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PROPOSED RADIOLOGICAL SURVEY PLAN

W.R. GRACE PROPERTY
POMPTON PLAINS, NEW JERSEY

A-153

I. Site History and Description

In approximately 1948, Rare Earths, Inc., of Pompton Plains, New Jersey (Figure 1), began processing monazite sand to extract thorium and rare earths. This operation was taken over by the Davison Chemical Division of W.R. Grace in 1957, which continued the thorium ore processing activities until operations ceased in July 1967. The plant was permanently closed in April 1971. In 1974, Applied Health Physics, Inc., decontaminated the site and the property was released by the NRC for unrestricted use in January 1975. On May 14, 1977, the main building was heavily damaged by fire and most of the early records were destroyed. A portion of the damaged building has been restored and the buildings are currently occupied by Electro-Nucleonics, Inc., under a long-term lease. Figure 2 is a current view of the plant.

The W.R. Grace property is located on Black Oak Ridge Road, approximately 3 km north of Wayne, and 2 km east of Pompton Plains, New Jersey. It occupies about 2.6 hectares. There are three main structures, two office buildings and a warehouse. The land area not occupied by buildings, parking lots, and other paved areas, is gently sloping from east to west and is overgrown with small trees and weeds. A small stream passes through the property, starting near the southeast corner, running north, then turning to the west, and leaving the property near the northwest corner. Surrounding properties are primarily residential or light commercial.

Wastes containing low (less than approximately 5%) concentrations of thorium were disposed of in on-site shallow land burial in accordance with 10CFR20.304. Although detailed records of quantities and compositions of waste are not available, W.R. Grace has indicated that approximately 8.6×10^3 kg of thorium residues and 7.3×10^2 kg of slightly contaminated decontamination debris have been buried on the property. Exact locations of these burials are also unknown, but possible locations, based on information from the Applied Health Physics report and conversations with several former employees are shown on Figure 3.

A followup inspection of the property was conducted by representatives of the New Jersey Bureau of Radiation Protection and NRC Region I in January 1981. The findings of that inspection indicated direct radiation levels and surface soil thorium concentrations exceeding the current criteria for release for unrestricted use. An aerial radiological survey performed in

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May 1981, identified elevated direct radiation levels both on the W.R. Grace property and off-site along a small stream, which runs through the property and then approximately 1 km west to the Pompton River. Preliminary sampling along this off-site stream have also shown above-background concentrations of thorium in sediment and bank soil.

II. Objectives of Survey

The objectives of the survey are to:

- A. measure direct radiation levels on the W.R. Grace property and along the small stream to the west of the property,
- B. determine the concentrations of radionuclides in surface soil on the property and in soils and sediments along the small stream west of the property,
- C. define specific locations and depths of burials, and
- D. determine if surface or subsurface radionuclides are migrating from the burial sites.

III. Responsibility

Work described in this survey plan will be performed under the supervision of Mr. J.D. Berger, Certified Health Physicist, with the Radiological Site Assessment Program of the Manpower Education, Research, and Training Division of Oak Ridge Associated Universities.

IV. Procedures

This survey will be conducted in two separate parts. The area along the small stream west of the W.R. Grace facility will be surveyed as soon as possible, due to the sensitive nature of potential thorium contamination. The survey of the main property will be performed several months later.

A. Stream Survey

1. Perform systematic direct gamma exposure level measurements at 50 m intervals along the stream between the W.R. Grace site and the Pompton River. Measurements will be made at the stream edge and approximately 5-10 m from the edge.
2. Collect systematic surface (to 5 cm) soil and sediment samples (1 kg) at points of direct radiation measurement described in step A. 1. Subsurface (0.5 to 1.0 m) soil samples will also be collected at approximately ten locations.
3. Collect stream water samples (4 l) at points where the stream enters and exits the W.R. Grace property and at about four additional locations between the site and the Pompton River.

4. Collect soil, sediment, and water samples and perform direct radiation measurements along the Pompton River, about 100 m upriver and downriver of the junction with the small stream.
5. Scan stream and immediately adjacent bank areas to identify locations of elevated direct radiation levels. Perform radiation measurements and soil and sediment sampling at those locations.

B. W.R. Grace Property

1. Site Preparation

- a. Bush-hog to clear land of weeds and tall grass. (Sub-contract)
- b. Survey land to establish a 20 m grid pattern on the W.R. Grace property and prepare site drawings.

