed by the AEC in 1954. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was on the list.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels greater than current criteria for release for unrestricted use and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by an NRC inspector in this area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

3. Independent Measurements

a. Grounds

On January 29, 1981, an inspector surveyed the grounds of the facility, including the areas where waste containing thorium had been buried. The survey was performed with a Ludlum Model 125 micro-R-meter. The results of the survey indicated radiation levels ranging from 0.010 to 1.0 millirem per hour on the site. The survey results are included as Attachment 2 to this report.

Soil samples were taken at several locations onsite. The locations and results of the analyses of these samples are included as Attachment 3 to this report. Concentrations as high as 1200 becquerels of thorium 232 per gram of soil were found.

The inspector observed that areas of the grounds are posted with "Caution Radioactive Materials" signs, but access to these areas is not restricted.

b. Buildings

On September 10, 1981 an inspector surveyed the interiors of all buildings on the W. R. Grace property. The surveys consisted of measurements of radiation levels made with a Ludlum Model 12S micro-R meter and smears taken on all floors to detect removable contamination. Three buildings were surveyed. With the exception of two areas, all areas surveyed had radiation levels less than 0.020 millirem per hour. A seldom used storage area in the "North Building" had radiation levels which ranged from 0.02 to 0.1 millirem per hour. This was also the only area inside where removable contamination was detected. The amount detected was less than 100 disintegrations per minute of alpha contamination per 100 square centimeters. The radiation levels appeared to be due to the presence of a few containers of the rare earth products which were once produced at the facility. An area of the "Plastics Production Laboratory" had radiation levels as high as 0.050

millirem per hour, but this appeared to be the result of waste material buried outside the building.

4. Exit Interview

On January 29, 1981 the inspector met with the individuals listed in paragraph 1 and summarized the scope and findings of the inspection. The inspector informed the W. R. Grace representatives that it was likely that more surveys would be performed at this facility at a future date to further evaluate the radiological status of the facility. The W. R. Grace representatives provided the inspector a summary of the history of activities at this facility (Attachment 1).

5. Review of Aerial Survey

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The results of this survey are documented in the report enclosed as Attachment 4. The aerial survey identified one offsite area west of the W. R. Grace property which exhibited higher than normal background radiation levels.

On November 23, 1981, a preliminary ground survey of this off-site area was performed by an NRC inspector. The survey found radiation levels in excess of background along the stream which runs from the W. R. Grace property towards the Pompton River. The measured radiation levels ranged from 0.01 to 0.2 millirem per hour; normal background radiation levels in this area of New Jersey ranges from 0.006 to 0.016 millirem per hour. The results of this survey are documented in Attachment 5.

HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

In December, 1973, Davison Chemical engaged the service of Applied Health Physics, Inc. (AHP) to conduct a radiological survey of the entire property. Decontamination operations were begun by AHP on March 11, 1974 and continued through July 18, 1974. The goal of the work was to attain certain radioactivity limits as specified in regulations of the A.E.C. and the New Jersey State Department of Health for unrestricted use. A certified health physicist was engaged during the decontamination work as a consultant to Davison to recommend appropriate methods of removing and disposing of radioactive wastes and to provide an expert's opinion on the progress and course of decontamination, as well as to assure compliance with the regulations of the State of New Jersey and the A.E.C. A survey report, dated September 9, 1974 was sent to the A.E.C. (then Nuclear Regulatory Commission - N.R.C.) who's Region I Office of Regulatory Operations performed a confirmatory survey. In a letter dated January 22, 1975, the N.R.C. released the facilities for unrestricted use, provided that a notation be recorded in the appropriate land records indicating radioactive material has been buried on this property. This has been recorded in the land records in Passaic County.

During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

On May 14, 1977, a fire of undetermined origin swept through the main building, heavily damaging the structure. Davison had about 2/3 of the remaining building razed and only restored the front 1/3 for office space. Some of the buildings were leased to Electro-Nucleonics, Inc. (ENI) soon after cessation of operations in July 1967, and the entire real estate was leased long-term to ENI in October 1979.

From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring.

JANUARY 29, 1981
READINGS IN MICRO-R PER HOUR



RESULTS OF SOIL SAMPLES

Sample	Thorium-232 picocuries per gram	Uranium-238 picocuries per gram
A	30 ± 4	23 ± 1
B	1230 ± 64	60 ± 17
C	221 ± 27	39 ± 6

The samples were analyzed using GeLi detector and a computer based multichannel analyzer in the Region I Laboratory.

W. R. Case Facility, Pompton Plains, New Jersey,
Location of Soil Samples, January 29, 1981

BLACK

Sanitary Sewer Easement

M.A.C.

5A

B

pavement

loading dock

metal shed

metal shed

M.A.C.

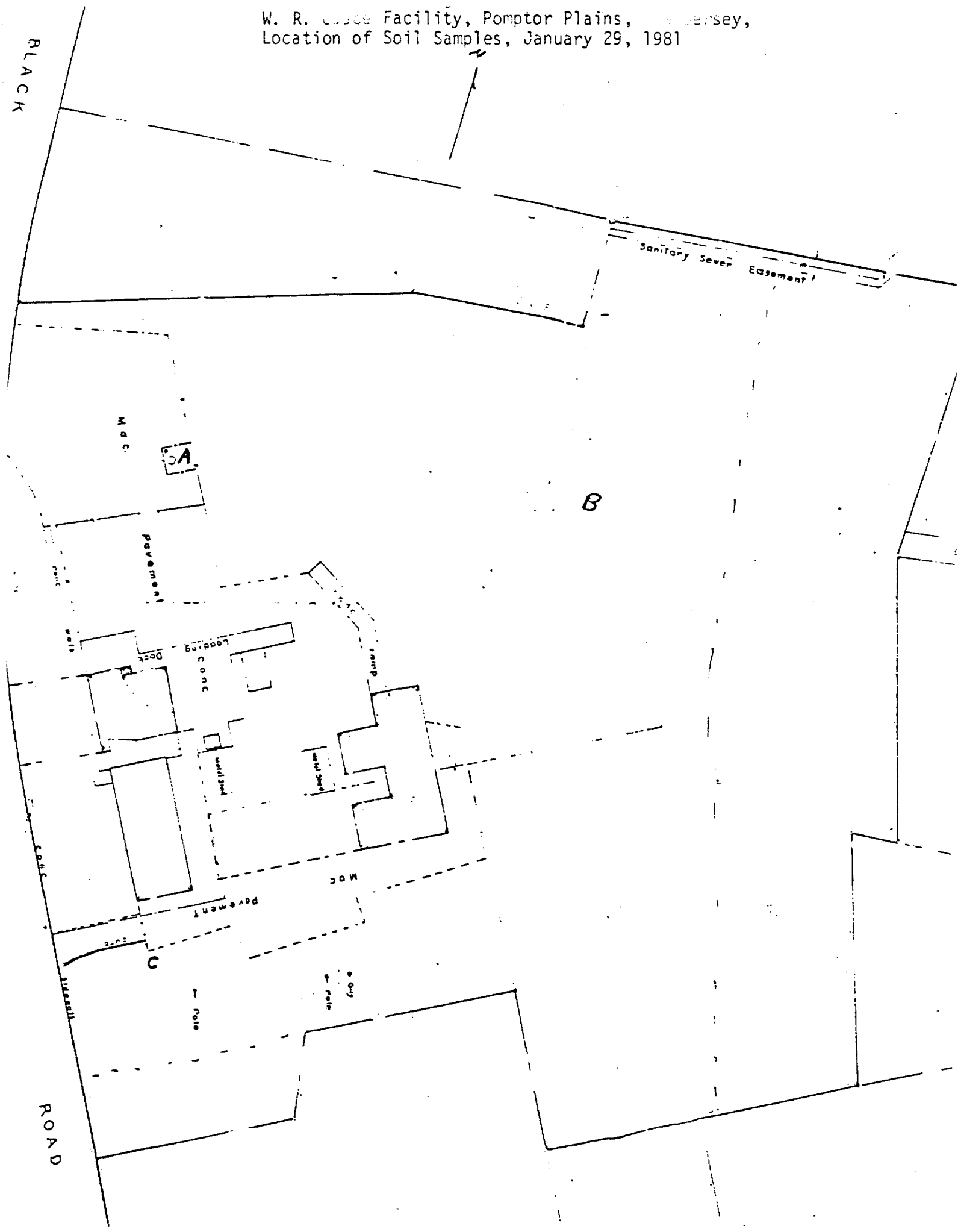
pavement

5C

4 pole

3 pole

ROAD



EG&G SURVEY REPORT
NRC-8113
NOVEMBER 1981

THE
REMOTE
SENSING
LABORATORY
OF THE UNITED STATES
DEPARTMENT OF ENERGY

AN AERIAL RADIOLOGICAL SURVEY OF THE
W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

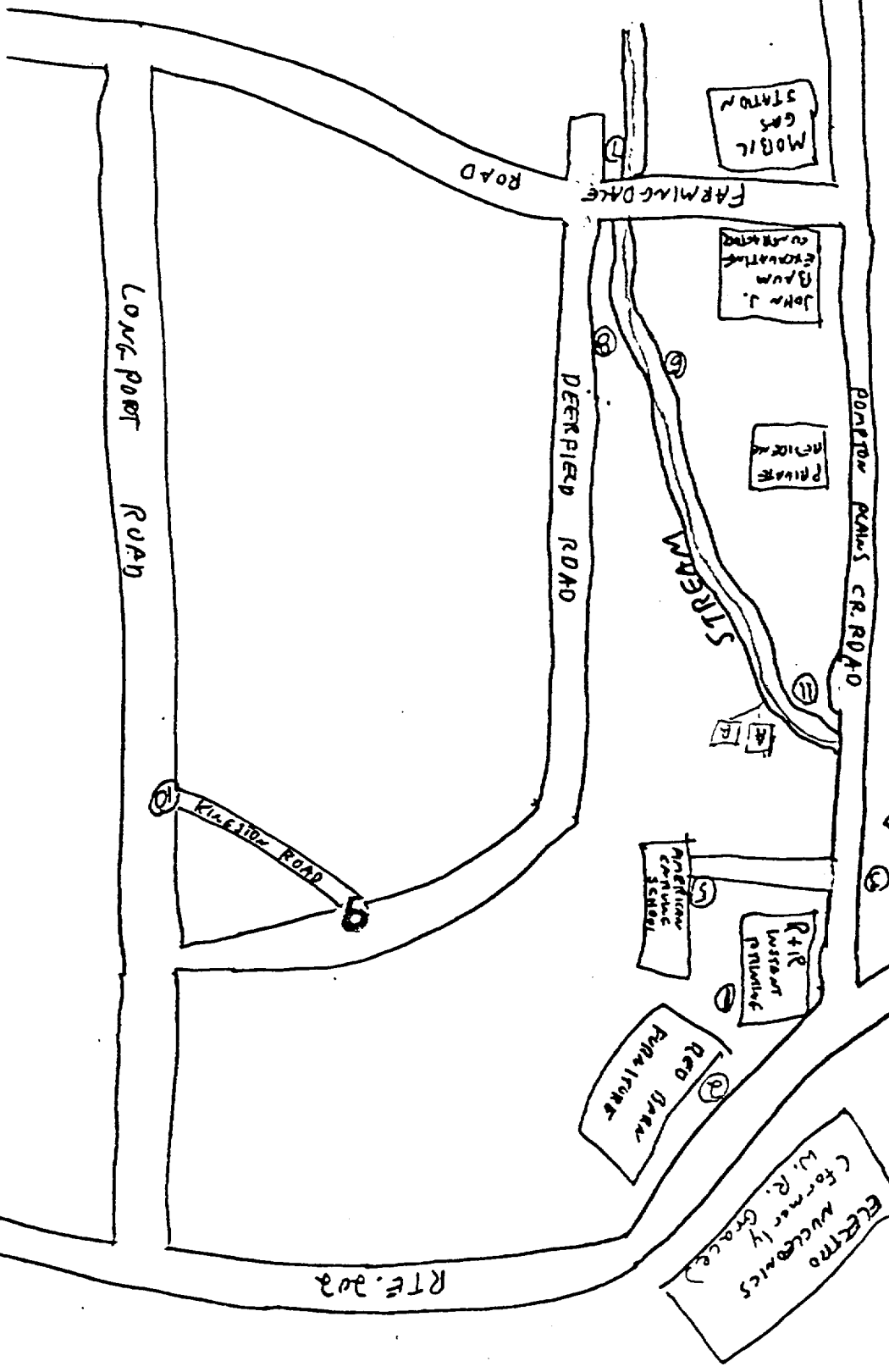
Sample Results - Area West of W. R. Grace

SAMPLE	RESULTS
Water from Stream	<200 pCi thorium-232 per liter*
Sediment from Stream	12 ± 6 pCi thorium-232 per gram

The samples were analyzed on a GeLi crystal attached to a computer-based multichannel analyzer in the Region I Laboratory.

*This means there was no thorium in the water to the best of our ability to measure it.

SURVEY IN VICINITY OF
 W.R. GRACE PROPERTY, WAYNE TOWNSHIP, N.
 SURVEY PERFORMED WITH LUNUM MODEL 125
 MICRO-R-METER.
 NOVEMBER 23, 1981



SURVEY - microgram per hour	
AMBIENT DOSE RATE	DOSE RATE
1	11
2	16
3	15
4	16
5	15
6	100-200
7	50
8	14-18
9	16
10	10
11	100
SAMPLES TAKEN	
A	STREAM SEDIMENT
B	STREAM WATER

1700

Docket No. 40-00086

MEMORANDUM FOR: Victor Stello, Deputy Executive
Director for Regional Operations
and Generic Requirements

FROM: Ronald C. Haynes, Regional Administrator,
Region I

SUBJECT: W. R. Grace and Co., Wayne, New Jersey

As you requested on November 25, 1981, enclosed is Report No. 99990001/81-21 for the W. R. Grace and Co., Wayne (Pompton Plains), New Jersey.

Ronald C. Haynes
Regional Administrator,
Region I

cc w/encl: Richard C. DeYoung, Director,
Office of Inspection and
Enforcement

John G. Davis, Director,
Office of Nuclear Materials Safety
and Safeguards

Historical Background and Summary of W. R. Grace Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was reportedly conducted under contract with the AEC. In 1954, the AEC issued a license authorizing the possession, transfer and use of source material (thorium) by Rare Earths, Inc. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was one of the specified sites.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels, greater than current criteria for release for unrestricted use, and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected, which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by

an NRC inspector in this offsite area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 99990001/81-21
Docket No. 40-00086
License No. STA-422 Priority IV Category E
Licensee: W. R. Grace and Co.
Davison Chemical Division
P.O. Box 2117
Baltimore, Maryland 21203

Facility Name: W. R. Grace and Co.

Inspection at: 868 Black Oak Ridge Road, Wayne, New Jersey 07470

Inspection conducted: January 29, September 10, and November 23, 1981

Inspectors: *M. Campbell* 12/1/81
M. Campbell, Radiation Specialist date signed
F. Costello 12/1/81
F. Costello, Radiation Specialist date signed
Approved by: *J. Q. Kinneman* 12/1/81
J. Q. Kinneman, Chief, Materials Radiological date signed
Protection Section

Inspection Summary:

Inspection Conducted on January 29, September 10, and November 23, 1981
(Report No. 99990001/81-21).

Areas Inspected: - Special safety inspection to determine current radiological condition of formerly licensed site used to process thorium and rare earths. This included a review of site historical background, independent measurements of levels of radiation and concentrations of radioactive materials, and review of an aerial radiological survey. The inspection involved 12 inspector-hours by two regionally-based NRC inspectors.

Results: Buildings on the site meet current criteria for release for unrestricted use. Some areas around the buildings and offsite may not meet current criteria for release for unrestricted use. Additional surveys will be required to completely characterize the site at 868 Black Oak Ridge Road, Wayne, New Jersey and surrounding areas.

