

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

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.

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 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 125 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 0.7 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.

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