2. Surface Measurements

- a. Perform ground-radar survey of the property to identify location of burial trenches and determine depth and location of subsurface objects. (Sub-contracts)
- b. Conduct a walkover surface level scan with gamma scintillation detectors to identify locations of elevated levels.
- c. Determine exposure levels ($\mu\text{R/h}$) at 1 m above the ground at each grid intersection and at points identified in B. 2. b. using gamma scintillation instruments calibrated against a pressurized ionization chamber.

3. Vertical Profile Measurements

- a. Drill a pattern of boreholes to a depth which exceeds the depth of the nearest burial trenches and where possible to ground water. (Sub-contract) Approximately 20-40 holes will be drilled between trenches and around the site perimeter; the exact number and location of these holes will be determined by the findings of the ground radar and surface radiation scans.
- b. Perform gross gamma scintillation measurements at 30 cm intervals from surface to ground water depth in these boreholes.
- c. Obtain gamma spectrum measurements at selected boreholes and where elevated levels are noted, to identify radionuclides.

4. Sampling

a. Soil

- (1) Collect systematic surface samples from grid point intersections at 40 m intervals.
- (2) Collect biased surface samples from locations of elevated surface measurements identified by the walk-over scan.
- (3) Collect subsurface samples at several depths in each borehole and at depths of elevated borehole logging measurements.
- (4) Collect surface samples at 50 m intervals along the banks of the small stream and sediment samples at the same locations.

b. Water

- (1) Collect samples of ground water from boreholes as available.
- (2) Collect samples of surface water from several points along the small drainage stream and from other areas of standing or surface water that may be present on the site at the time of the survey.
- (3) Collect samples of water from on-site sumps and wells.

c. Vegetation

Collect samples of ground vegetation at approximately six locations on the site.

C. Background and Baseline Samples

Perform measurements of gamma exposure levels and collect samples of soil, sediment, water, and vegetation from off-site locations to establish background and baseline levels for comparison with on-site data.