DETAILS

1. Persons Contacted

Armin Wille, P.E., Senior Facilities Engineer
Edward Heyman, General Manager, Public Relations
Leroy Zeeger, Director of Research, Electro-Nucleonics, Inc.,
(Tenant company)
Jeanette Eng, Director, Radiation Decontamination Assessment Section,
Bureau of Radiation Protection, State of New Jersey

2. Historical Background and Summary of W. R. Grace Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was reportedly conducted under contract with the AEC. In 1954, the AEC issued a license authorizing the possession, transfer and use of source material (thorium) by Rare Earths, Inc. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removeable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was one of the specified sites.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels, greater than current criteria for release for unrestricted use, and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No

radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected, which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by an NRC inspector in this offsite area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

3. Independent Measurements

a. Grounds

On January 29, 1981, an inspector surveyed the grounds of the facility, including the areas where waste containing thorium had been buried. The survey was performed with a Ludlum Model 12S micro-R-meter. The results of the survey indicated radiation levels ranging from 0.010 to 1.0 millirem per hour on the site. The survey results are included as Attachment 2 to this report.

Soil samples were taken at several locations onsite. The locations and results of the analyses of these samples are included as Attachment 3 to this report. Concentrations as high as 1200 picocuries of thorium-232 per gram of soil were found.

The inspector observed that areas of the grounds are posted with "Caution Radioactive Materials" signs, but access to these areas is not restricted.

b. Buildings

On September 10, 1981 an inspector surveyed the interior of all buildings on the W. R. Grace property. The surveys consisted of radiation level measurements made with a Ludlum Model 12S micro-R meter and smears taken on all floors to detect removable contamination. Three buildings were surveyed. With the exception of two areas, all areas surveyed had radiation levels less than 0.020 millirem per hour. A seldom used

storage area in the "North Building" had radiation levels which ranged from 0.02 to 0.1 millirem per hour. This was also the only area inside where removable contamination was detected. The amount detected was less than 100 disintegrations per minute of alpha contamination per 100 square centimeters. The radiation levels appeared to be due to the presence of a few containers of the rare earth products which were once produced at the facility. An area of the "Plastics Production Laboratory" had radiation levels as high as 0.050 millirem per hour, but this appeared to be the result of waste material buried outside the building.

4. Exit Interview

On January 29, 1981 the inspector met with the individuals listed in paragraph 1 and summarized the scope and findings of the inspection. The inspector informed the W. R. Grace representatives that it was likely that more surveys would be performed at this facility at a future date to further evaluate the radiological status of the facility. The W. R. Grace representatives provided the inspector a summary of the history of activities at this facility (Attachment 1).

5. Review of Aerial Survey

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The results of this survey are documented in the report enclosed as Attachment 4. The aerial survey identified one offsite area west of the W. R. Grace property which exhibited higher than normal background radiation levels.

On November 23, 1981, a preliminary ground survey of this off-site area was performed by an NRC inspector. The survey found radiation levels in excess of background along the stream which runs from the W. R. Grace property towards the Pompton River. The measured radiation levels ranged from 0.01 to 0.2 millirem per hour; normal background radiation levels in this area of New Jersey ranges from 0.006 to 0.016 millirem per hour. The results of this survey are documented in Attachment 5.

HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

In December, 1973, Davison Chemical engaged the service of Applied Health Physics, Inc. (AHP) to conduct a radiological survey of the entire property. Decontamination operations were begun by AHP on March 11, 1974 and continued through July 18, 1974. The goal of the work was to attain certain radioactivity limits as specified in regulations of the A.E.C. and the New Jersey State Department of Health for unrestricted use. A certified health physicist was engaged during the decontamination work as a consultant to Davison to recommend appropriate methods of removing and disposing of radioactive wastes and to provide an expert's opinion on the progress and course of decontamination, as well as to assure compliance with the regulations of the State of New Jersey and the A.E.C. A survey report, dated September 9, 1974 was sent to the A.E.C. (then Nuclear Regulatory Commission - N.R.C.) who's Region I Office of Regulatory Operations performed a confirmatory survey. In a letter dated January 22, 1975, the N.R.C. released the facilities for unrestricted use, provided that a notation be recorded in the appropriate land records indicating radioactive material has been buried on this property. This has been recorded in the land records in Passaic County.

During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

On May 14, 1977, a fire of undetermined origin swept through the main building, heavily damaging the structure. Davison had about 2/3 of the remaining building razed and only restored the front 1/3 for office space. Some of the buildings were leased to Electro-Nucleonics, Inc. (ENI) soon after cessation of operations in July 1967, and the entire real estate was leased long-term to ENI in October 1979.

From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring.

JANUARY 29, 1981
READINGS IN MICRO-R PER HOUR



ATTACHMENT 3 REPORT NO. 99990001/81-21

PAGE 1

RESULTS OF SOIL SAMPLES

Sample	Thorium-232 picocuries per gram	Uranium-238 picocuries per gram
A	30 ± 4	23 ± 1
B	1230 ± 64	60 ± 17
C	221 ± 27	39 ± 6

The samples were analyzed using GeLi detector and a computer based multichannel analyzer in the Region I Laboratory.

The most conservative current NRC criteria for release of facilities for unrestricted use requires that concentrations of thorium-232 in soil not exceed 5 picocuries per gram. (This is equivalent to a total thorium concentration of 10 picocuries per gram.)

EG&G SURVEY REPORT
NRC-8113
NOVEMBER 1981

THE
REMOTE
SENSING
LABORATORY

OF THE UNITED STATES
DEPARTMENT OF ENERGY

AN AERIAL RADIOLOGICAL SURVEY OF THE

W. R. GRACE PROPERTY

WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

DISCLAIMER

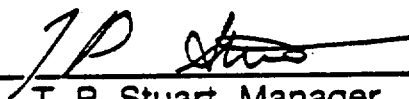
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AN AERIAL RADIOLOGICAL SURVEY OF THE
W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

T. S. Dahlstrom
Project Scientist

REVIEWED BY



T. P. Stuart, Manager
Nuclear Radiation Department

This Document is UNCLASSIFIED



G. P. Stobie
Classification Officer

ABSTRACT

During the week of 24 May 1981, an aerial radiological survey was performed over the W. R. Grace property in Wayne Township, New Jersey. The facility is occupied by a firm known as Electronucleonics, Inc. An isoradiation map was generated from the aerial data which shows increased levels of ^{205}Tl , a thorium daughter, over the burial grounds and in an area to the west believed to have resulted from subsurface water erosion of material from the burial grounds.

3 **Abstract**

Sections

7 1.0 Summary

7 2.0 Introduction

7 3.0 Background

8 4.0 Discussion and Results

Figures

9 1 Exposure Rate Isoradiation Contours

12 A-1 Gamma Pulse-Height Spectrum of Typical Background Area

12 A-2 Net Spectrum of Elevated Activity Over the Burial Ground

Appendix

9 A Survey Method, Data Analysis Equipment, Data Processing Methods and Results

11 *References*

1.0 SUMMARY

An aerial radiological survey was made during the week of 24 May 1981, of the W.R. Grace property located in Wayne Township, New Jersey. The site is occupied by Electro-nucleonics, Inc. and was formerly used to extract rare earths and thorium from monzanite sands. The property contains a 1.67 acre burial site, where building debris, sludges, and ore tailing had been buried. Average radiation levels of greater than $120 \mu\text{R/h}$ at one meter over the burial ground were inferred from the aerial data. Ground surveys over the same area indicated radiation levels of some local hot spots of 800 to $1000 \mu\text{R/h}$. These levels were all due to the thorium daughter, ^{208}Tl .

The aerial survey data also suggests there had been some subsurface contamination to the west along a stream running adjacent to the property. The maximum levels in this area were inferred to be 60 to $120 \mu\text{R/h}$ at the one meter level. The average background levels were 8 to $12 \mu\text{R/h}$ including $3.7 \mu\text{R/h}$ cosmic radiation contribution.

2.0 INTRODUCTION

The United States Department of Energy (DOE) maintains an aerial surveillance operation called the Aerial Measuring System (AMS). AMS is operated for DOE by EG&G. This continuing nationwide program, started in 1958, involves surveys to monitor radiation levels in and around facilities producing, utilizing, or storing radioactive materials. The purpose of the surveys, in general, is to document, at a given point in time, the location of all areas containing gamma-emitting radionuclides (visible at the surface) and to aid in evaluating the magnitude and spatial extent of any radioactive contaminants released into the environment. At the request of federal and state agencies, AMS is deployed for various aerial survey operations.

Aerial radiological detection systems average the radiation levels due to gamma-emitting radionuclides existing over an area of several acres. The systems are capable of detecting anomalous gamma count rates and determining the specific radionuclides causing the anomalies; however, because of averaging, they tend to underestimate the magnitude of localized sources as compared with ground-based readings. As such, the indicated radiation levels in the vicinity of anomalies are not definitive.

Ground surveys are required for accurate definition of the extent and intensity of such anomalies.

The results of the survey are reported as radiation exposure rates in microrentgens per hour ($\mu\text{R/h}$) at 1 meter above the ground surface. Approximate annual absorbed radiation dose levels expressed as millirem per year (mrem/y) are obtained by multiplying $\mu\text{R/h}$ by 8.76. This conversion number applies only to the external radiation dose component.

This report is the result of a survey requested by the Environmental Protection Agency for an area centered on the former W. R. Grace Property in Wayne Township, N.J. The preparation of the report was requested by the Nuclear Regulatory Commission.

3.0 BACKGROUND

Natural background radiation originates from radioactive elements present in the earth and cosmic rays entering the earth's atmosphere from space. The terrestrial gamma rays originate primarily from the uranium decay chain, the thorium decay chain, and radioactive potassium. Local concentrations of these nuclides produce radiation levels at the surface of the earth in the range of 1 to $15 \mu\text{R/h}$ (9 to 130 mrem/y). Some areas with high uranium and thorium concentrations in surface minerals exhibit even higher radiation levels, especially in the western states. For example, in the Colorado Plateau area the average radiation level is above 200 mrem/y. At some locations in Brazil and India, the natural radiation level is above 1000 mrem/y. One member of each of the uranium and thorium decay chains is an isotope of the noble gas, radon, which can diffuse through soil and be borne by air to other locations. Thus, the level of this airborne radiation depends on the meteorological conditions, the mineral content of the soil, the soil permeability, and other conditions existing at each location at any particular time. The airborne radiation contributes from 1 to 10% of the natural background radiation levels.

Cosmic rays (the space component) interact in a complicated manner with the elements of the earth's atmosphere and the soil. These interactions produce an additional natural source of gamma radiation. Radiation levels due to cosmic rays vary with altitude and geomagnetic

latitude: they range from 3.7 to 23 $\mu\text{R/h}$ (range of 200 mrem/y).¹ The cosmic ray contribution in Wayne Township is estimated to 3.7 $\mu\text{R/h}$.

4.0 DISCUSSION AND RESULTS

The results of the aerial survey are shown in Figure 1 as exposure rate isoradiation contours. These contours are derived from gross gamma count rates at survey altitude. The contours are overlaid on a combination of an aerial photograph and a USGS map (a single photograph of the entire survey area was unavailable). Data analysis details are given in Appendix A.

As shown in Figure 1, the natural background radiation levels generally ranged from 8 to 12 $\mu\text{R/h}$. Lower radiation levels are evident over large bodies of water where cosmic radiation dominates the background levels.

Radiation levels higher than background were found over the burial ground and over an area west of the property. These contours are shown in blue in Figure 1.

The highest radiation levels inferred from the gross gamma count rates from the aerial survey data were above 120 $\mu\text{R/h}$. However, these numbers represent levels averaged over the total field-of-view of the detector system and do not reflect small localized hot spots. Measurements taken on the ground with hand-held survey meters gave exposure rates from 800 to 1000 $\mu\text{R/h}$ in one area (about two feet in diameter) on the western boundary of the burial ground.

The spread of contamination to the west of the plant is most likely due to subsurface erosion

along the outer boundaries of a stream which runs along the eastern and southern boundaries of the property and then flows west on the opposite side of Black Oak Ridge road. The highest levels in this region (inferred from the aerial survey data) were 60 to 120 $\mu\text{R/h}$.

The blue E level contour surrounding the burial ground and the area to the west does not accurately define the boundaries of the higher radiation levels at ground level. Because the burial ground and stream exhibit relatively high level activity and are concentrated in small areas, the detectors "see" the radiation from these areas, both before the helicopter reaches them and after it has passed them.

There are additional E level contours to the west and south of the contaminated areas. However, these are most likely due to natural radiation anomalies and are not associated with the burial grounds.

A gamma ray energy spectrum was extracted from the aerial data taken over the burial ground (see appendix A). The photopeaks of the ^{208}Tl and other isotopes in the thorium decay chain dominated the spectrum.

The survey data were also processed by another method to identify those areas that contained ^{208}Tl in excess of its natural abundance. The results showed only the area contained within the blue contours. The existence of ^{208}Tl identifies the presence of thorium, which was expected to be present in the residue of monzanite sands used in the production of rare earths and thorium compounds at this facility.

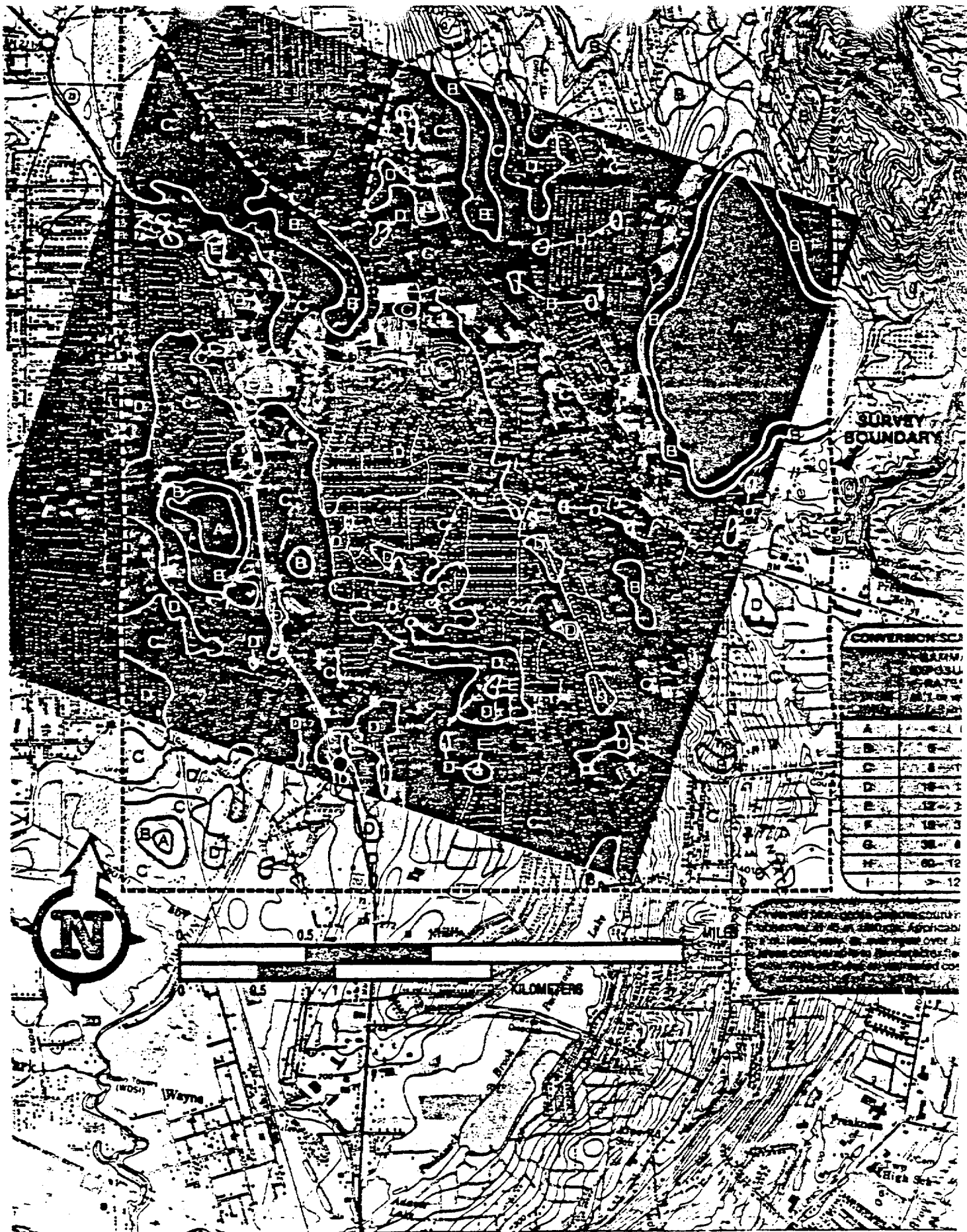


Figure 1. EXPOSURE RATE ISORADIATION CONTOURS

APPENDIX A. SURVEY METHOD, DATA ANALYSIS EQUIPMENT, DATA PROCESSING METHODS AND RESULTS

The data reported here were generated from measurements taken with an airborne system during the week of 24 May 1981. Gamma rays were detected in 12.7-cm diameter by 5.1-cm thick NaI (Tl) crystals arranged in two arrays of ten crystals each. To cover the area of interest the system was flown in a BO-105 helicopter at 45 m altitude along a series of parallel lines. Position information from a microwave ranging system was recorded on magnetic tape along with the radiation data. Correlations between the two and extractions of specific types of nuclides were effected with a computer data processing system. A description of the equipment and operating procedures can be found in References 2 and 3.

