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DOE/OR-881

REMEDIAL ACTION WORK PLAN

FOR THE ALBANY RESEARCH CENTER

FEBRUARY 1987

UNITED STATES DEPARTMENT OF ENERGY

OAK RIDGE OPERATIONS

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This document provides general information about the Department of Energy's remedial action program at the Albany Research Center, Albany, Oregon. Additional information is available from the Department of Energy, Technical Services Division, Post Office Box E, Oak Ridge, Tennessee 37831.

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CHRONOLOGY OF WORK TO DATE AND PLANNED ACTIVITIES

1978-82	Radiological surveys of the Albany Research Center property conducted by Argonne National Laboratory and A.H. Environment, Inc.
1984	Radiological survey of the Albany Research Center property conducted by Bechtel National, Inc.
1985	Three alternative methods of disposal for the contaminated material evaluated by the U.S. Department of Energy; transport to Hanford, Washington selected as preferred approach.
1987	Decontaminate nine buildings, excavate contaminated soil on the grounds, backfill and seed the excavated areas, transport soil and rubble to Hanford.
Beyond 1987	Certify the Albany Research Center property for unrestricted use.

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1.0 INTRODUCTION AND OBJECTIVES

1.1 BACKGROUND

Under conditions of the Atomic Energy Act of 1954, as amended, the U.S. Department of Energy (DOE) is conducting remedial action at the Albany Research Center (ARC) in Albany, Oregon. The work is being performed under the Formerly Utilized Sites Remedial Action Program (FUSRAP), a DOE effort to identify, decontaminate, or otherwise control sites where low-activity radioactive contamination (exceeding current guidelines) remains from either the early years of the nation's atomic energy program or commercial operations causing conditions that Congress has mandated DOE to remedy.

1.2 PURPOSE

This work plan provides an overview of the remedial action, which is expected to be completed within a single work season, from July through October 1987. Figure 1-1 shows the location of the ARC.

1.3 MANAGEMENT APPROACH

All FUSRAP activities are under the direction of the DOE Assistant Secretary for Nuclear Energy, through the Office of Remedial Action and Waste Technology and the Division of Facility and Site Decommissioning Projects. DOE Headquarters (DOE-HQ) has the responsibility for developing overall policy applicable to FUSRAP. DOE-HQ provides broad guidance and establishes the program budget.

The Oak Ridge Operations Office, Technical Services Division (ORO-TSD), manages FUSRAP on a day-to-day basis and oversees the work of the Project Management Contractor (PMC) chosen to implement project activities. In addition to the technical and administrative management of FUSRAP, ORO-TSD manages the authorized project budget.

