058444

Certification Docket for the Remedial Action Performed at Properties in Maywood, Rochelle Park, and Lodi, New Jersey in 1984 and 1985

Department of Energy
Technical Services Division
Oak Ridge Operations Office

December 1988

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CERTIFICATION DOCKET FOR THE REMEDIAL ACTION PERFORMED AT PROPERTIES IN MAYWOOD, ROCHELLE PARK, AND LODI, NEW JERSEY, IN 1984 AND 1985

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INTRODUCTION TO THE CERTIFICATION DOCKET FOR THE REMEDIAL ACTION PERFORMED AT PROPERTIES IN MAYWOOD, ROCHELLE PARK, AND LODI, NEW JERSEY, IN 1984 AND 1985

Description of the Formerly Utilized Sites Remedial Action Program at Maywood, Rochelle Park, and Lodi, New Jersey

The U.S. Department of Energy (DOE), Office of Nuclear Energy, Office of Remedial Action and Waste Technology, Division of Facility and Site Decommissioning Projects (and/or the predecessor agency, offices, and divisions) has implemented a remedial action project in Maywood, New Jersey. The 1984 Energy and Water Appropriations Act (reauthorized in 1985) directed DOE to conduct a decontamination research and development project at four sites, including the site of the former Maywood Chemical Works (now owned by the Stepan Company) and its vicinity properties. The work is being administered by the Formerly Utilized Sites Remedial Action Program (FUSRAP), one of two remedial action programs under the direction of the DOE Division of Facility and Site Decommissioning Projects.

The United States Government initiated FUSRAP in 1974 to identify, clean up, or otherwise control sites where low-activity radioactive contamination (exceeding current guidelines) remains from the early years of the nation's atomic energy program or commercial operations causing conditions that Congress has mandated DOE to remedy. The objectives of FUSRAP are:

- Identify and assess all sites formerly utilized to support early Manhattan Engineer District/Atomic Energy Commission (MED/AEC) nuclear work to determine whether further decontamination and/or control is needed.
- Decontaminate and/or apply controls to these sites to permit conformance with current applicable guidelines.
- Dispose of and/or stabilize all generated residues in a radiologically and environmentally acceptable manner.

- Accomplish all work in accordance with appropriate land-owner agreements, local and state environmental and land-use requirements to the extent permitted by Federal law, and applicable DOE orders, regulations, standards, policies, and procedures.

- Certify the sites for appropriate future use.

FUSRAP is currently being managed by the DOE Oak Ridge Operations Office (ORO). As the Project Management Contractor (PMC) for FUSRAP, Bechtel National, Inc. (BNI) is the DOE representative for planning, managing, and implementing FUSRAP.

Radiological surveys were performed in the Maywood area as the result of a resident inquiry in late 1980. An aerial radiological survey was performed that identified widespread low-activity contamination on the Stepan Company site, to the west and south of the site, and to the north and southeast in discrete areas. Follow-up surveys conducted for the Nuclear Regulatory Commission (NRC) and DOE further characterized the site and identified contamination at residences in Maywood and Rochelle Park, New Jersey, and a vacant property in Rochelle Park. Additional residential properties were identified in Lodi, New Jersey, during characterization surveys in 1984.

DOE developed a remedial action plan to remove the contamination in the Maywood area in two phases. The priority in the first phase of the work consists of removing contaminated materials from residential properties, and then from commercial vicinity properties. The contaminated materials are being stored temporarily at the Maywood Interim Storage Site (MISS).

Remedial action at former MED/AEC or commercial sites, and the subsequent disposal of radioactive wastes on a state or regional basis are subject to the mandates of the National Environmental Policy Act (NEPA) of 1969. Executive Order 11991 empowered the Council on Environmental Quality (CEQ) to issue regulations to federal agencies for implementing the procedural provisions of NEPA,

whose requirements are mandatory under law. The CEQ issued the regulations containing guidance and specific requirements in June 1979. The DOE guidelines for implementing the NEPA process and satisfying the CEQ regulations were made effective on March 28, 1980.

The NEPA process requires FUSRAP decision makers to identify and assess the environmental consequences of proposed actions prior to beginning remedial activities, developing disposal sites, or transporting and emplacing radioactive wastes. Documentation required by the NEPA in support of remedial action is prepared by Argonne National Laboratory (ANL). Supporting documentation is provided by the FUSRAP PMC in the preparation of a series of engineering studies and environmental reports for the site under consideration to evaluate remedial action alternatives. The action deemed appropriate by DOE based on the NEPA process evaluations is then implemented with consideration for public safety and in compliance with applicable federal, state, and local requirements. For properties discussed in this report, the NEPA requirements were satisfied by the preparation of the Action Description Memorandum, which led to a Finding of No Significant Impact.

Work performed under FUSRAP is governed by the provisions of the DOE FUSRAP plan for Quality Assurance and the Project Quality Assurance Program, which comply with DOE Order 5700.6 and apply to BNI as PMC, architect-engineers, construction and service subcontractors, and other subcontractors as may be identified. Effectiveness of implementation is appraised by the BNI quality assurance organization, and by DOE-ORO on a continuing and regular basis.