Gross Counting Rates

The gamma ray energy spectrum measured during this survey covers the range between 0.05 million electron volts (MeV) and 3 MeV. This spectrum is useful for identifying specific nuclides contributing to the total activity. The most active areas in Figure 1 were singled out for spectral examination. The nuclides responsible for the increased activity were sought by comparing background spectral data with spectral data accumulated while the aircraft was over the anomalous area. The background was taken from data gathered at positions just before or just after the anomaly (Figure 1). A typical background spectrum is shown in Figure A-1. Figure A-2 presents channel-by-channel differences between anomalous and background data. The predominant peaks are due to ^{208}Tl , a daughter of thorium.

The gross count rate isopleths (Figure 1) are based on the sum of all counts in that portion of the gamma ray energy spectrum between 0.05 MeV and 3 MeV. The terrestrial component of gross count rate and the sum of exposure rates due to soil and cosmic ray activity were produced as follows:

1. Overflight of a body of water at the survey altitude to measure the sum of count rates due to aircraft background, cosmic rays, and airborne radon daughter radionuclides.

2. Measurement of count rate over the survey area.
3. Subtraction of Item 1 from Item 2.
4. A predetermined factor obtained over a calibration range near Lake Mead was then applied to convert Item 3 above to exposure rate.

Dependent on (a) the proximity of the survey area to the body of water overflowed in Step 2, (b) the differences in topography and meteorological conditions between the areas, and (c) the differences in time between execution of the two flights, the counts resulting from Step 3 and the isopleths shown in Figure 1 may be either rich or poor in airborne radon daughter content. Daily variations in airborne radon daughter concentrations can lead to discontinuities in isopleths across boundaries between areas flown on different days. When necessary, corrections were made for this effect. The correction, based on data from a single cross-track flight, adjusted counting rates to a constant component due to the airborne radon daughter levels. Although not precisely known, this airborne radon daughter component is estimated to contribute an uncertainty of no more than 10% to the exposure rate.

The calibration described in Step 4 was done over an area containing a typical mix of naturally occurring radionuclides. The conversion factor will be in error where the mix is atypical, where man-made nuclides exist, or when airborne radon daughter contributions are not completely subtracted. The conversion factor used was 987 counts per second per $\mu\text{R/h}$ one meter above the ground.

It should be stressed that inherent spatial resolution in any remote sensing survey that uses uncollimated detectors (such as the airborne system) is one to two times the distance between the surveyed surface and the detector. Therefore, ground surveys using detectors at the one meter level will not compare well with an aerial survey over areas that contain sources whose lateral dimensions are small relative to the aircraft altitude. Isopleths constructed from a ground survey over a point source will indicate a source width of one to two meters, whereas aerial survey isopleths over the same source will indicate a source width of at least several tens of meters.

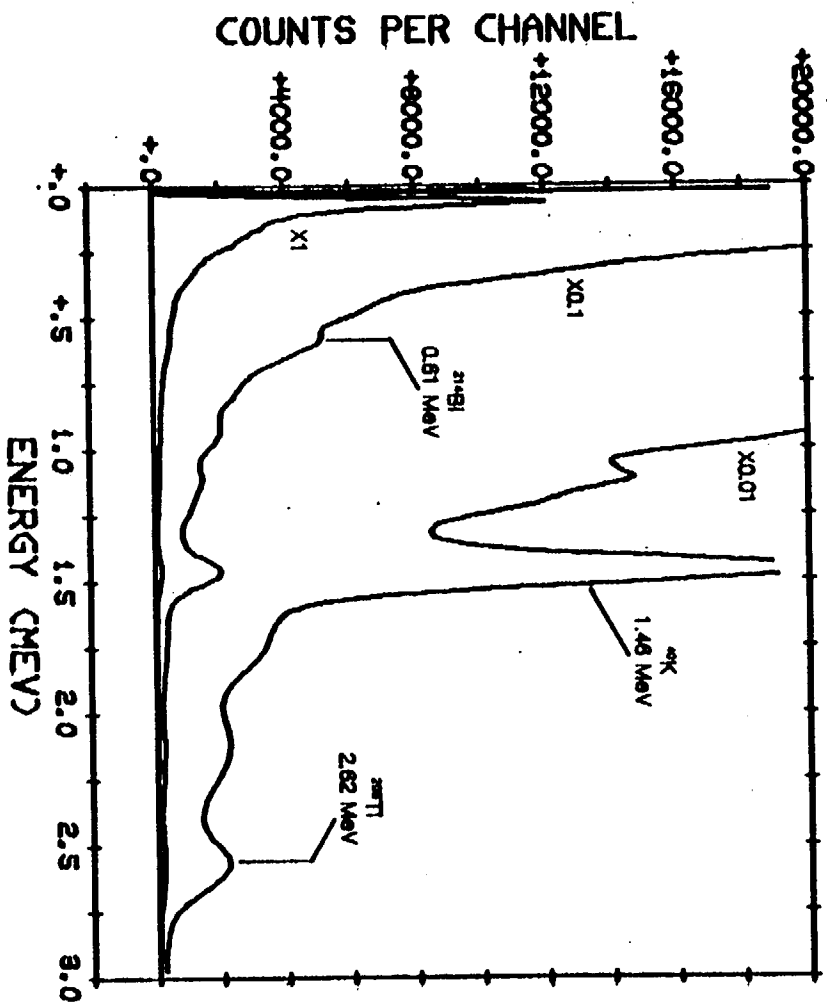


Figure A-1. GAMMA PULSE-HEIGHT SPECTRUM OF TYPICAL BACKGROUND AREA

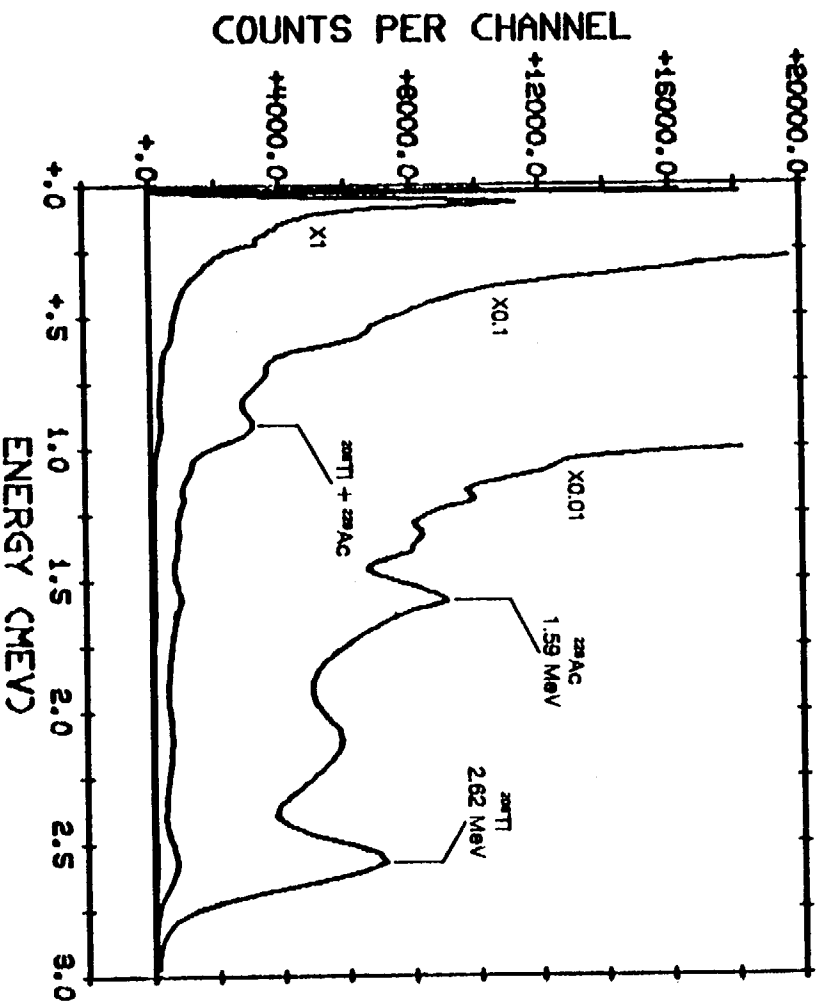


Figure A-2. NET SPECTRUM OF ELEVATED ACTIVITY OVER THE BURIAL GROUND

REFERENCES

1. Klement, A. W.; Miller, C. R.; Min, R. P.; Shieren, B. August 1972. *Estimate of Ionizing Radiation Doses in the United States 1960-2000*. U.S. EPA Report ORP/CD72-1. Washington, D.C.: Environmental Protection Agency.
2. Boyns, P. K. July 1976. *The Aerial Radiological Measuring System (ARMS): Systems, Procedures and Sensitivity (1976)*. Report No. EGG-1183-1691. Las Vegas, NV: EG&G.
3. Jobst, J. E. 1979. "The Aerial Radiological Measuring Systems Program." *Nuclear Safety* 20: 136-47.

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W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY
NRC-8113
DATES OF SURVEY: MAY 1981
DATE OF REPORT: NOVEMBER 1981

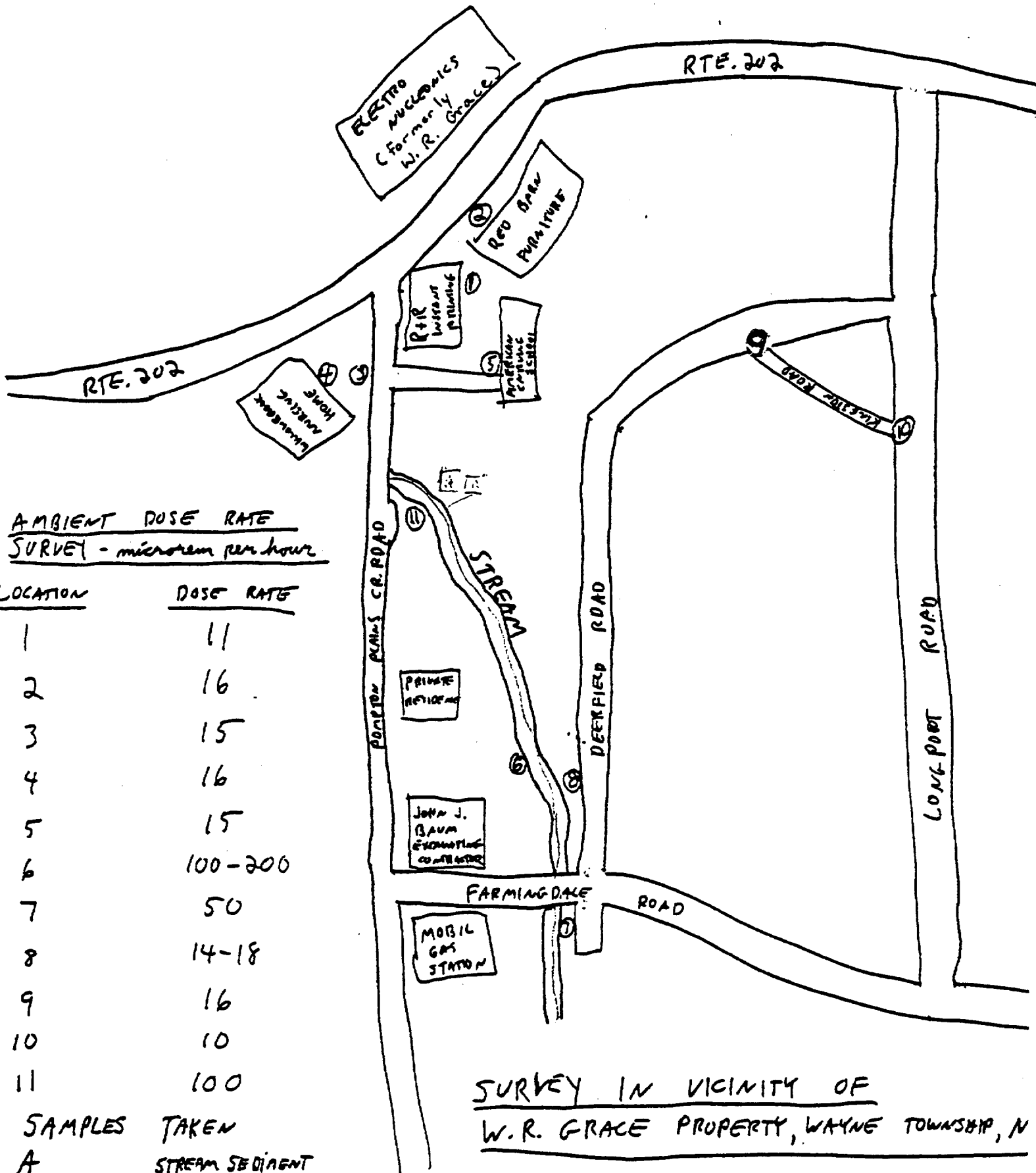
Sample Results - Area West of W. R. Grace

SAMPLE	RESULTS
Water from Stream	<200 pCi thorium-232 per liter*
Sediment from Stream	12 \pm 6 pCi thorium-232 per gram

The samples were analyzed on a GeLi crystal attached to a computer based multichannel analyzer in the Region I Laboratory.

*This is the Region I Laboratory's minimum detectable activity for this sample which means there was no thorium in the water to the best of our ability to measure it.

The most conservative current NRC criterial for release of facilities for unrestricted use requires that concentrations of thorium-232 in soil not exceed 5 picocuries per gram. (This is equivalent to a total thorium concentration of 10 picocuries per gram).



AMBIENT DOSE RATE SURVEY - microrem per hour

<u>LOCATION</u>	<u>DOSE RATE</u>
1	11
2	16
3	15
4	16
5	15
6	100-200
7	50
8	14-18
9	16
10	10
11	100

- SAMPLES TAKEN
- A STREAM SEDIMENT SAMPLE
- B STREAM WATER SAMPLE

SURVEY IN VICINITY OF W.R. GRACE PROPERTY, WAYNE TOWNSHIP, N

SURVEY PERFORMED WITH LUDLUM MODEL 125 MICRO-R-METER.