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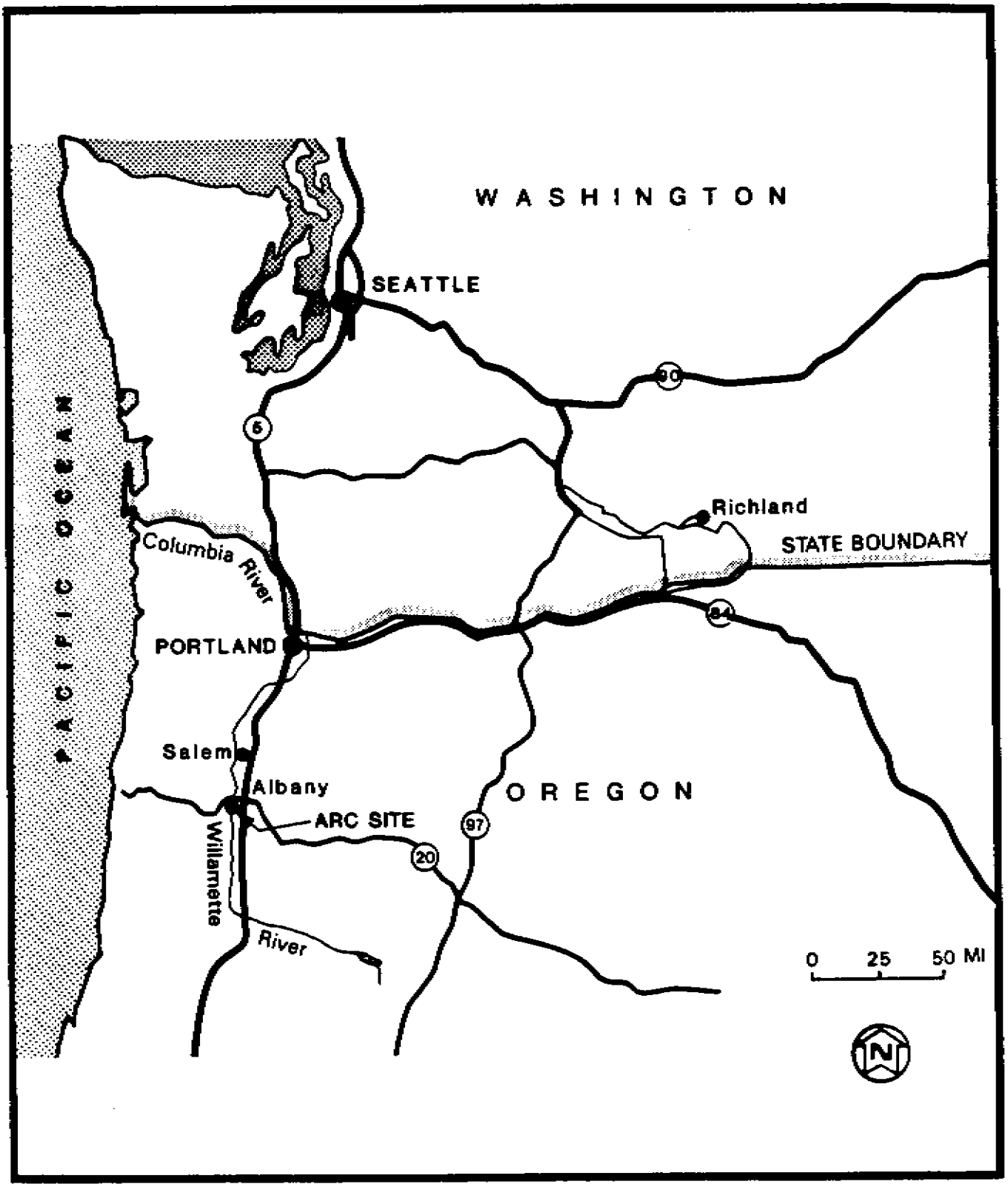

FIGURE 1-1 LOCATION OF THE ALBANY RESEARCH CENTER

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The PMC, Bechtel National, Inc. (BNI), acts as DOE's representative in the planning, management, and implementation of FUSRAP. As PMC, BNI is responsible for analyzing site conditions and planning, recommending, and engineering remedial actions for the various FUSRAP sites. Upon approval from ORO-TSD, BNI implements remedial actions as required. BNI administers construction subcontracts, coordinates the sequence of operations, controls the relationships among subcontractors, and ensures execution and documentation of each authorized project in accordance with DOE guidance. In implementing approved remedial actions at a specific site, BNI maximizes subcontracting in the local region.

At each FUSRAP site, BNI is responsible for defining and implementing quality assurance procedures and environmental monitoring, safety, and radiological programs. BNI is responsible for monitoring and controlling all activities at the site through close cooperation with its radiological support subcontractor, Thermo Analytical/Eberline (TMA/E), and all remedial action subcontractors.

Argonne National Laboratory (ANL) performs analyses for the National Environmental Policy Act (NEPA) documentation process as outlined in the Council on Environmental Quality NEPA guidelines and implementing DOE Orders. Through the NEPA process, DOE will advise federal, state, and local agencies and the public of the results of preliminary engineering evaluations, environmental analyses, and conclusions regarding options for disposing of contaminated materials. As part of its NEPA activities, ANL performs the environmental assessments necessary to support work activities.

1.4 REMEDIAL ACTION GUIDELINES

The radiological guidelines established by DOE for the cleanup of radioactive materials under FUSRAP are summarized in Table 1-1. These guidelines are based on very conservative calculations designed to protect the public health and safety.

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TABLE 1

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES FOR THE ALBANY RESEARCH CENTER

BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 100 mrem/yr.