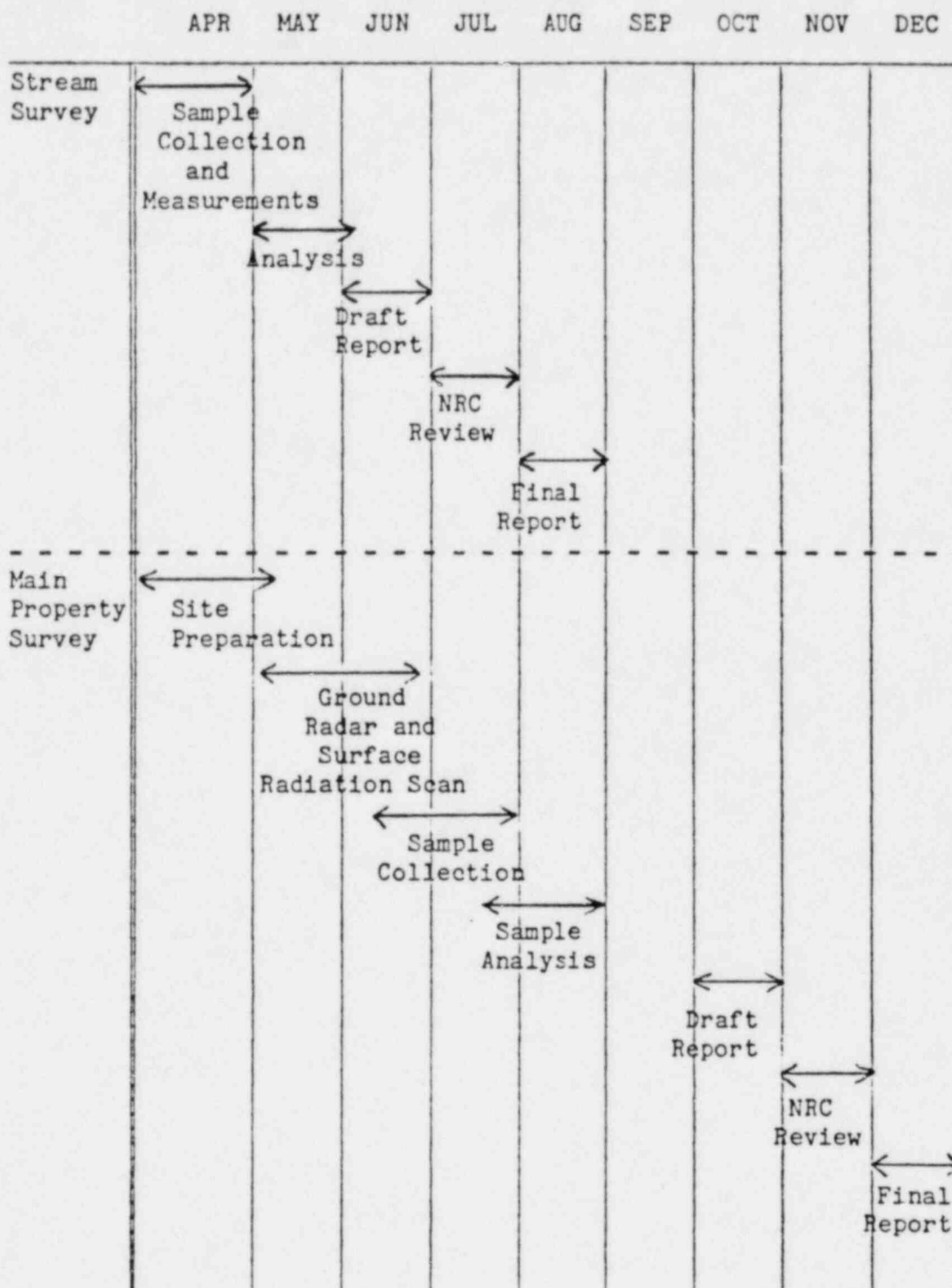
D. Analysis of Samples

Samples will be returned to laboratories in Oak Ridge, Tennessee. Analytical techniques and quality control procedures established by DOE, EPA, and other qualified environmental measurements laboratories will be used.

Samples will be analyzed for major radionuclides of the naturally occurring uranium and thorium series.

V. Schedule

The following is the estimated schedule for various phases of this survey plan. The actual schedule will be determined to a large degree by weather and ground moisture conditions.