NOVEMBER 23, 1981

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 99990001/81-21
Docket No. 40-00086
License No. STA-422 Priority IV Category E
Licensee: W. R. Grace and Co.
Davison Chemical Division
P.O. Box 2117
Baltimore, Maryland 21203

Facility Name: W. R. Grace and Co.

Inspection at: 868 Black Oak Ridge Road, Wayne, New Jersey 07470

Inspection conducted: January 29, September 10, and November 23, 1981

Inspectors:

M. Campbell
M. Campbell, Radiation Specialist

12/1/81
date signed

F. Costello
F. Costello, Radiation Specialist

12/1/81
date signed

Approved by:

J. D. Kinneman
J. D. Kinneman, Chief, Materials Radiological
Protection Section

12/1/81
date signed

Inspection Summary:

Inspection Conducted on January 29, September 10, and November 23, 1981
(Report No. 99990001/81-21).

Areas Inspected: - Special safety inspection to determine current radiological condition of formerly licensed site used to process thorium and rare earths. This included a review of site historical background, independent measurements of levels of radiation and concentrations of radioactive materials, and review of an aerial radiological survey. The inspection involved 12 inspector-hours by two regionally-based NRC inspectors.

Results: Buildings on the site meet current criteria for release for unrestricted use. Some areas around the buildings and offsite may not meet current criteria for release for unrestricted use. Additional surveys will be required to completely characterize the site at 868 Black Oak Ridge Road, Wayne, New Jersey and surrounding areas.

DETAILS

1. Persons Contacted

Armin Wille, P.E., Senior Facilities Engineer
Edward Heyman, General Manager, Public Relations
Leroy Zeeger, Director of Research, Electro-Nucleonics, Inc.,
(Tenant company)
Jeanette Eng, Director, Radiation Decontamination Assessment Section,
Bureau of Radiation Protection, State of New Jersey

2. Historical Background and Summary of W. R. Grace Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was reportedly conducted under contract with the AEC. In 1954, the AEC issued a license authorizing the possession, transfer and use of source material (thorium) by Rare Earths, Inc. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removeable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

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storage area in the "North Building" had radiation levels which ranged from 0.02 to 0.1 millirem per hour. This was also the only area inside where removable contamination was detected. The amount detected was less than 100 disintegrations per minute of alpha contamination per 100 square centimeters. The radiation levels appeared to be due to the presence of a few containers of the rare earth products which were once produced at the facility. An area of the "Plastics Production Laboratory" had radiation levels as high as 0.050 millirem per hour, but this appeared to be the result of waste material buried outside the building.

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HISTORICAL BACKGROUND OF THE POMPTON
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

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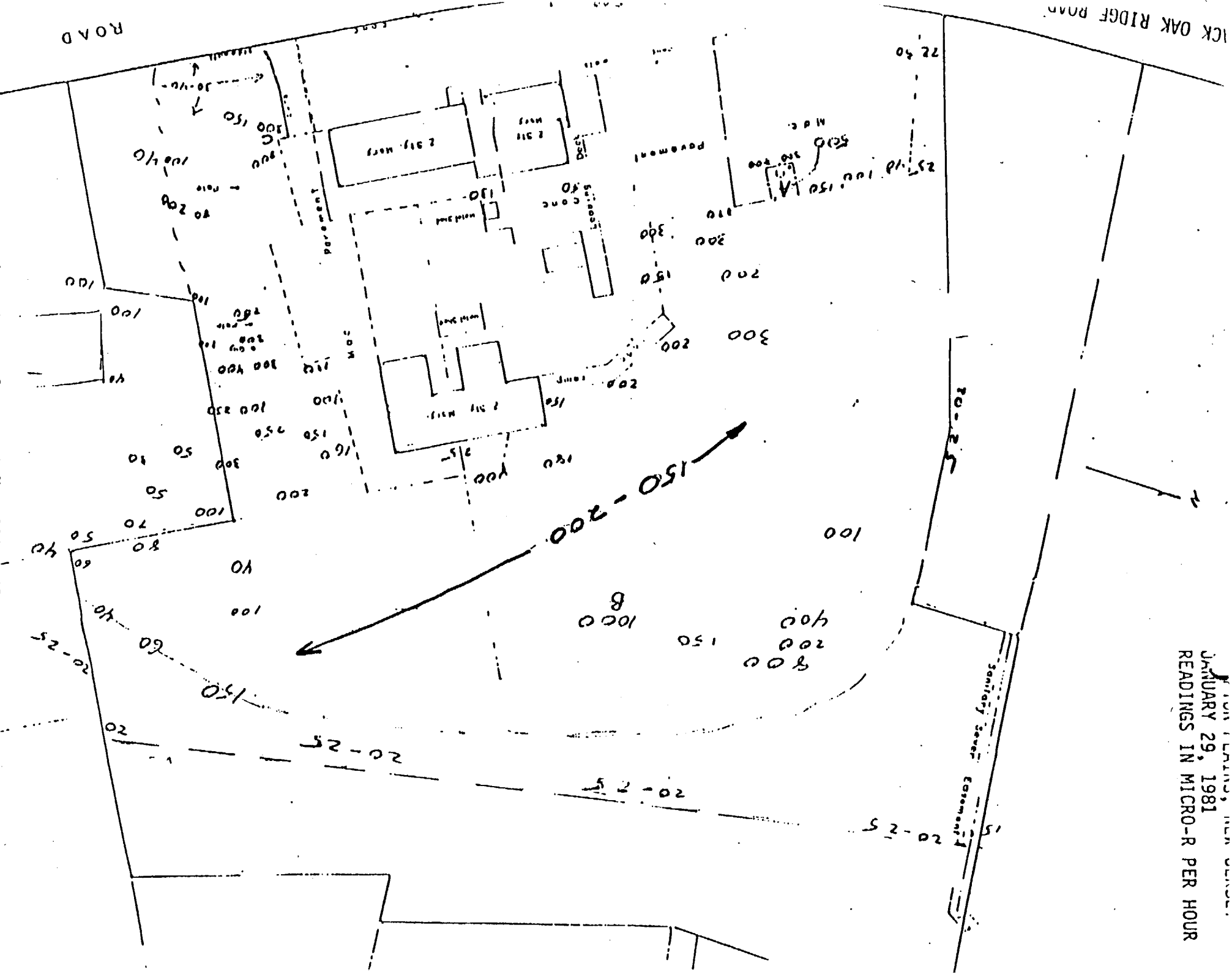
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During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

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The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring.



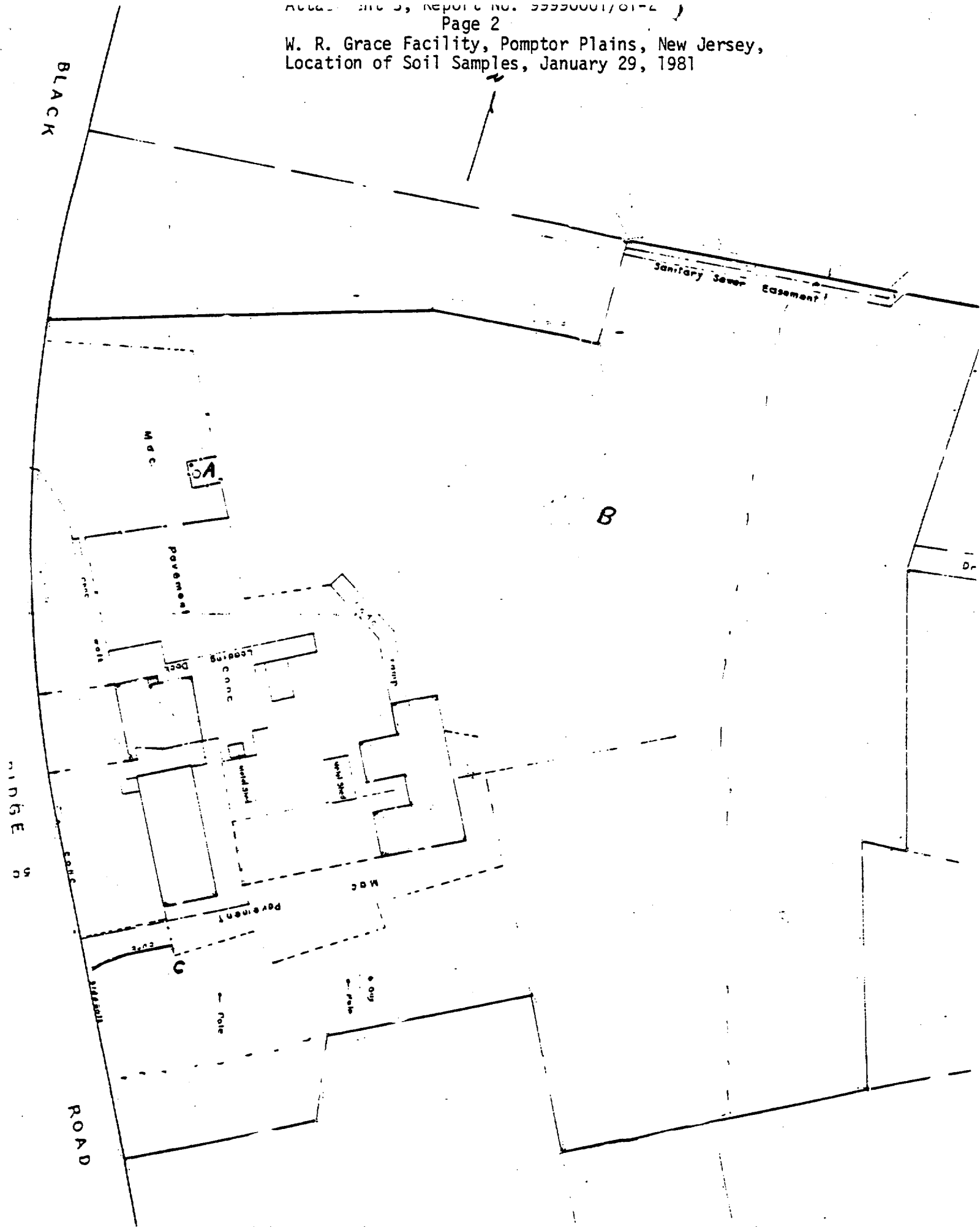
RESULTS OF SOIL SAMPLES

Sample	Thorium-232 picocuries per gram	Uranium-238 picocuries per gram
A	30 \pm 4	23 \pm 1
B	1230 \pm 64	60 \pm 17
C	221 \pm 27	39 \pm 6

The samples were analyzed using GeLi detector and a computer based multichannel analyzer in the Region I Laboratory.

The most conservative current NRC criteria for release of facilities for unrestricted use requires that concentrations of thorium-232 in soil not exceed 5 picocuries per gram. (This is equivalent to a total thorium concentration of 10 picocuries per gram.)

W. R. Grace Facility, Pompton Plains, New Jersey,
Location of Soil Samples, January 29, 1981





REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

Docket No. 40-00086


1 DEC 1981

MEMORANDUM FOR: Victor Stello, Deputy Executive
Director for Regional Operations
and Generic Requirements

FROM: Ronald C. Haynes, Regional Administrator,
Region I

SUBJECT: W. R. Grace and Co., Wayne, New Jersey

As you requested on November 25, 1981, enclosed is Report No. 99990001/81-21 for the W. R. Grace and Co., Wayne (Pompton Plains), New Jersey facility and a one page Historical Background and Summary of W. R. Grace Inspection Results.


Ronald C. Haynes
Regional Administrator,
Region I

Enclosures: 1. Report No. 99990001/81-21
2. Summary

cc w/encl: Richard C. DeYoung, Director,
Office of Inspection and
Enforcement

John G. Davis, Director,
Office of Nuclear Materials Safety
and Safeguards

ITEM # 413

B/410

Historical Background and Summary of W. R. Grace Inspection Results

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In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was one of the specified sites.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels, greater than current criteria for release for unrestricted use, and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected, which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by

an NRC inspector in this offsite area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

W.R. GRACE & COMPANY
Licensing History
Pompton Plains, New Jersey

April 1, 1954

License R-132 issued to Rare Earths, Inc., Pompton Plains, New Jersey for possession and processing of unlimited quantities of source material in monazite sand.

January 24, 1957

License R-196 issued to the Davison Chemical Division of W.R. Grace & Company for possession of unlimited quantities of thorium-containing materials at both the Pompton Plains, New Jersey and Curtis Bay, Maryland sites.

November 22, 1961

License No. STA-422 issued to the W.R. Grace & Company to possess unlimited quantities of thorium at the Pompton, New Jersey site.

April 8, 1971

License application states that all processing of thorium materials had ceased.

February 28, 1973

License No. STA-422 expired.

July 31, August 1, 2, and
September 20, 1974

Closeout inspection of License No. STA-422 indicates that an unknown quantity of waste products were buried on the property.

January 22, 1975

Property formerly licensed under License No. STA-422 released for unrestricted use.

HISTORICAL BACKGROUND OF THE POM. DN
PLAINS, NEW JERSEY FACILITY OF THE DAVISON
CHEMICAL DIVISION OF W. R. GRACE & CO.

Pursuant to a contract dated May 26, 1948 between Rare Earths, Inc. and the United States Atomic Energy Commission (A.E.C.), Rare Earths, Inc. obtained a license under the Atomic Energy Act of 1954 to possess, transfer, and use the radioactive material thorium which is defined by the U.S. Code as a "source material". In late 1956 or early 1957, this license was transferred to the Davison Chemical Division of W. R. Grace & Co. along with the assignment of the Contract issued by the A.E.C., and was in effect from the end of 1956 or from early 1957. The thorium was shipped to the Pompton Plains New Jersey plant of Rare Earths, Inc. (later Davison) as a component of monazite sand which was obtained from the A.E.C. Title to the monazite and the thorium remained in the government during the performance of work under the contract. According to the terms of the contract, at least 95% of the thorium was to be returned to the A.E.C., but the monazite gangue supposed to contain not more than 5% thorium was retained by the Company for disposition. This gangue was buried on the plant property under A.E.C. supervision at various depths.

At the expiration of the contract with the A.E.C. in June, 1956, monazite sands were purchased from foreign and domestic sources and processed to extract the so-called "rare earths" contained in the monazite for commercial sale. The A.E.C. license was changed to a "source material" license. All monazite gangue, now containing all of the thorium found in the sand, was continued to be buried at the plant site until April 30, 1971 when the plant was permanently closed.

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During the entire operations of the plant, regulatory officials of the A.E.C. and the New Jersey Health Department periodically inspected the plant. Detailed records of quantities and exact composition of the buried wastes are not available. Since the operations were under close supervision by the A.E.C., one must assume that the maximum permissible annual burial curies were not exceeded.

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From the above it should be apparent that this entire business was operated under the continued supervision and with the regular approval of the U. S. Atomic Energy Commission and in conformity with then customary safeguards. This company has at all times, complied with the law and has been careful to coordinate all of its activities with the authorities.

The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring. This employee is Mr. Armin Wille, Senior Facilities Engineer, W. R. Grace & Co., Davison Chemical Division, P.O. Box 2117, Baltimore, Maryland 21203. Telephone (301) 659-9093.

Docket No. 40-00086

1 DEC 1981

W. R. Grace and Co.
Davison Chemical Division
ATTN: Mr. Armin Wille
Senior Facilities Engineer
P.O. Box 2117
Baltimore, Maryland 21203

Gentlemen:

Subject: NRC Inspection No. 99990001/81-21

This refers to the special safety inspection conducted by Ms. M. Campbell and Mr. F. Costello of this office on January 29, September 10, and November 23, 1981 at your facility at 868 Black Oak Ridge Road, Wayne, New Jersey of activities formerly authorized by NRC License No. STA-422 and to the discussion of our findings held by Ms. Campbell with yourself at the conclusion of the inspection, and to a subsequent telephone discussion between yourself and Ms. Campbell on November 3, 1981. The purpose of this inspection was to perform a survey to evaluate the current radiological condition of this facility and the surrounding area.