Remedial action has been completed on the properties identified in this docket. Additional certification dockets will be prepared to address subsequent phases of remedial action at Maywood, New Jersey, and its vicinity. DOE certified that the properties are in compliance with applicable DOE standards and criteria on November 18, 1988, and signed the notice of certification for the Federal Register on December 21, 1988.

Purpose

This docket has been assembled to document the successful decontamination of a portion of the properties in the vicinity of the former Maywood Chemical Works site that were contaminated with residues derived from that site. The material in this docket consists of documents supporting the certification that the radiological conditions at the properties associated with the MISS are in compliance with radiological guidelines and standards determined to apply to these sites and that the use of these properties will not result in any measurable radiological hazard to the general public.

The certification docket contains only the material deemed most pertinent to the certification of these properties; the comprehensive package of records is available and will be archived by DOE through the Assistant Secretary for Management and Administration after certification of the properties. Copies of this docket will be available for public review between 9:00 a.m. and 4:00 p.m., Monday through Friday (except Federal holidays) at the DOE Public Reading Room located in Room 1E-190 of the Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C.

Property Identification

The properties decontaminated as part of the Phase I remedial action include the properties listed below. Drawings of these properties are provided in Exhibit III and in the post-remedial action reports referenced in Exhibit II (6).

Parcel 1 located on 454 Davison Street, Borough of Maywood identified as Block 124A, Lots 22, 23.

Parcel 2 located on 459 Davison Street, Borough of Maywood, identified as Block 123, Lots 18, 19, 20A.

Parcel 3 located on 460 Davison Street, Borough of Maywood, identified as Block 124, Lots 24, 25.

Parcel 4 located on 464 Davison Street, Borough of Maywood, identified as Block 124, Lots 26, 27.

Parcel 5 located on 468 Davison Street, Borough of Maywood, identified as Block 124, Lots 28, 29.

Parcel 6 located on 459 Latham Street, Borough of Maywood, identified as Block 124, Lots 18, 19.

Parcel 7 located on 461 Latham Street, Borough of Maywood, identified as Block 124, Lots 16, 17.

Parcel 8 located on 467 Latham Street, Borough of Maywood, identified as Block 124, Lots 14, 15.

Parcel 9 located on Ballod Associates property (up to the toe of the Route 17 embankment), Township of Rochelle Park, identified as Block 18, Lot 1 and Block 19A, Lot 1.

Parcel 10 located on 10 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 42, 43.

Parcel 11 located on 22 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 48,49.

Parcel 12 located on 26 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 50, 51.

Parcel 13 located on 30 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 52, 53.

Parcel 14 located on 34 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 54, 55.

Parcel 15 located on 38 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 56, 57.

Parcel 16 located on 42 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 58, 59.

Parcel 17 located on 86 Park Way, Township of Rochelle Park, identified as Block 17, Lots 36, 37, 38, 39B.

Parcel 18 located on 90 Park Way, Township of Rochelle Park, identified as Block 17, Lots 39A, 40, 41.

Parcel 19 located on 58 Trudy Drive, Borough of Lodi, identified as Block 176G, Lot 15.

Parcel 20 located on 59 Trudy Drive, Borough of Lodi, identified as Block 176H, Lot 5.

Parcel 21 located on 61 Trudy Drive, Borough of Lodi, identified as Block 176I, Lot 6.

Parcel 22 located on 64 Trudy Drive, Borough of Lodi, identified as Block 176L, Lot 3.

Parcel 23 located on 3 Hancock Street, Borough of Lodi, identified as Block 176H, Lot 4.

Parcel 24 located on 121 Avenue F, Borough of Lodi, identified as Block 223A, Lots 60, 61.

Parcel 25 located on 123 Avenue F, Borough of Lodi, identified as Block 223A, Lots 62, 63.

Parcel 26 located on 59 Avenue C, Borough of Lodi, identified as Block 212, Lots 11, 12, 13.

Docket Contents

Exhibit I is a summary of remedial action activities at the subject properties. It provides a brief history of the origin of the contamination in the Maywood, New Jersey, vicinity, and summarizes the radiological characterizations conducted, the remedial action performed, and post-remedial action/verification activities.

The following documents contain the guidelines that determine the need for remedial action. The subject properties have been decontaminated to comply with these guidelines. The first document listed is included as Appendix A of Exhibit I; the second is included in Exhibit II (1).

U.S. Department of Energy. "U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites," Rev. 1, July 1985.

U.S. Department of Energy. Design Criteria for Formerly Utilized Sites Remedial Action Program (FUSRAP) and Surplus Facilities Management Program (SFMP), 14501-00-DC-01, Rev. 3, Oak Ridge, TN, February 1986.

The following documents authorized or designated the remedial action at the 26 subject properties. A copy of each is included in Exhibit II (2).

Letter, F.E. Coffman, Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy,

Department of Energy Headquarters, to J. LaGrone, Manager, Oak Ridge Operations Office, Department of Energy. "R&D Decontamination Projects Under the Formerly Utilized Sites Remedial Action Program (FUSRAP)," August 3, 1983.