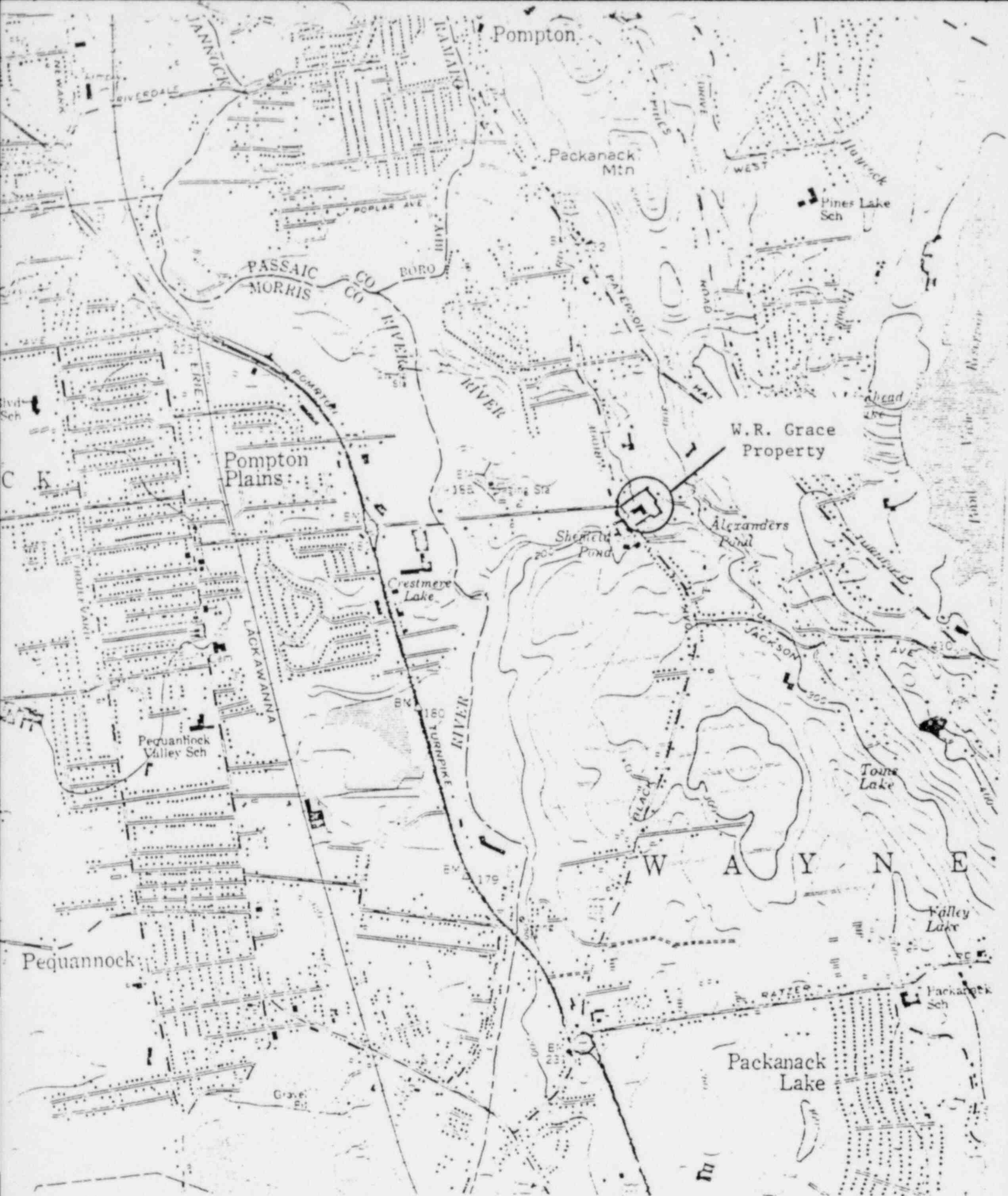


FIGURE 1. Map of Central New Jersey Showing Location of W.R. Grace Property.