Areas examined during this inspection are described in the Office of Inspection and Enforcement Inspection Report which is enclosed with this letter. Within these areas, the inspection consisted of selective examinations of procedures and records, interviews with personnel, measurements of radiation levels and concentrations of radioactive materials, review of the aerial radiological survey, and observations by the inspectors.

Additional surveys will be required to adequately characterize the radiological condition of the site and the surrounding area. As was discussed during and following the inspection, these surveys will be performed by an NRC contractor. We will contact you to make specific arrangements for the surveys.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit a written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1).

No reply to this letter is required; however, should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

ITEM # 414

Original Signed By:

Thomas T. Martin, Director,
Division of Engineering and
Technical Inspection

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ME
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mbell
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Costello
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Kinneman
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Joyner
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Martin
12/1/81

W. R. Grace and Co.

2

3-10 1981

Enclosure: Office of Inspection and Enforcement
Report No. 99990001/81-21

cc w/encl:

Public Document Room (PDR)

Nuclear Safety Information Center (NSIC)

State of New Jersey ✓

bcc w/encl:

Region I Docket Room (with concurrences)

Chief, Operational Support Section (w/o encl) ✓

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 99990001/81-21
Docket No. 40-00086
License No. STA-422 Priority IV Category E
Licensee: W. R. Grace and Co.
Davison Chemical Division
P.O. Box 2117
Baltimore, Maryland 21203

Facility Name: W. R. Grace and Co.

Inspection at: 868 Black Oak Ridge Road, Wayne, New Jersey 07470

Inspection conducted: January 29, September 10, and November 23, 1981

Inspectors: *M. Campbell* 12/1/81
M. Campbell, Radiation Specialist date signed
F. Costello 12/1/81
F. Costello, Radiation Specialist date signed
Approved by: *J. N. Kinneman* 12/1/81
J. N. Kinneman, Chief, Materials Radiological date signed
Protection Section

Inspection Summary:

Inspection Conducted on January 29, September 10, and November 23, 1981
(Report No. 99990001/81-21).

Areas Inspected: - Special safety inspection to determine current radiological condition of formerly licensed site used to process thorium and rare earths. This included a review of site historical background, independent measurements of levels of radiation and concentrations of radioactive materials, and review of an aerial radiological survey. The inspection involved 12 inspector-hours by two regionally-based NRC inspectors.

Results: Buildings on the site meet current criteria for release for unrestricted use. Some areas around the buildings and offsite may not meet current criteria for release for unrestricted use. Additional surveys will be required to completely characterize the site at 868 Black Oak Ridge Road, Wayne, New Jersey and surrounding areas.

DETAILS

1. Persons Contacted

Armin Wille, P.E., Senior Facilities Engineer
Edward Heyman, General Manager, Public Relations
Leroy Zeeger, Director of Research, Electro-Nucleonics, Inc.,
(Tenant company)
Jeanette Eng, Director, Radiation Decontamination Assessment Section,
Bureau of Radiation Protection, State of New Jersey

2. Historical Background and Summary of W. R. Grace Inspection Results

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The entire burial grounds are monitored at least twice a year by a Davison employee responsible for radiation monitoring.

ATTACHMENT 3 REPORT NO. 99990001/81-21

PAGE 1

RESULTS OF SOIL SAMPLES

Sample	Thorium-232 picocuries per gram	Uranium-238 picocuries per gram
A	30 + 4	23 + 1
B	1230 + 64	60 + 17
C	221 + 27	39 + 6

The samples were analyzed using GeLi detector and a computer based multichannel analyzer in the Region I Laboratory.

The most conservative current NRC criteria for release of facilities for unrestricted use requires that concentrations of thorium-232 in soil not exceed 5 picocuries per gram. (This is equivalent to a total thorium concentration of 10 picocuries per gram.)

W. R. Grace Facility, Pomptor Plains, New Jersey,
Location of Soil Samples, January 29, 1981



 **EG&G**
ENERGY MEASUREMENTS GROUP

EG&G SURVEY REPORT
NRC-8113
NOVEMBER 1981

THE
**REMOTE
SENSING
LABORATORY**
OF THE UNITED STATES
DEPARTMENT OF ENERGY

AN AERIAL RADIOLOGICAL SURVEY OF THE

W. R. GRACE PROPERTY

WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

DISCLAIMER

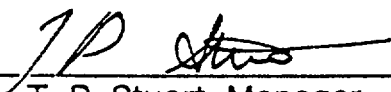
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AN AERIAL RADIOLOGICAL SURVEY OF THE
W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY

DATE OF SURVEY: MAY 1981

T. S. Dahlstrom
Project Scientist

REVIEWED BY



T. P. Stuart, Manager
Nuclear Radiation Department

This Document is UNCLASSIFIED



G. P. Stobie
Classification Officer

ABSTRACT

During the week of 24 May 1981, an aerial radiological survey was performed over the W. R. Grace property in Wayne Township, New Jersey. The facility is occupied by a firm known as Electronucleonics, Inc. An isoradiation map was generated from the aerial data which shows increased levels of ^{208}Tl , a thorium daughter, over the burial grounds and in an area to the west believed to have resulted from subsurface water erosion of material from the burial grounds.

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12 A-2 Net Spectrum of Elevated Activity Over the Burial Ground

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1.0 SUMMARY

An aerial radiological survey was made during the week of 24 May 1981, of the W.R. Grace property located in Wayne Township, New Jersey. The site is occupied by Electro-nucleonics, Inc. and was formerly used to extract rare earths and thorium from monzomite sands. The property contains a 1.67 acre burial site, where building debris, sludges, and ore tailing had been buried. Average radiation levels of greater than $120 \mu\text{R/h}$ at one meter over the burial ground were inferred from the aerial data. Ground surveys over the same area indicated radiation levels of some local hot spots of 800 to $1000 \mu\text{R/h}$. These levels were all due to the thorium daughter, ^{208}Tl .

The aerial survey data also suggests there had been some subsurface contamination to the west along a stream running adjacent to the property. The maximum levels in this area were inferred to be 60 to $120 \mu\text{R/h}$ at the one meter level. The average background levels were 8 to $12 \mu\text{R/h}$ including $3.7 \mu\text{R/h}$ cosmic radiation contribution.

2.0 INTRODUCTION

The United States Department of Energy (DOE) maintains an aerial surveillance operation called the Aerial Measuring System (AMS). AMS is operated for DOE by EG&G. This continuing nationwide program, started in 1958, involves surveys to monitor radiation levels in and around facilities producing, utilizing, or storing radioactive materials. The purpose of the surveys, in general, is to document, at a given point in time, the location of all areas containing gamma-emitting radionuclides (visible at the surface) and to aid in evaluating the magnitude and spatial extent of any radioactive contaminants released into the environment. At the request of federal and state agencies, AMS is deployed for various aerial survey operations.

Aerial radiological detection systems average the radiation levels due to gamma-emitting radionuclides existing over an area of several acres. The systems are capable of detecting anomalous gamma count rates and determining the specific radionuclides causing the anomalies; however, because of averaging, they tend to underestimate the magnitude of localized sources as compared with ground-based readings. As such, the indicated radiation levels in the vicinity of anomalies are not definitive.

Ground surveys are required for accurate definition of the extent and intensity of such anomalies.

The results of the survey are reported as radiation exposure rates in microrentgens per hour ($\mu\text{R/h}$) at 1 meter above the ground surface. Approximate annual absorbed radiation dose levels expressed as millirem per year (mrem/y) are obtained by multiplying $\mu\text{R/h}$ by 8.76. This conversion number applies only to the external radiation dose component.

This report is the result of a survey requested by the Environmental Protection Agency for an area centered on the former W. R. Grace Property in Wayne Township, N.J. The preparation of the report was requested by the Nuclear Regulatory Commission.

3.0 BACKGROUND

Natural background radiation originates from radioactive elements present in the earth and cosmic rays entering the earth's atmosphere from space. The terrestrial gamma rays originate primarily from the uranium decay chain, the thorium decay chain, and radioactive potassium. Local concentrations of these nuclides produce radiation levels at the surface of the earth in the range of 1 to $15 \mu\text{R/h}$ (9 to 130 mrem/y). Some areas with high uranium and thorium concentrations in surface minerals exhibit even higher radiation levels, especially in the western states. For example, in the Colorado Plateau area the average radiation level is above 200 mrem/y. At some locations in Brazil and India, the natural radiation level is above 1000 mrem/y. One member of each of the uranium and thorium decay chains is an isotope of the noble gas, radon, which can diffuse through soil and be borne by air to other locations. Thus, the level of this airborne radiation depends on the meteorological conditions, the mineral content of the soil, the soil permeability, and other conditions existing at each location at any particular time. The airborne radiation contributes from 1 to 10% of the natural background radiation levels.

Cosmic rays (the space component) interact in a complicated manner with the elements of the earth's atmosphere and the soil. These interactions produce an additional natural source of gamma radiation. Radiation levels due to cosmic rays vary with altitude and geomagnetic

latitude: they range from 3.7 to 23 $\mu\text{R}/\text{h}$ (up to 200 mrem/y).¹ The cosmic ray contribution in Wayne Township is estimated to 3.7 $\mu\text{R}/\text{h}$.

4.0 DISCUSSION AND RESULTS

The results of the aerial survey are shown in Figure 1 as exposure rate isoradiation contours. These contours are derived from gross gamma count rates at survey altitude. The contours are overlaid on a combination of an aerial photograph and a USGS map (a single photograph of the entire survey area was unavailable). Data analysis details are given in Appendix A.

As shown in Figure 1, the natural background radiation levels generally ranged from 8 to 12 $\mu\text{R}/\text{h}$. Lower radiation levels are evident over large bodies of water where cosmic radiation dominates the background levels.

Radiation levels higher than background were found over the burial ground and over an area west of the property. These contours are shown in blue in Figure 1.

The highest radiation levels inferred from the gross gamma count rates from the aerial survey data were above 120 $\mu\text{R}/\text{h}$. However, these numbers represent levels averaged over the total field-of-view of the detector system and do not reflect small localized hot spots. Measurements taken on the ground with hand-held survey meters gave exposure rates from 800 to 1000 $\mu\text{R}/\text{h}$ in one area (about two feet in diameter) on the western boundary of the burial ground.

The spread of contamination to the west of the plant is most likely due to subsurface erosion

along the outer boundaries of a stream which runs along the eastern and southern boundaries of the property and then flows west on the opposite side of Black Oak Ridge road. The highest levels in this region (inferred from the aerial survey data) were 60 to 120 $\mu\text{R}/\text{h}$.

The blue E level contour surrounding the burial ground and the area to the west does not accurately define the boundaries of the higher radiation levels at ground level. Because the burial ground and stream exhibit relatively high level activity and are concentrated in small areas, the detectors "see" the radiation from these areas, both before the helicopter reaches them and after it has passed them.

There are additional E level contours to the west and south of the contaminated areas. However, these are most likely due to natural radiation anomalies and are not associated with the burial grounds.

A gamma ray energy spectrum was extracted from the aerial data taken over the burial ground (see appendix A). The photopeaks of the ^{208}Tl and other isotopes in the thorium decay chain dominated the spectrum.

The survey data were also processed by another method to identify those areas that contained ^{208}Tl in excess of its natural abundance. The results showed only the area contained within the blue contours. The existence of ^{208}Tl identifies the presence of thorium, which was expected to be present in the residue of monzanite sands used in the production of rare earths and thorium compounds at this facility.



Figure 1. EXPOSURE RATE ISORADIATION CONTOURS

APPENDIX A. SURVEY METHOD, DATA ANALYSIS EQUIPMENT, DATA PROCESSING METHODS AND RESULTS

The data reported here were generated from measurements taken with an airborne system during the week of 24 May 1981. Gamma rays were detected in 12.7-cm diameter by 5.1-cm thick NaI (Tl) crystals arranged in two arrays of ten crystals each. To cover the area of interest the system was flown in a BO-105 helicopter at 45 m altitude along a series of parallel lines. Position information from a microwave ranging system was recorded on magnetic tape along with the radiation data. Correlations between the two and extractions of specific types of nuclides were effected with a computer data processing system. A description of the equipment and operating procedures can be found in References 2 and 3.

Gross Counting Rates

The gamma ray energy spectrum measured during this survey covers the range between 0.05 million electron volts (MeV) and 3 MeV. This spectrum is useful for identifying specific nuclides contributing to the total activity. The most active areas in Figure 1 were singled out for spectral examination. The nuclides responsible for the increased activity were sought by comparing background spectral data with spectral data accumulated while the aircraft was over the anomalous area. The background was taken from data gathered at positions just before or just after the anomaly (Figure 1). A typical background spectrum is shown in Figure A-1. Figure A-2 presents channel-by-channel differences between anomalous and background data. The predominant peaks are due to ^{208}Tl , a daughter of thorium.

The gross count rate isopleths (Figure 1) are based on the sum of all counts in that portion of the gamma ray energy spectrum between 0.05 MeV and 3 MeV. The terrestrial component of gross count rate and the sum of exposure rates due to soil and cosmic ray activity were produced as follows:

1. Overflight of a body of water at the survey altitude to measure the sum of count rates due to aircraft background, cosmic rays, and airborne radon daughter radionuclides.

2. Measurement of count rate over the survey area.
3. Subtraction of Item 1 from Item 2.
4. A predetermined factor obtained over a calibration range near Lake Mead was then applied to convert Item 3 above to exposure rate.

Dependent on (a) the proximity of the survey area to the body of water overflowed in Step 2, (b) the differences in topography and meteorological conditions between the areas, and (c) the differences in time between execution of the two flights, the counts resulting from Step 3 and the isopleths shown in Figure 1 may be either rich or poor in airborne radon daughter content. Daily variations in airborne radon daughter concentrations can lead to discontinuities in isopleths across boundaries between areas flown on different days. When necessary, corrections were made for this effect. The correction, based on data from a single cross-track flight, adjusted counting rates to a constant component due to the airborne radon daughter levels. Although not precisely known, this airborne radon daughter component is estimated to contribute an uncertainty of no more than 10% to the exposure rate.

The calibration described in Step 4 was done over an area containing a typical mix of naturally occurring radionuclides. The conversion factor will be in error where the mix is atypical, where man-made nuclides exist, or when airborne radon daughter contributions are not completely subtracted. The conversion factor used was 987 counts per second per $\mu\text{R/h}$ one meter above the ground.

It should be stressed that inherent spatial resolution in any remote sensing survey that uses uncollimated detectors (such as the airborne system) is one to two times the distance between the surveyed surface and the detector. Therefore, ground surveys using detectors at the one meter level will not compare well with an aerial survey over areas that contain sources whose lateral dimensions are small relative to the aircraft altitude. Isopleths constructed from a ground survey over a point source will indicate a source width of one to two meters, whereas aerial survey isopleths over the same source will indicate a source width of at least several tens of meters.