SOIL (LAND) GUIDELINES (MAXIMUM LIMITS FOR UNRESTRICTED USE)

Radionuclide	Soil Concentration (pCi/g) above background[a,b,c]
Radium-226 Radium-228 Thorium-230 Thorium-232	5 pCi/g, averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over any 15-cm-thick soil layer below the surface layer.
Other radionuclides	Soil guidelines will be calculated on a site-specific basis using the DOE manual developed for this use.

STRUCTURE GUIDELINES (MAXIMUM LIMITS FOR UNRESTRICTED USE)

Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that are intended for unrestricted use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR 192) is: In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL.[d] In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive materials are not the cause.

External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site to be released for unrestricted use shall not exceed the background level by more than 20 μR/h.

Indoor/Outdoor Structure Surface Contamination

	Allowable Residual Surface Contamination[e] (dpm/100 cm^2)		
Radionuclide[f]	Average[g,h]	Maximum[h,i]	Removable[h,j]
Transuranics, Ra-226, Ra-228, Th-230, Th-228 Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224 U-232, I-126, I-131, I-133	1,000	3,000	200

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TABLE 1

(continued)

Indoor/Outdoor Structure Surface Contamination (continued)

Radionuclide[f]	Allowable Residual Surface Contamination[e] (dpm/100 cm^2) Average[g,h]	Maximum[h,i]	Removable[h,j]
U-Natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 β-γ	15,000 β-γ	1,000 β-γ

[a]These guidelines take into account ingrowth of radium-226 from thorium-230 and of radium-228 from thorium-232, and assume secular equilibrium. If either thorium-230 and radium-226 or thorium-232 and radium-228 are both present, not in secular equilibrium, the guidelines apply to the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that the dose for the mixtures will not exceed the basic dose limit.

[b]These guidelines represent unrestricted-use residual concentrations above background averaged across any 15-cm-thick layer to any depth and over any contiguous 100-m^2 surface area.

[c]Localized concentrations in excess of these limits are allowable provided that the average concentration over a 100-m^2 area does not exceed these limits.

[d]A working level (WL) is any combination of short-lived radon decay products in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy.

[e]As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[f]Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

[g]Measurements of average contamination should not be averaged over more than 1 m^2. For objects of less surface area, the average shall be derived for each such object.

[h]The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

[i]The maximum contamination level applies to an area of not more than 100 cm^2.

[j]The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

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2.0 SITE DESCRIPTION

2.1 LOCATION

The ARC is located in Albany, Oregon, approximately 23 mi south of Salem, Oregon. The ARC property covers an almost-rectangular area of approximately 45 acres. It is bounded on the north by Queen Avenue, on the east by Liberty Street, on the south by a tennis club, and on the west by Broadway Street (see Figure 2-1).

The ARC site comprises three main areas: the ARC proper, which consists of a number of buildings in the northernmost 29 acres of the property; a 2-acre, inactive BioMass Research Facility, located near the center of the property; and a 14-acre grass-and-weed covered area known as the "Back Forty," which occupies the southernmost part of the property (see Figure 2-1).

2.2 RADIOLOGICAL CONDITIONS

From 1954 to 1971 the Bureau of Mines, Department of the Interior conducted metallurgical operations on a variety of materials, including thorium, at the ARC for the Atomic Energy Commission (AEC). Operations included reducing, melting, machining, welding, and alloying. Research on alloys of uranium and thorium began in 1955 and continued until 1978.

When work for the AEC ceased, the process buildings were decontaminated according to the general guidelines provided by the AEC. These guidelines, however, were not as specific as the DOE guidelines in effect in 1978 when work with uranium and thorium at the ARC was terminated, and the records relating to the decontamination effort were not adequate to determine whether or not radiological conditions in the buildings and on the grounds complied with the 1978 guidelines. As a result, radiological surveys of the ARC were