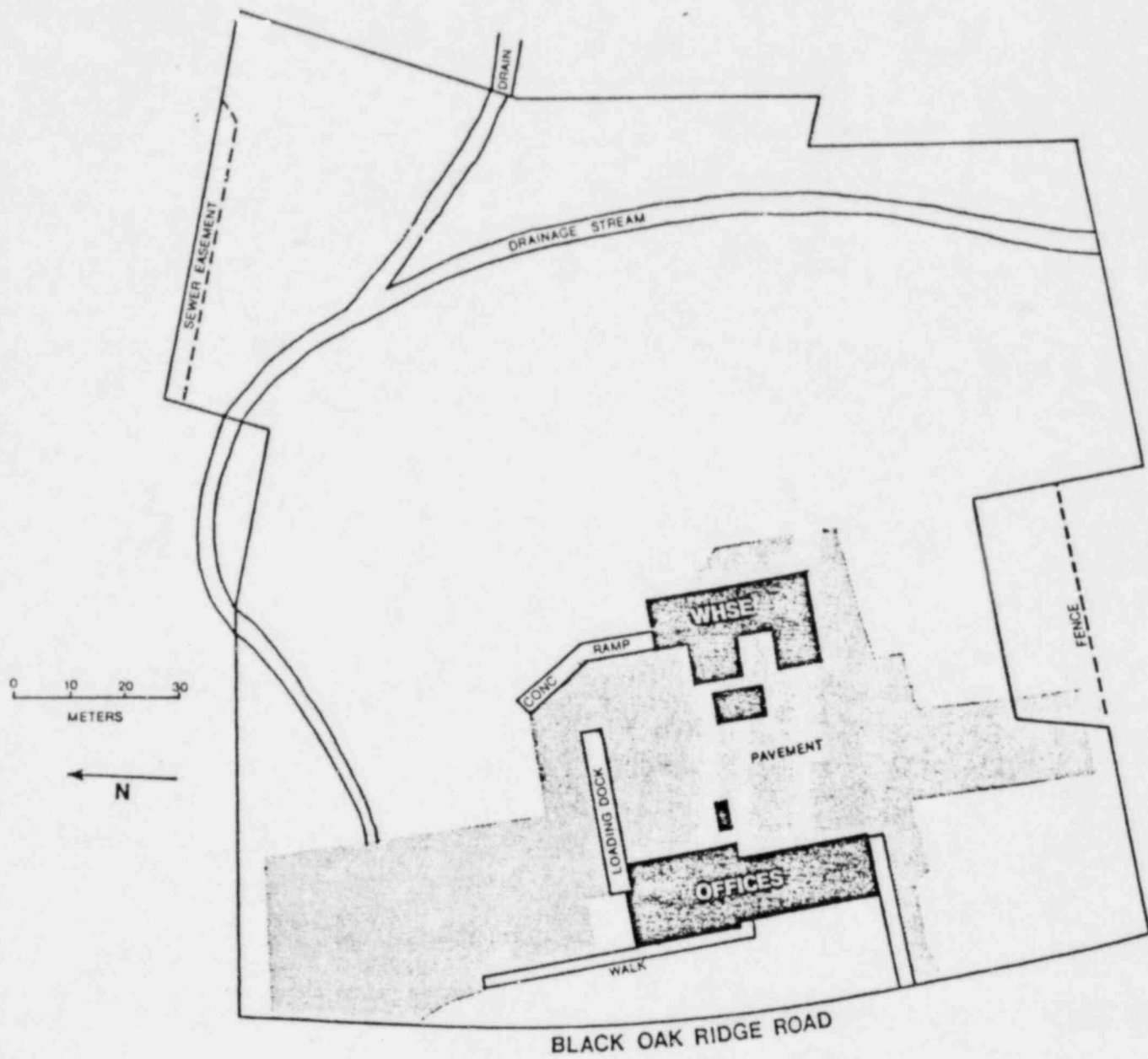
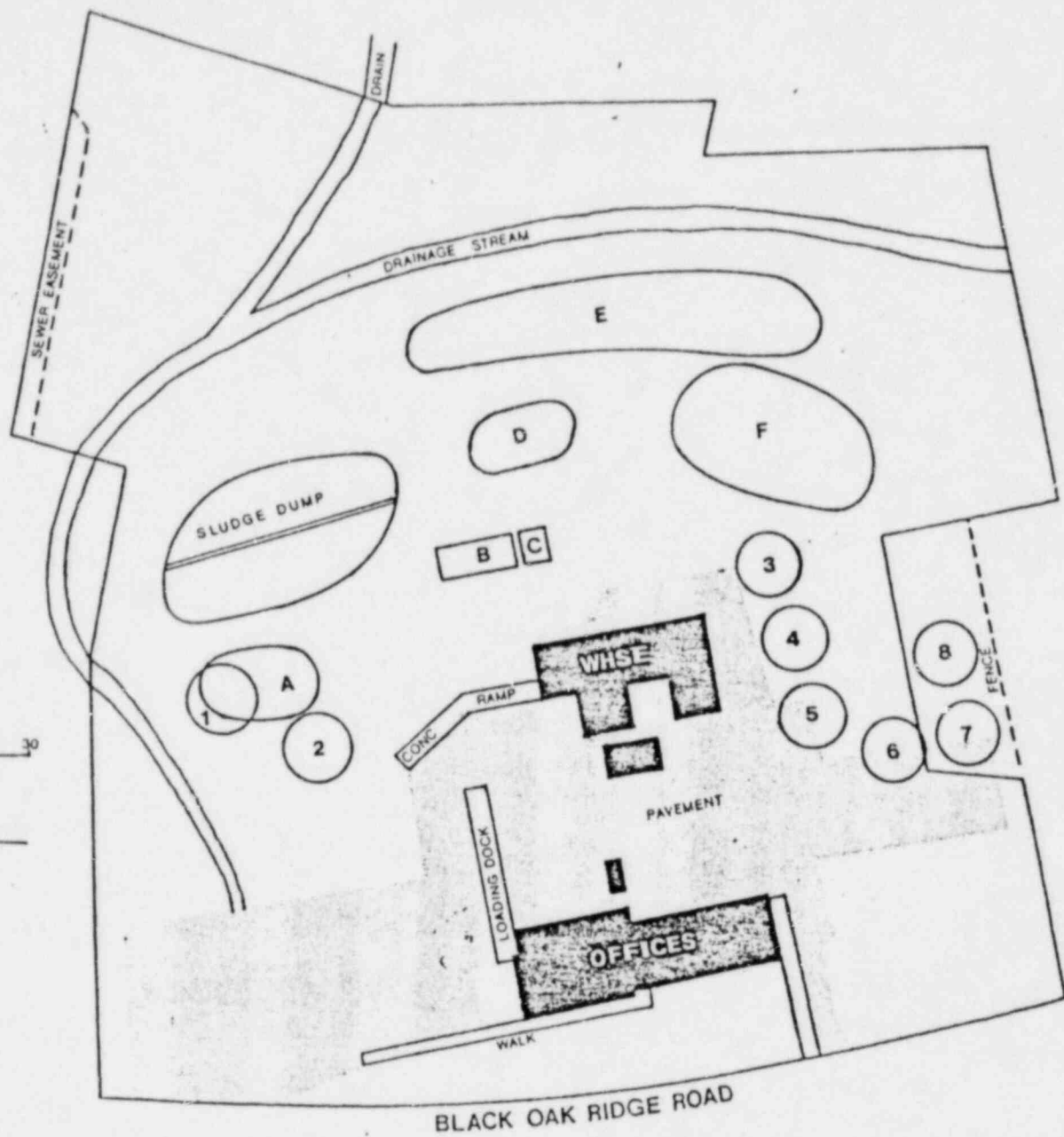


FIGURE 2. Davison Chemical Division Facility, W.R. Grace & Co.



A=Reworked Sludges
 B=Yttrium Concentrate
 C=Thorium Hydroxide

D=Waste Treatment Disposal
 E=Ore Tailings and Gangue
 F=Yttrium and Silica Sludges

1-8 = Circular Holes Filled April-June 1974 from Decontaminated Buildings

FIGURE 3. Burial Locations at Davison Chemical Co.