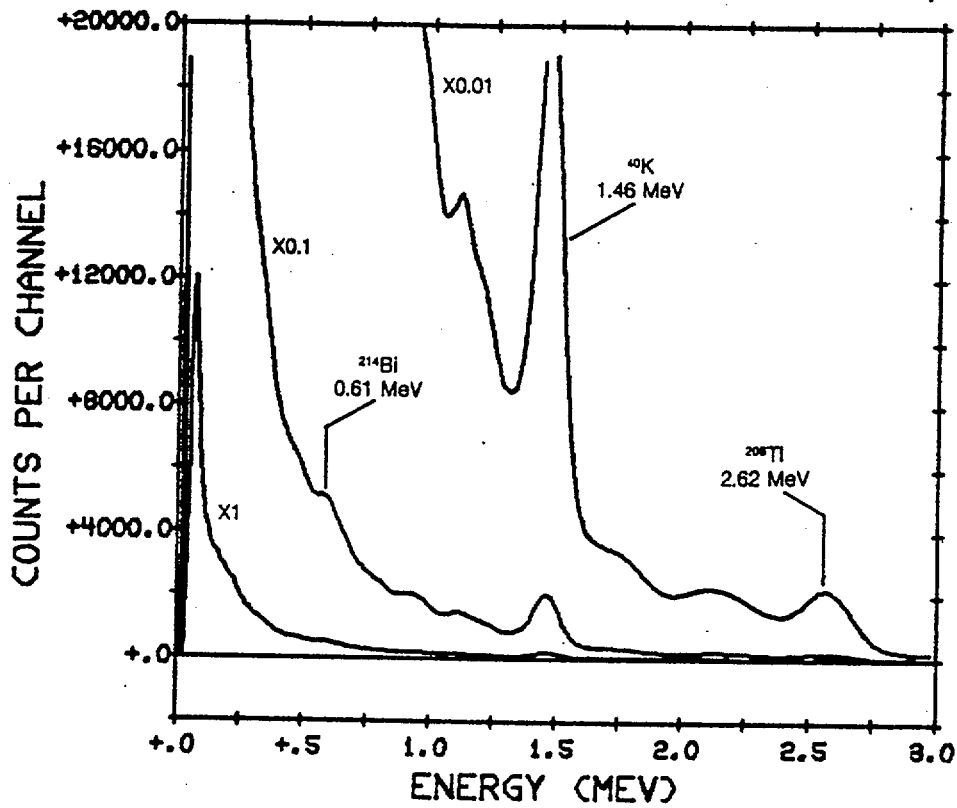


Figure A-1. GAMMA PULSE-HEIGHT SPECTRUM OF TYPICAL BACKGROUND AREA

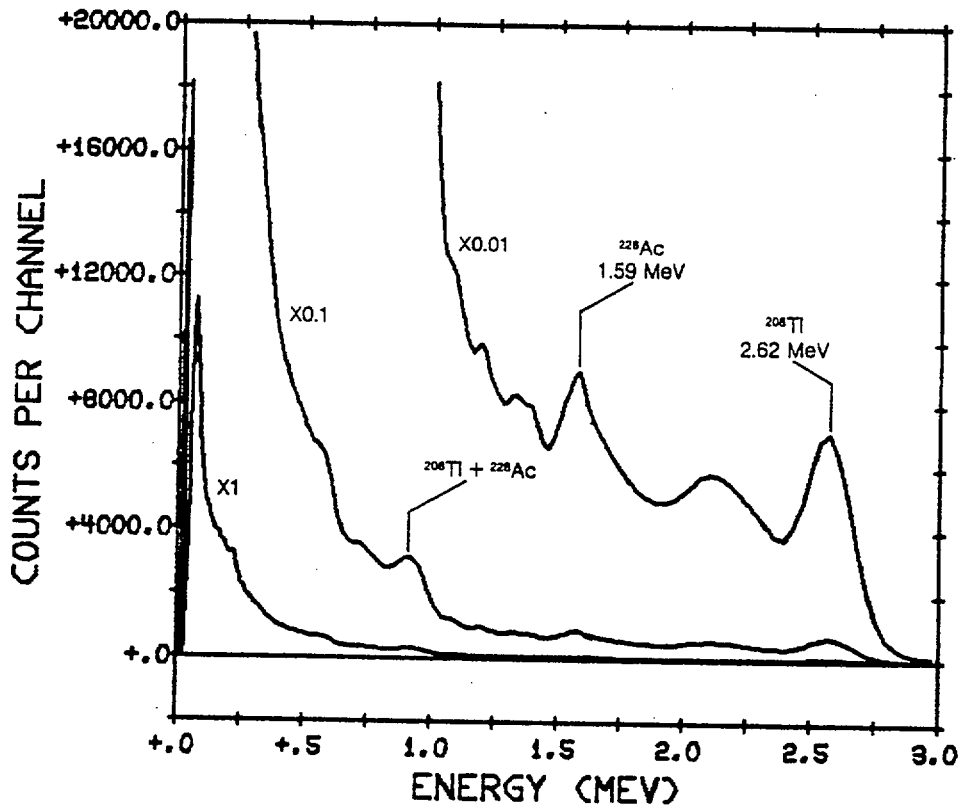


Figure A-2. NET SPECTRUM OF ELEVATED ACTIVITY OVER THE BURIAL GROUND

REFERENCES

1. Klement, A. W.; Miller, C. R.; Min, R. P.; Shleren, B. August 1972. *Estimate of Ionizing Radiation Doses in the United States 1960-2000*. U.S. EPA Report ORP/CD72-1. Washington, D.C.: Environmental Protection Agency.
2. Boyns, P. K. July 1976. *The Aerial Radiological Measuring System (ARMS): Systems, Procedures and Sensitivity (1976)*. Report No. EGG-1183-1691. Las Vegas, NV: EG&G.
3. Jobst, J. E. 1979. "The Aerial Radiological Measuring Systems Program." *Nuclear Safety* 20: 136-47.

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W. R. GRACE PROPERTY
WAYNE TOWNSHIP, NEW JERSEY
NRC-8113
DATES OF SURVEY: MAY 1981
DATE OF REPORT: NOVEMBER 1981

ATTACHMENT 5, REPORT NO. 99990001/81-21

Page 1

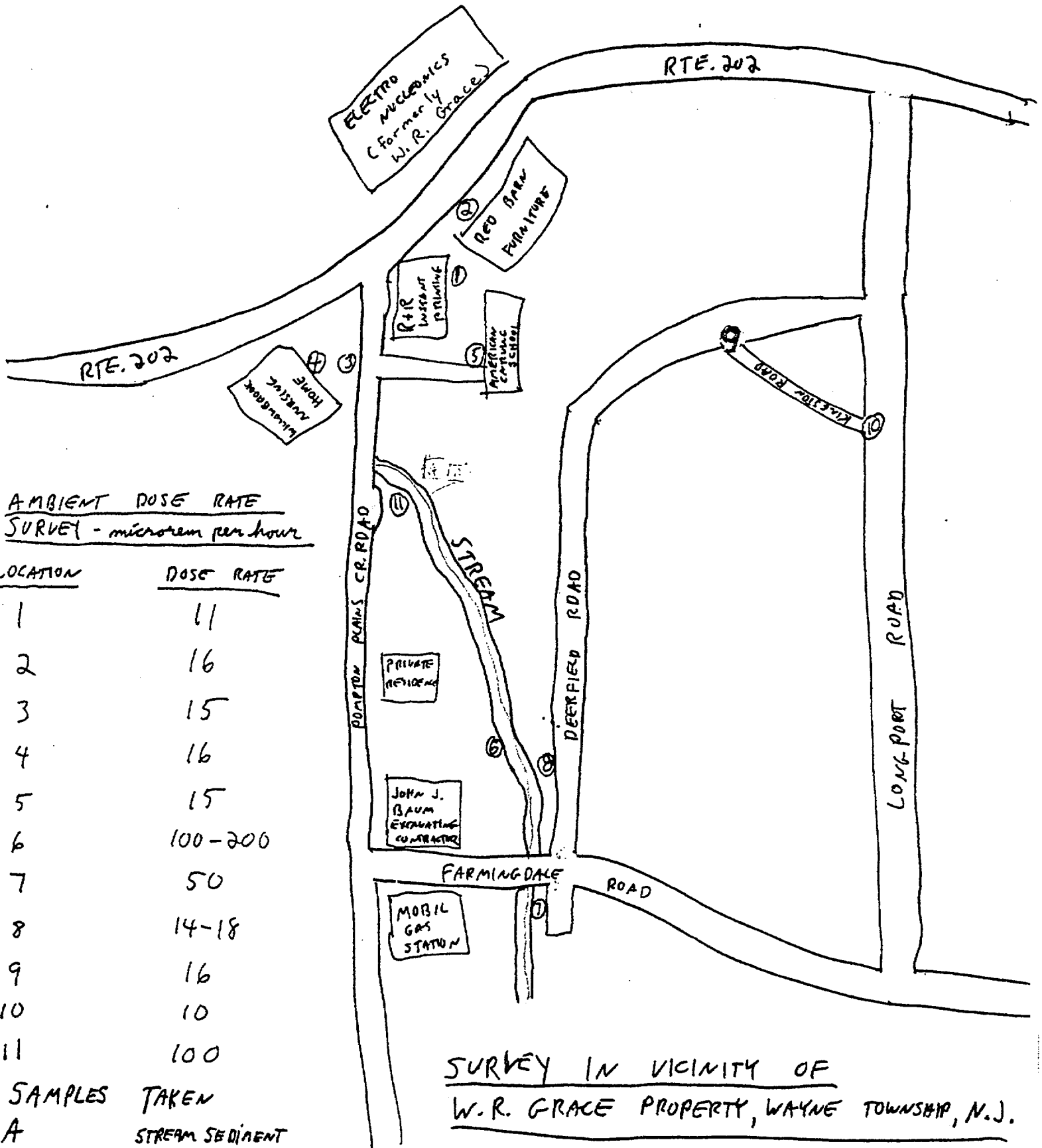
Sample Results - Area West of W. R. Grace

SAMPLE	RESULTS
Water from Stream	<200 pCi thorium-232 per liter*
Sediment from Stream	12 \pm 6 pCi thorium-232 per gram

The samples were analyzed on a GeLi crystal attached to a computer based multichannel analyzer in the Region I Laboratory.

*This is the Region I Laboratory's minimum detectable activity for this sample which means there was no thorium in the water to the best of our ability to measure it.

The most conservative current NRC criterial for release of facilities for unrestricted use requires that concentrations of thorium-232 in soil not exceed 5 picocuries per gram. (This is equivalent to a total thorium concentration of 10 picocuries per gram).



AMBIENT DOSE RATE SURVEY - microrem per hour

<u>LOCATION</u>	<u>DOSE RATE</u>
1	11
2	16
3	15
4	16
5	15
6	100-200
7	50
8	14-18
9	16
10	10
11	100

- SAMPLES TAKEN
- A STREAM SEDIMENT SAMPLE
- B STREAM WATER SAMPLE

SURVEY IN VICINITY OF W. R. GRACE PROPERTY, WAYNE TOWNSHIP, N.J.

SURVEY PERFORMED WITH LUDLUM MODEL 125 MICRO-R-METER.

NOVEMBER 23, 1981

FACSIMILE REQUEST

Date 12/1/81

MESSAGE TO: Doug Sly IE HQ - E/W

TELECOPY NUMBER: _____

NUMBER OF PAGES: 2 INCLUDING THIS REQUEST FORM

Please return to

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TRANSMITTED BY: Shawna

DATE & TIME: 12/1/81 - 10:15

VERIFIED BY: D. Sly

2

ITEM # 415 B/412

Historical Background and Summary of W. R. Grace Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was probably conducted under contract with the AEC and was licensed by the AEC in 1954. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was on the list.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels greater than current criteria for release for unrestricted use and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by an NRC inspector in this area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

Docket No. 40-00086

1 DEC 1981

MEMORANDUM FOR: Victor Stello, Deputy Executive
Director for Regional Operations
and Generic Requirements

FROM: Ronald C. Haynes, Regional Administrator,
Region I

SUBJECT: W. R. Grace and Co., Wayne, New Jersey

As you requested on November 25, 1981, enclosed is Report No. 99990001/81-21 for the W. R. Grace and Co., Wayne (Pompton Plains), New Jersey facility and a one page Historical Background and Summary of W. R. Grace Inspection Results.

Original Signed By:
Ronald C. Haynes
Regional Administrator,
Region I

Enclosures: 1. Report No. 99990001/81-21
2. Summary

cc w/encl: Richard C. DeYoung, Director,
Office of Inspection and Enforcement ✓ (AT)

John G. Davis, Director,
Office of Nuclear Materials Safety and Safeguards ✓ (AT)

4

<i>CC</i>	<i>EM</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
R1:DETI Campbell 12/1/81	R1:DETI Costello 12/1/81	R1:DETI Kinneman 12/1/81	R1:DETI Joyner 12/1/81	R1:DETI Martin 12/1/81	R1:ADRA Alan 12/1/81	R1:REG ADM. Haynes 12/1/81

B/413

ITEM # 416



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

1 DEC 1981

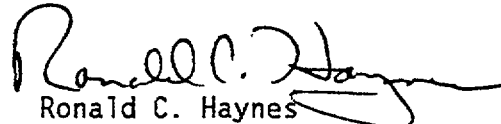
Docket No. 40-00086

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Director for Regional Operations
and Generic Requirements

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Ronald C. Haynes
Regional Administrator,
Region I

Enclosures: 1. Report No. 99990001/81-21
2. Summary

cc w/encl: Richard C. DeYoung, Director,
Office of Inspection and
Enforcement

John G. Davis, Director,
Office of Nuclear Materials Safety
and Safeguards

Historical Background and Summary of W. R. Grace Inspection Results

In approximately 1948, Rare Earths, Inc. began processing monazite sand to extract thorium and rare earth elements at Pompton Plains, New Jersey. The work was reportedly conducted under contract with the AEC. In 1954, the AEC issued a license authorizing the possession, transfer and use of source material (thorium) by Rare Earths, Inc. In 1957 this activity was taken over by the Davison Chemical Division of W. R. Grace. The processing of monazite sand at this location ceased in 1971. The processing produced large quantities of wastes containing residual thorium. In 1974, W. R. Grace hired a consultant to decontaminate the site to meet the AEC criteria for release for unrestricted use. These criteria required that average radiation levels on the ground be less than 0.2 millirem per hour and maximum levels be less than 1 millirem per hour and that removeable alpha contamination in the buildings not exceed 1000 disintegrations per minute (dpm) per 100 square centimeters. The facility was released by the NRC for unrestricted use on January 22, 1975 following a confirmatory survey. Documents supplied by W. R. Grace in support of their request for release indicated that 1600 pounds of materials slightly contaminated with thorium were buried on the site in 1974 and that 19,000 pounds of thorium had previously been buried on the site.

In August 1980, the Office of Inspection and Enforcement issued a temporary instruction which required that the regional offices review specified formerly licensed facilities to determine whether they met current criteria for unrestricted use. The W. R. Grace (Rare Earths) facility in Wayne (Pompton Plains), New Jersey was one of the specified sites.

In January 1981, a Region I inspector, accompanied by a representative of the New Jersey Bureau of Radiation Protection, conducted a survey of the site. Based on measurements made at the site and analyses of soil samples in the Regional Office Laboratory, it was concluded that surface soil contamination levels, greater than current criteria for release for unrestricted use, and elevated radiation levels exist at the site. On September 10, 1981, an NRC inspector surveyed the interior of all buildings at the site. No radiation levels in excess of 0.1 mrem/hr or contamination levels in excess of 100 dpm per 100 cm were detected, which indicates that the buildings meet current criteria for release for unrestricted use.

On May 25, 1981, an aerial radiological survey of this facility and the surrounding area was conducted by EG&G, Inc., at the request of the State of New Jersey and the U.S. Environmental Protection Agency. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey was performed by

an NRC inspector in this offsite area. The survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River. More extensive surveys on the site and in the offsite area with elevated radiation levels will be conducted in early 1982 by Oak Ridge Associated Universities under contract with the NRC's Office of Nuclear Material Safety and Safeguards.

PRELIMINARY NOTIFICATION OF EVENT OR UNUSUAL OCCURRENCE--PNO-I-81-128A

This preliminary notification constitutes EARLY notice of events of POSSIBLE safety or public interest significance. The information is as initially received without verification or evaluation, and is basically all that is known by IE staff on this date.

Facility: W. R. Grace and Company
Wayne, New Jersey
Facility Formerly Licensed
Under DN 40-00086

Licensee Emergency Classification:
 Notification of Unusual Event
 Alert
 Site Area Emergency
 General Emergency
 Not Applicable

Subject: RADIOACTIVE MATERIALS DISCOVERED OFFSITE (UPDATE)

As part of an NRC review of formerly licensed sites, in January 1981 surveys of a W. R. Grace and Company site in Wayne, New Jersey indicated that radiation levels and surface soil contamination exceed current criteria for unrestricted use. The Davison Chemical Division of W. R. Grace and Company processed monazite sand for thorium and rare earth elements at this site between 1948 and 1971. This activity was licensed by the AEC starting in 1954. In 1974, the buildings were decontaminated and the grounds were covered with clean fill so that they met then current AEC decontamination criteria. In 1975, the license was terminated by the NRC subsequent to a closeout survey.