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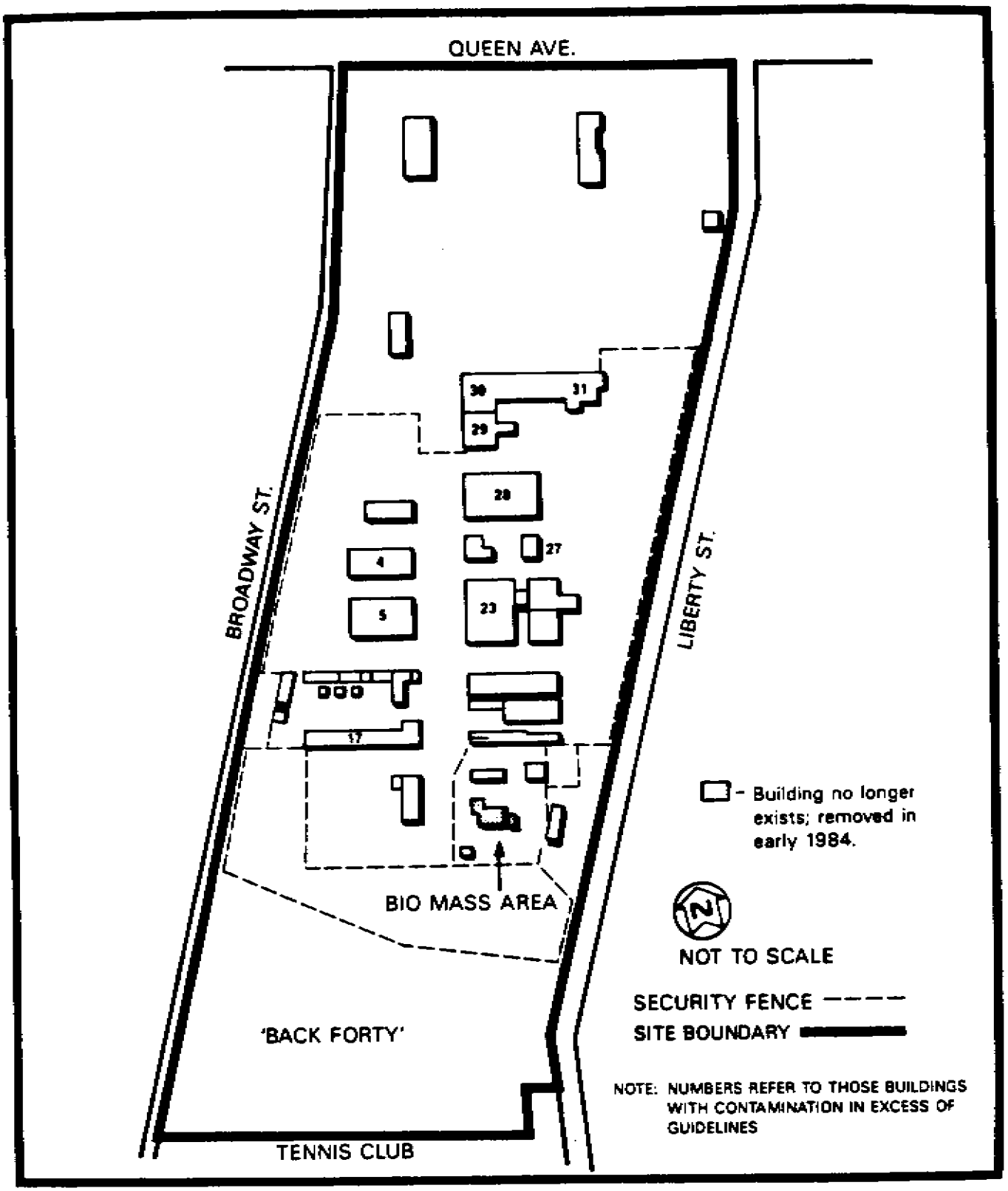

FIGURE 2-1 PLAN OF THE ALBANY RESEARCH CENTER

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undertaken by ANL between June 1978 and September 1982, and by A.H. Environment, Inc. in 1981. During these surveys, interior surfaces in several buildings were found to be contaminated and contaminated soil was found in some areas on the grounds. ANL recommended that although the levels of contamination at the ARC did not pose an immediate health hazard, decontamination of the property was advisable.

Because a grid system had not been used during the earlier surveys, BNI conducted a radiological survey of the ARC property early in 1984 to identify the exact locations and boundaries of contamination. The survey of the grounds revealed areas of thorium-232 and radium-226 contamination in surface and subsurface soils. In the buildings, surface contamination was found on floors and/or walls, in trenches and drains, and on equipment.