On May 25, 1981, an aerial radiological survey of the site and the surrounding area was conducted by EG&G, Inc. The aerial survey identified one offsite area west of the site which exhibited higher than normal background radiation levels. On November 23, 1981, a preliminary ground survey found radiation levels up to 0.2 millirem per hour along the stream which runs from the W. R. Grace property towards the Pompton River.

A coordination meeting is planned for December 14, 1981 between representatives of the Department of Energy and the Nuclear Regulatory Commission, since there is a possibility that some of the thorium extraction performed at this site was under an AEC contract.

The State of New Jersey has been informed. No press release is planned by the licensee, by the State, or by Region I at this time. Notification of local officials has been delayed until after resolution of former contractual responsibilities.

CONTACT: Campbell 488-1246 Kinneman 488-1252

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~~ITEM #~~ 417
~~# WEL~~

B/4/81

11 DEC 1981

Docket No. 40-00086

U. S. Department of Energy
ATTN: Dr. William Mott, Director
Environmental and Safety
Engineering Division

EP-141
Washington, D. C. 20545

Gentlemen:

Subject: W. R. Grace Facility, Wayne (Pompton Plains), New Jersey

Region I Report No. 99990001/81-21, which contains a copy of the aerial radiological survey of the W. R. Grace and Company facility in Wayne (Pompton Plains), New Jersey is enclosed for your information. Our contractors at Oak Ridge Associated Universities are planning to perform further ground surveys starting in December 1981.

We will keep you informed of NRC activities at this site.

Sincerely,

Original Signed By:

Thomas T. Martin, Director, Division
of Engineering and Technical
Inspection

Enclosure: Region I Report No. 99990001/81-21

bcc w/encl:
Region I Docket Room (with concurrences)

<i>MM</i> R1:DETI Campbell/wb 11/25/81	<i>[Signature]</i> R1:DETI Kinneman 12/1/81	<i>[Signature]</i> R1:DETI Boyner 12/1/81	<i>[Signature]</i> R1:DETI Martin 12/1/81
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DEC 16 1981

MEMORANDUM FOR: D. Mausshardt, NMSS

FROM: H. D. Thornburg, Director
Division of Safeguards and Radiological Safety Inspection

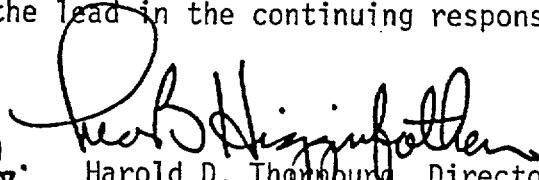
SUBJECT: W. R. GRACE SITE - POMPTON PLAINS

This is to confirm the results of our meeting on this subject on December 14, 1981. It was agreed that all parties with possible jurisdiction, along with our contractor (ORAU) should meet as soon as it can be arranged for an exchange of technical and regulatory information regarding this matter. NRC, EPA, DOE and the State of New Jersey should be represented as well as ORAU. EPA and the State of New Jersey may have valuable survey information regarding radioactivity in the creek or deposited in and along the creek. Any existing regulatory information might also be of future use to us.

ORAU could use any of the information obtained by other agencies in planning this survey. More importantly, the meeting would serve to coordinate the activities of the agencies with possible jurisdiction in this matter.

We agreed that characterization of the potential radiological risk to the public from the stream had a high priority and that this consideration should drive our response. We agreed that we should proceed in scheduling the ORAU preliminary work immediately following the coordination meeting discussed above. It was also agreed that no delays should occur because of discussions over agency jurisdiction.

I have relayed the above information to Region I for their consideration in dealing with this matter. Region I has the lead in the continuing response to this matter.

for: 
Harold D. Thornburg, Director
Division of Safeguards and Radiological
Safety Inspection

cc: J. G. Davis, NMSS
R. C. DeYoung, IE
R. Haynes, RI
R. Cunningham, NMSS
T. T. Martin, RI ✓
G. Page, NMSS



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

4
TERA
1E. HJF
File
40-00086

30 DEC 1981

Docket No. 40-00086

U.S. Environmental Protection Agency
ATTN: Dr. Joyce Feldman
Regional Radiation Representative
Region II
26 Federal Plaza
New York, New York 10007

Dear Dr. Feldman:

Subject: W. R. Grace Facility, Wayne (Pompton Plains), New Jersey

Region I Inspection Report No. 99990001/81-21 is enclosed for your information. As Ms. Campbell of this office discussed with you on December 21, 1981, we are planning to have our contractor, Oak Ridge Associated Universities, perform more detailed surveys of the area in early 1982. We will keep you informed of the schedule for this survey.

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:

JOHN D KINNEMAN
Thomas T. Martin, Director
Division of Engineering and
Technical Inspection

Enclosure: As Stated

for
RI:DETI
Campbell/grd
12/29/81

Kinneman
RI:DETI
Kinneman
12/29/81

~~RI:DETI
Martin
12/ /81~~

R1D5:1E:27



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

FEB 25 1982

Assessment Office
Township of Wayne
475 Valley Road
Wayne, New Jersey 07470

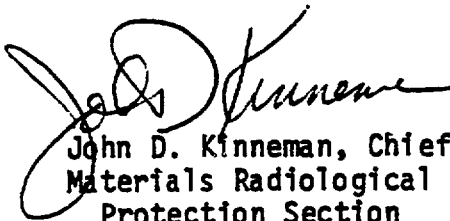
Gentlemen:

Subject: Identity of Property Owner

Please provide us with the identity of the owner of the property or properties located between Black Oak Ridge Road and the Pompton River, through which the Sheffield Brook runs. The property appears to be undeveloped, and may be a water right-of-way. It does not appear to be associated with any street address. Please contact me or Ms. M. Campbell by telephone (215-337-5252) if this is an inadequate description of the property.

Your cooperation in this matter is appreciated.

Sincerely,


John D. Kinneman, Chief
Materials Radiological
Protection Section

ITEM # 418

1/2
B/415

PRELIMINARY NOTIFICATION OF EVENT OR UNUSUAL OCCURRENCE--PNO-I-82-47

This preliminary notification constitutes EARLY notice of events of POSSIBLE safety or public interest significance. The information is as initially received, without verification or evaluation, and is basically all that is known by the Region I staff on this date.

Facility: W. R. Grace and Company
Wayne, New Jersey Facility
Formerly Licensed Under
DN 40-00086

Licensee Emergency Classification:
____ Notification of Unusual Event
____ Alert
____ Site Area Emergency
____ General Emergency
 X Not Applicable

Subject: Radioactive Materials Discovered Offsite

This updates previous Preliminary Notifications (81-128, 81-128A, and 81-128B) concerning thorium contamination on and off the W.R. Grace and Company site in Wayne, New Jersey.

On June 29, 1982, Region I was notified by the Health Officer of Pequannock Township (adjacent to Wayne, New Jersey) that radiation levels of 1.5 to 2 millirem per hour had been measured next to the nearest railroad spur (about two miles away) to the formerly licensed facility.

Measurements made by an NRC inspector on June 30, 1982 confirmed that radiation levels of up to 1 millirem per hour on contact were measured at one location along the railroad spur. Representatives of the former licensee stated that this railroad spur may have been used to ship some monazite sand to the facility, but that most of their materials were transported by truck. The highest radiation level measured offsite to date was 0.2 millirem per hour on contact. Samples of the soil in this area were taken by the NRC inspector and will be analyzed for thorium by the Region I office.

Region I has requested NMSS to have Oak Ridge Associated Universities include this area in the surveys of the W.R. Grace and Company property planned for the week of July 12, 1982.

Region I was notified of this information by a telephone call from the Region I inspector at 2:00 p.m. on June 30, 1982. The State of New Jersey has been notified.

The former licensee and Region I do not plan to issue a press release at this time. Region I will continue to respond to media inquiries regarding this site.

CONTACT: Campbell 488-1246 Joyner 488-1251

DISTRIBUTION:
Mr. St. _____ MNSB _____ Phillips _____ E/W _____ Willste _____ Mail: ADM:DMB
Chairman Palladino EDO _____ NRR _____ IE _____ NMSS _____ DOT:Trans. Only
Comm. Gilinsky PA _____ OIA _____ RES _____
Comm. Ahearne MPA _____ AEOD _____
Comm. Roberts ELD _____

ACRS _____ Air Rights _____ INPO _____
SECY _____ SP _____ NSAC _____
CA _____
PDR _____ Regional Offices _____ TMI Resident Section _____
RI Resident Office _____

ITEM # 560

Licensee: _____
(Reactor Licensees) _____



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 19 1982

NOTE TO: R. G. Page

FROM: W. T. Crow

SUBJECT: TELECON - RE: PRELIMINARY SITE VISIT TO THE W. R. GRACE FACILITY
IN POMPTON PLAINS, NEW JERSEY

On February 18, 1982, I spoke to Mr. John Kinneman, NRC Region I office, and Mr. Burton Mobley of W. R. Grace and informed them that Jim Berger (ORAU) is planning a preliminary site visit to the W. R. Grace facility on February 26, 1982 to formulate plans for a radiological survey.

Mr. Kinneman stated that he would have Myu Campbell contact ORAU to firm up a meeting place. I suggested that he may wish to contact Burton Mobley to arrange a time for a meeting with the W. R. Grace staff.

Mr. Mobley agreed with the proposed date and indicated that he has assigned this project to a Mr. Ron Mace. He suggested that he and Mr. Mace might meet with ORAU and Region I personnel at the Howard Johnson's on the evening of the 25th.

W. T. Crow

W. T. Crow

ITEM # 421

B/418

2/26/82

Myu Campbell
Jim Boyer
LEROY ZEGER
Burton Mobley
RR Mace
T. D. Tangill
Leslie W. Cole

USNRC 25 337-524
ORAN 615-576-3303
ENE (201) 835-8343
W.R. Grae 301-659-9058
WR GRACE 301 659 9059
W. R GRACE 301 659 9060
ORAN 615-576-6653

ITEM # 422

419

AT 865 BLACK OAK RIDGE Rd. WAYNE NJ. 07470

NOISE

WASHINGTON, D. C. 20535
301-452-7000

DATE 2/19/83

FACSIMILE SERVICE REQUEST

MESSAGE TO: Myu Campbell & John Kinneman, R.I.

TELECOPY NUMBER: 488-1242

AUTOMATIC: YES NO

VERIFICATION NUMBER 488-1334

NO. OF PAGES: 1 PLUS INSTRUCTION SHEET RETURN COPIES = YES ()
NO (X)

STATE & CITY King of Prussia, PA

MESSAGE FROM: W.T. Crow, AMSS

TELECOPY NUMBER: 301-427-4298 RAPIFAX AUTOMATIC

301-427-4403 3M VRC AUTOMATIC

VERIFICATION NUMBER-- 301-427-4287 MAIL ROOM #100

BUILDING Willste OFFICE PHONE 427-4510 MAIL STOP 396

CLASS OF SERVICE OVERNIGHT 4 HOUR 2 HOUR
 1 HOUR Immediate

SPECIAL INSTRUCTION

Received/Time date

Transmitted/Time-Date

B1420

ITEM # 423

99990001/81
IE: HQ

JAN 6 1982

Docket No. 99990001/81-21

W. R. Grace and Co.
Davison Chemical Division
ATTN: Mr. Armin Wille
Senior Facilities Engineer
P. O. Box 2117
Baltimore, Maryland 21203

Gentlemen:

Subject: Inspection 99990001/81-21

This refers to your letter dated December 11, 1981, in response to our letter dated December 3, 1981.

Thank you for the information documented in your letter. Your letter will be sent to the Public Document Room with the copy of our letter and the Inspection Report, to assure that the public record is complete.

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:

Thomas T. Martin, Director,
Division of Engineering and
Technical Inspection

cc:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
State of New Jersey ✓

bcc:
Region I Docket Room (with concurrences)

[Signature]
RI:DE&TI
Campbell/pja
1/4/82

[Signature]
RI:DE&TI
Kinneman
1/4/82

[Signature]
RI:DE&TI
Martin
1/5/82

01421

IE 07

ITEM # 424

151

GRACE

Davison Chemical Division

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

(301) 659-9000
Direct Dial (301)

December 11, 1981

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

Attn: Mr. Thomas T. Martin, Director
Division of Engineering and Technical Inspection

Dear Mr. Martin,

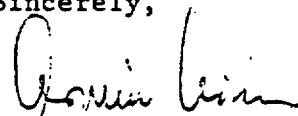
This letter confirms our telephone conversation of December 10, 1981 regarding your letter of December 3, 1981 along with NRC Inspection No. 99990001/81-21 of our property at 868 Black Oak Ridge Road, Wayne, New Jersey. We do not find information of a proprietary nature in this report as defined in 10 CFR 2.790(b)(1) and therefore will not apply to withhold information contained in the report.

We have carefully reviewed the inspection report as well as the EG&G aerial radiological survey and have noted the following inaccuracies and errors:

1. Page 3, paragraph 3a. - "The inspector observed that areas of the grounds are posted with "Caution Radioactive Materials" signs, but access to these areas is not restricted." Signs are posted conspicuously on the inside of the property all along the boundary of the burial site as well as on the outside of the chainlink fence that surrounds the property. These signs read, "Caution Radioactive Material Buried Here". In addition, access to these areas is restricted to the general public by virtue of the aforementioned industrial-type fence and gates which are kept locked at all times except for two gates which are opened by the lessee during normal business hours to allow their employees access to their workplace.
2. EG&G Aerial Survey, Abstract -"in an area to the west believed to have resulted from subsurface water erosion of material from the burial grounds." We feel very strongly that this statement contains a technical error and an erroneous assumption. "Subsurface water erosion" technically cannot happen and we believe that the levels of Thallium 208 resulted from process up-sets of the former plant's waste water treatment plant. Furthermore, we believe that using the above terms could be misconstrued by the public through the press to imply a flow of sub-surface water through the burial site and into the creek. This could unnecessarily cause unfounded concerns by the nearby residents and businesses.

We appreciate the opportunity to comment on the report and would be pleased to discuss any other points with you.

Sincerely,



Armin Wille, P.E.
Sr. Facilities Engineer

ITEM # 425

B/422

140
AW/cm

0

3

GRACE

Davison Chemical Division

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

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

December 8, 1981

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

Attn: Ms. Myu A. Campbell

Dear Ms. Campbell,

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

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

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

Sincerely,



Armin Wille
Sr. Facilities Engineer

02

AW/cm

Enclosures

B/423

ITEM # 426

146

19

This document consists of 6 pages
No. 3 of 7 copies, Series A.

CONTRACT NO. AT(30-1)-1037

CONTRACT

CONTRACTOR AND ADDRESS:

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

CONTRACT FOR:

PURCHASE OF MATERIALS

ESTIMATED CONTRACT PRICE:

\$22,500.00

PAYMENT: To be made by:

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

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

WITNESSETH THAT:

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

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

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

ARTICLE I - SCOPE OF THE WORK

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

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

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

ARTICLE II - SPECIFICATIONS

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

ARTICLE III - DELIVERY AND SHIPMENT

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

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

ARTICLE IV - PAYMENTS

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

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

ARTICLE V - CHANGES

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

ARTICLE VI - NOTICE OF SHIPMENTS

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

ARTICLE VII - ASSIGNMENT OR TRANSFER

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

ARTICLE VIII - DISPUTES

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

ARTICLE IX - DISCLOSURE OF INFORMATION

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

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

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

ARTICLE X - INSPECTION AND REPORTS

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

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

ARTICLE XI - RESPONSIBILITY FOR SUPPLIES TENDERED

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

ARTICLE XII - SUBCONTRACTS

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

ARTICLE XIII - COVENANT AGAINST CONTINGENT FEES

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

ARTICLE XIV - OFFICIALS NOT TO BENEFIT

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

ARTICLE XV - EIGHT-HOUR LAW

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

ARTICLE XVI - DEFINITIONS

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

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

THE UNITED STATES OF AMERICA

Witnesses:

By: UNITED STATES ATOMIC ENERGY COMMISSION

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

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

Charles P. Meitzger
CHARLES P. MEITZGER
51 Clinton Ave. Albany, N.Y.
(Address)

RARE EARTHS, INC.