2.3 WASTE VOLUME PROJECTIONS

Data from the 1984 BNI survey were used to determine the waste volume projections for the ARC remedial action. Approximately 2,600 yd^3 of contaminated soil will have to be removed from the grounds. The contaminated surface areas inside the buildings total an estimated 485 ft^2, the decontamination of which is expected to yield roughly 1.5 yd^3. Because some pieces of the contaminated equipment will be decontaminated and others removed, the total volume of this type of material will be determined during remedial action; the current estimate is approximately 400 yd^3.

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3.0 WORK PLAN

The remedial action alternative selected by DOE for the ARC consists of transporting the contaminated materials to the DOE Hanford Reservation near Richland, Washington (see Figure 1-1), a distance of approximately 350 mi. This approach was selected from three alternatives evaluated by BNI and DOE in 1984 and 1985. The other two alternatives were on-site, above-grade disposal and on-site, below-grade disposal. Removal of the material to Hanford was shown to be the most cost-effective and safest method of disposal as well as the one most acceptable to the citizens of Albany. Work at the ARC is scheduled to begin in July 1987 and to be completed by the end of the calendar year.

3.1 DESIGN ENGINEERING

From February to May 1987, BNI will be performing design engineering to support the NEPA process and to develop the engineering subcontract packages necessary to support the remedial action.

3.2 ACCESS AGREEMENTS

BNI will obtain an access agreement from the Bureau of Mines before the start of the remedial actions.

3.3 REMEDIAL ACTIONS

The remedial action will consist of decontaminating nine buildings (see Figure 2-1), excavating contaminated soil and backfilling the excavated areas, and transporting the soil and rubble to Hanford.

Building decontamination will be performed by means of scabbling, hydrolasing (spraying with water under high pressure), and washing. Chemical decontamination agents will be used as required. Excavation will be performed using a backhoe. Deep excavation in

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the "Back Forty" area may necessitate the use of a dewatering well point system or a well sump. Water treatment and holding basins will be constructed as necessary. Water collected during decontamination activities will be tested and handled in accordance with state and local permit requirements for discharge. BNI will obtain the necessary permits before the start of remedial action. Excavated areas will be backfilled with clean soil and seeded.

It is planned that the contaminated material will be shipped in bulk to Hanford. It will be excavated and loaded directly into dump trucks that will be covered with tarpaulins before entering public roads. Measures will be implemented to prevent leakage. After depositing each load at Hanford, the trucks will be surveyed for radioactivity and decontaminated if necessary before returning to the ARC. A washdown facility will also be constructed at the ARC for decontaminating equipment used for excavation and building decontamination operations.

3.4 POST-REMEDIAL ACTION SAMPLING AND ANALYSIS

During the remedial action, BNI will collect and document data from analyses of soil samples and in situ radiological measurements to determine the adequacy of the remedial action as it progresses. Post-remedial action radiological measurements will be taken to confirm that the remedial action has been effective in removing all material contaminated in excess of guidelines. When field measurements and the results of field soil sample analyses show that the remedial action guidelines have been complied with, the radiological condition of the cleaned area will be documented and the area backfilled.

An assessment of the remedial action will be conducted by an independent verification contractor under contract to DOE to verify the BNI data supporting the adequacy of the remedial action and to confirm that radiological conditions at the site comply with remedial action guidelines.

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Data documenting the final radiological condition of the decontaminated areas will be presented in a post-remedial action report for the ARC.

Once the ARC has been verified as conforming with DOE guidelines for residual radioactivity, DOE will issue a certification statement specifying whether the property can be released for unrestricted use or whether its use should remain restricted. This statement will be provided to the Bureau of Mines and appropriate state officials; it will also appear in a Federal Register notice announcing the completion of remedial action at the ARC. The State will be requested to annotate the relevant land records with regard to the remedial action and certification of the property.

After the certification statement has been issued, a Certification Docket containing a complete summary of the remedial action will be made available in public document rooms before being permanently archived by DOE.

3.5 SURVEILLANCE AND MAINTENANCE

To protect the environment and the health and safety of the public and site personnel, BNI will conduct a maintenance and surveillance program at the ARC. The program will include physical safety controls as well as environmental monitoring during specific remedial action operations. Typically, monitoring is conducted for air (radon and particulates), surface water, sediments, and external radiation as appropriate. The program will be carried out until completion of the remedial action and will comply with applicable requirements of DOE, the State of Oregon, and other federal regulatory agencies.