By: Henry J. Mandlo
Title: Pres.

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

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

(Corporate Seal)

Richard L Stone

ENG. FILE

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

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

AMENDMENT NO. 1

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

JUN 29 1951

Encl

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

WITNESSETH THAT:

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

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

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

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

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

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

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

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

UNITED STATES OF AMERICA

By: UNITED STATES ATOMIC ENERGY COMMISSION

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

Witnesses:

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

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

RARE EARTHS, INC.

By: Henry H. Mandle
Title: President

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

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

(Corporate Seal)

Richard M Mandle
Richard M Mandle

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

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

AMENDMENT NO. 2

CONTRACTOR AND ADDRESS:

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

AMENDMENT FOR:

CHANGE IN SPECIFICATIONS

Encl 1

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

WITNESSETH THAT:

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

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

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

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

1. Delete Article II and substitute the following therefor:

"ARTICLE II - SPECIFICATIONS

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

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

"ARTICLE XIII - COVENANT AGAINST CONTINGENT FEES

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

"ARTICLE XV - EIGHT-HOUR LAW

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

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

Witnesses:

Hilda May Breen
Hilda May Breen
Box 196, R.D. 4, Paterson, N.J.
(Address)

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

UNITED STATES OF AMERICA

BY: UNITED STATES ATOMIC ENERGY COMMISSION

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

RARE EARTHS, INC.

By: Richard L. Stone
Richard L. Stone

Title: Vice-President

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

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

(Corporate Seal)

Richard M. Mandle
Richard M. Mandle, Assistant Secretary

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

Loggins 7/24/52 HMB

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

File - AEC - Sales

AMENDMENT No. 3

CONTRACTOR AND ADDRESS:

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

AMENDMENT FOR:

EXTENSION OF CONTRACT TERM.

INCREASE IN COMMISSION
OBLIGATION:

\$32,400.00

TOTAL COMMISSION OBLIGATION:

\$84,900.00

PAYMENT TO BE MADE BY:

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

CONTRACT No. AT(30-1)-1037, Amend. No. 3.

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

WITNESSETH THAT:

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

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

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

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

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

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

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

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

"ARTICLE IX - DISCLOSURE OF INFORMATION

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

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

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

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

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

"ARTICLE XV - EIGHT-HOUR LAW

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

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

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

"ARTICLE XVII - CONVICT LABOR

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

"ARTICLE XVIII - DOMESTIC ARTICLES

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

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

"ARTICLE XIX - RENEGOTIATION

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

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

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

THE UNITED STATES OF AMERICA

By: UNITED STATES ATOMIC ENERGY COMMISSION

H. B. Fry

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

Witnesses:

Ruth Tank

Pulis Avenue
Franklin Lakes, N. J.

Helen H. Bree

Box 4960, R. D. 4
Paterson, N. J.

RARE EARTHS, INC.

By: *Richard L. Stone*

Title: *Vice President*

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

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



Richard M. Mandle

(Corporate Seal)

31 Pages
Appendix of

This document consists of 25 pages. No. 3 of 11. Series A.

CONTRACT NO. AT(29-6)-993

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

WITNESSETH THAT:

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

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

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

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

ARTICLE I - SCOPE OF THE WORK

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

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

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

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

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

ARTICLE II - SPECIFICATIONS AND RECOVERY

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

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

ARTICLE III - WEIGHING, SAMPLING AND ANALYSING

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

ARTICLE IV - PAYMENTS

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

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

(3) Adjustments:

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

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

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

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

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

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

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

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

ARTICLE V - CHANGES

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

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

ARTICLE VI - DISPUTES

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

ARTICLE VII - ASSIGNMENT

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

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

ARTICLE VIII - EXAMINATION OF RECORDS

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

ARTICLE IX - INSPECTION OF CONTRACTOR'S ACTIVITIES, REPORTS

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

ARTICLE X - SECURITY

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

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

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

ARTICLE XI - SUBCONTRACTS

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

ARTICLE XII - LABOR

- (1) Eight Hour Laws

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

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

(2) Walsh-Horley Public Contracts Act

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

(3) Convict Labor

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

(4) Nondiscrimination

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

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

ARTICLE XIII - PATENTS

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

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

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

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

ARTICLE XIV - TAXES

(1) Definitions

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

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

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

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

(2) Federal Taxes.

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

(3) State or Local Taxes.

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

(4) Evidence of Exemption.

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

(5) Price Adjustment.

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

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

(6) Refund or Drawback

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

ARTICLE XV - GOVERNMENT AGAINST CONTINGENT FEES

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

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

ARTICLE XVI - OFFICIALS NOT TO BENEFIT

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

ARTICLE XVII - BUY AMERICAN ACT

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

ARTICLE XVII - PROPERTY

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

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

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

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

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

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

ARTICLE XIX - TERMINATION FOR DEFAULT

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

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

of this contract entitled "Disputes."

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

ARTICLE XX - TERMINATION FOR CONVENIENCE OF THE GOVERNMENT

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

shall be made as follows:

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

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

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

ARTICLE XXI - DEFINITIONS

(1) As used in this contract:

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

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

THE UNITED STATES OF AMERICA

BY: UNITED STATES ATOMIC ENERGY COMMISSION

Date of Signing by the Commission

July 18, 1955

Jane Johnson
Director, Division of Raw Materials

RARE EARTHS, INC.

Witnesses:

Pete J. Harris, President, R.E. BY: *Richard L. Stone* *Richard M. Merrill*
Peter J. Colli, General Mgr. TITLE: *Vice Pres.* *Vice Pres.*

Date of Signing by Rare Earths, Inc.

July 16, 1955

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

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

Harry C. Helmsinger



APPENDIX

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APPENDIX "A"

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

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

Average ThO₂ content $\frac{470.3}{7923}$ = 5.9%

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

APPENDIX "B-1"
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SAMPLING PROCEDURE

FOR
MONAZITE SAND

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

Weighing

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

Sampling

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

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

Sample Preparation

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

1. Secondary Sample

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

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2. Official Moisture Determination

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

3. Grind to -20 Mesh

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

4. Blending and Size Reduction

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

5. Grind to -150 Mesh

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

6. Blending of Final Sample

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

7. Final Bottling of Sample

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

8. Sample Distribution

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

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

APPENDIX "B-2"

ANALYTICAL PROCEDURE FOR THE
CHEMICAL ANALYSIS OF MONAZITE SAND

Principle

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

Reagents Required

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

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

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

Step II Procedure for Decomposition of Monazite Sand

In duplicate, accurately weigh 5 grams of the ground prepared sample and transfer to clean, dry 140 ml. porcelain casseroles. To each, add 15 ml. of c.p. H_2SO_4 and stir constantly to prevent caking as the temperature of the mixture is brought up to gentle evolution of SO_3 fumes. Cover the casserole with a watch glass and maintain the temperature at gentle fuming for $1\frac{1}{2}$ hours.

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

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

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

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

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

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

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

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

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

Step IV Separation of Thorium from the Rare Earths

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

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

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

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

Step V Determination of Rare Earth Oxides

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

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

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

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

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

APPENDIX "B-3"

PROCEDURE FOR RESOLVING
DIFFERENCES-MONAZITE SAND.

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

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

APPENDIX "C-1"
SAMPLING PROCEDURE FOR
RARE EARTHS SODIUM SULFATE

Sampling

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

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

Official Sample

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

Sample Preparation

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

1. Secondary Sample

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

2. Moisture Determination

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

3. Grinding

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

4. Blending and Bottling of Official Samples

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

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

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

5. Weighing

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

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

6. Retention of Samples

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

ANALYTICAL PROCEDURE FOR THE CHEMICAL ANALYSIS
OF RARE EARTH SODIUM SULFATES

Principle

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

Reagents Required

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

Step I Determination of Moisture on Prepared Sample

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

Step II Determination of Thorium Oxide

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

.3 grams of sodium meta bisulfite crystals and heat to 60 - 70°C. Remove from the heater, and while stirring, slowly add 2% hexamine solution until a turbidity is just produced and 2 ml. in excess. Allow to stand at 70°C for 30 minutes or until coagulation occurs. Add 1 ml. of 2% hexamine to the clear supernatant liquid. If no turbidity occurs, precipitation of thorium is complete. Stir and allow the precipitate to settle, and filter thru #40 Whatman paper. Wash with 5% NH₄Cl solution which has been made neutral to methyl orange indicator. Save the filtrate in a 600 ml. pyrex beaker for the determination of rare earths as directed in Step III.

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

Dissolve the precipitate with hot 1 + 1 HCl and wash the filter with hot 5% HCl. Collect the filtrate and washings in a 250 ml. volumetric flask. Cool to room temperature and dilute to volume. Mix and transfer a 25 ml. aliquot of the solution to a 50 ml. pyrex beaker. Adjust the pH of the solution to 1 ± .5 with NH₄OH and/or HCl, and transfer the solution to a 50 ml. volumetric flask. Add 10 ml. of 95% ethyl alcohol and 2 ml. of .1% water solution of thoron reagent. Dilute to volume with water, mix, and read the optical density of the solution in the Beckman Du Spectrophotometer at 545 mμ wave length. From the calibration curve, determine the thorium content of the sample. Calculate to ThO₂ dry basis using the average moisture found in Step I. Prepare a standard calibration curve with each set of samples run by preparing a series of solutions containing zero-10-20-40-60 and 80 micrograms of thorium. Add to each, 10 ml. 75% ethyl alcohol, 2 ml. thoron reagent and 2 ml. HCl, and dilute to 50 ml. volume.

Step III Determination of Rare Earth Oxides

Heat the combined filtrates from the two hexamine separations contained in a 600 ml. beaker to near boiling and precipitate by addition of NH₄OH. Add 10% excess NH₄OH by volume and allow to cool in the water bath as the precipitate settles. Filter thru #40 Whatman paper, washing with cool 2% NH₄Cl - 10% NH₄OH solution several times.

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

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

$$\frac{\text{Weight per cent as determined}}{100 - \text{per cent moisture on prepared sample}} \times 100 = \text{Wt. \% Rare Earth Oxides on dry basis.}$$

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

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APPENDIX "C-3"

SPECIFICATIONS OF RARE

EARTHS SODIUM SULFATE

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

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

42.0% min.

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

0.25% max.

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

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APPENDIX "C-4"

PROCEDURE FOR RESOLVING DIFFERENCES

THORIUM AND RARE EARTHS OXIDE CONTENT

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

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

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

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

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

APPENDIX "D-1"

SAMPLING PROCEDURE FOR
THORIUM HYDRATE PRODUCT

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

Daily Sampling

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

Composite Sample

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

Sample Preparation

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

1. Secondary Sample

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

2. Moisture Determination

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

3. Grinding to -100 Mesh

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

4. Blending and Bottling

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

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

5. Weighing

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

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

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

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

APPENDIX "D-2"

ANALYTICAL PROCEDURE FOR THE CHEMICAL

ANALYSIS OF THORIUM HYDROXIDE

Principle

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

C. P. Reagents Required

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

Step I Determination of Moisture on the Dry Prepared Sample

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

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

Step II Determination of the Nitric Acid Insoluble Matter

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

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

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

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

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

Step IV Separation of Thorium From the Rare Earths

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

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

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

Step V Determination of Rare Earths

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

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

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

~~OFFICIAL USE ONLY~~

~~OFFICIAL USE ONLY~~Step VI Determination of Sulfates

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

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

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

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

Step VII Determination of Phosphorus

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

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

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

Preparation of Ammonium Molybdate Solution

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

~~OFFICIAL USE ONLY~~

Step VIII Determination of Chlorides

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

Standardization of Nephelometer

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

Reagents required and preparation of Standard Curve.

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

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

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

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

Analytical Procedure

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

Step IX Determination of Fluorine

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

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

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

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

Preparation of the Standard Curve

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

OFFICIAL USE ONLY

APPENDIX "D-3"

SPECIFICATIONS OF

THORIUM PRODUCT

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

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

OFFICIAL USE ONLY

APPENDIX "D-4"

PROCEDURE FOR RESOLVING
DIFFERENCES--THORIUM HYDRATE PRODUCT

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

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

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

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

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

Cy No. 3.

CONTRACT NO. AT(49-6)-993
Amendment No. 1

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

WITNESSETH THAT:

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

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

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

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

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

1. W. R. Grace & Co. hereby becomes a party to Contract No. AT(49-6)-993 in the place of Rare Earths, Inc. and undertakes to perform according to the terms and provisions thereof the work heretofore required to be performed by Rare Earths, Inc. and remaining unperformed on the effective date of this amendment.

2. Rare Earths, Inc., hereby waives any and all rights that it may have against the Commission or the Government under Contract No. AT(49-6)-993 and consents to the substitution of W. R. Grace & Co. as contracting party thereto in its place.

3. W. R. Grace & Co., as successor to Rare Earths, Inc., hereby succeeds to all of the rights and privileges and assumes all of the obligations and liabilities of Rare Earths, Inc. under Contract No. AT(49-6)-993 to the same extent as if W. R. Grace & Co. and not Rare Earths, Inc. had been the original contracting party with the Commission under the contract; and wherever the term "Rare Earths, Inc." appears in Contract No. AT(49-6)-993 the term "W. R. Grace & Co." shall be substituted therefor.

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

THE UNITED STATES OF AMERICA

WITNESSES:

Walter D. Hall, Jr.
James M. Creamer

By: UNITED STATES ATOMIC ENERGY COMMISSION

Title: James M. Creamer
Director, Division of Raw Materials
Date: January 16, 1957

WITNESSES:

R.S. Clark
Edith B. Schmincke

RARE EARTHS, INC.

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

WITNESSES:

James W. Cook
John C. Baker

W. R. GRACE & CO.

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

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

WITNESS my hand and the seal of said corporation.

R.S. Clark

R. S. Clark

(Corporate Seal)

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

WITNESS my hand and the seal of said corporation.

M.C. Roop

M. C. Roop

(Corporate Seal)

*Agreement file
to amendment will
m.p.*

Y

CONTRACT NO. AT(49-6)-993
Amendment No. 2

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

WITNESSETH THAT:

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

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

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

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

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

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

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

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

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

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

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

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

WITNESSES: THE UNITED STATES OF AMERICA
By: UNITED STATES ATOMIC ENERGY COMMISSION
Madge J. Halliday
Eve D. Petros Title: Director, Division of Raw Materials

WITNESSES: W. R. GRACE & CO.
By: Messing
Elizabeth B. Griffin
David P. Bennett Title: Executive Vice President

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

WITNESS my hand and the seal of said corporation.

MCRoop

(Corporate Seal)

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

MJBerger 5/5/78

Copy 2 file (Contract Side)

Copy No. 2

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

SUPPLEMENTAL AGREEMENT

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

WITNESSETH THAT:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

WITNESSES:

Loakie N. Clark
Patricia M. Bennett

WITNESSES:

H. B. Beyer
E. S. Schlegel

THE UNITED STATES OF AMERICA

BY: UNITED STATES ATOMIC ENERGY COMMISSION

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

W. R. GRACE & CO.

By: [Signature] *swj*
 Title: Executive Vice Presidents

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

WITNESS my hand and the seal of said corporation.

W. A. Case

(Corporate Seal)