Memorandum, E.G. DeLaney, Manager, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Radiological Survey for Maywood Vicinity Properties on Grove Avenue and Park Way," April 30, 1984.

Memorandum, A.J. Whitman, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Designation for Remedial Action at 454 Davison Avenue, Maywood, New Jersey," August 16, 1984.

Memorandum, A.J. Whitman, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Radiological Survey Data for 38 Grove Avenue, Rochelle Park, New Jersey," September 4, 1984.

Memorandum, W.R. Voigt, Jr., Acting Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to J. LaGrone, Manager, Oak Ridge Operations Office, Department of Energy. "Authorization to Conduct Remedial Action Vicinity Properties in Lodi, New Jersey," October 19, 1984.

Memorandum, W.R. Voigt, Jr., Acting Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to J. LaGrone, Manager, Oak Ridge Operations Office, Department of Energy. "Authorization to Conduct Remedial Action of Vicinity Properties at Lodi, New Jersey," May 6, 1985.

Memorandum, E.G. DeLaney, Manager, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Authorization for Remedial Action - 123 Avenue F, Lodi, New Jersey," May 13, 1985.

The following documents describe the radiological condition of the subject properties before remedial action. They are referenced in this docket in Exhibit II (3).

U.S. Nuclear Regulatory Commission Office of Inspection and Enforcement, Region I. Inspection Report No. 40-8610/80-01, February 18, 1981.

Oak Ridge Associated Universities. Radiological Assessment of Ballod Associates Property (Stepan Chemical Company) Maywood, New Jersey, Oak Ridge, TN, July, 30, 1981.

EG&G Energy Measurements Group. An Aerial Radiologic Survey of the Stepan Chemical Company and Surrounding Area, Maywood, New Jersey, NRC-8109, Oak Ridge, TN, September 1981.

Morton, Henry W. Natural Thorium in Maywood, New Jersey, Nuclear Safety Associates, Inc., Potomac, MD, September 29, 1982.

NUS Corporation. Radiological Study of Maywood Chemical, Maywood, New Jersey, November 1983.

Oak Ridge National Laboratory. Results of the Radiological Survey 454 Davison Avenue, Maywood, New Jersey, ORNL/RASA-85/2, Oak Ridge, TN, February 1986.

Oak Ridge National Laboratory. Results of the Radiological Survey at 459 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 460 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 464 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 468 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 459 Latham Street, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 461 Latham Street, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 467 Latham Street, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Bechtel National, Inc. Radiological Survey Report for 10 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-34, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 22 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-37, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 26 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-38, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 30 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-39, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 34 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-40, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 38 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-41, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 42 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-42, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 86 Park Way, Rochelle Park, New Jersey, DOE/OR/20722-32, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 90 Park Way, Rochelle Park, New Jersey, DOE/OR/20722-33, Oak Ridge, TN, September 1984.

Oak Ridge National Laboratory. Results of the Mobile Gamma Scanning Activities in Lodi, New Jersey, ORNL/RASA-84/3, Oak Ridge, TN, October 1984.

Oak Ridge National Laboratory. Results of the Radiological Survey at 59 Avenue C (LJ006), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Oak Ridge National Laboratory. Results of the Radiological Survey at 58 Trudy Drive (LJ004), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Oak Ridge National Laboratory. Results of the Radiological Survey at 59 Trudy Drive (LJ003), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Oak Ridge National Laboratory. Results of the Radiological Survey at 61 Trudy Drive (LJ002), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 121 Avenue F, Lodi, New Jersey, DOE/OR/20722-67, Oak Ridge, TN, May 1985.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 123 Avenue F, Lodi, New Jersey, DOE/OR/20722-64, Oak Ridge, TN, May 1985.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 3 Hancock Street, Lodi, New Jersey, DOE/OR/20722-65, Oak Ridge, TN, May 1985.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 64 Trudy Drive, Lodi, New Jersey, DOE/OR/20722-66, Oak Ridge, TN, May 1985.

Letter, J.F. Nemec, Bechtel National, Inc., to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Lodi Survey Results," CCN 27283, May 7, 1985.

Department of Energy. Remedial Action Work Plan for the Maywood Site, ORO-850, Oak Ridge, TN, July 1984.

Department of Energy. Remedial Action Work Plan for the Maywood Site, ORO-850, Revision 1, Oak Ridge, TN, April 1985.

Letter, G.P. Crotwell, Bechtel National, Inc., to R.G. Atkin, Site Manager, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Ballod Characterization Report," CCN 28153, June 12, 1985.

The documents listed below fulfill the NEPA requirements for the subject properties. The second document also contains radiological data for the subject properties. Both documents are included in Exhibit II (4).

Memorandum, F.E. Coffman, Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to File. "Action Description Memorandum (ADM) Review: Proposed Remedial Action of Vicinity Properties, Maywood, New Jersey," June 1, 1984.

Argonne National Laboratory. Action Description Memorandum, Proposed 1984 Remedial Actions at Maywood, New Jersey, Argonne, IL, June 8, 1984.

Exhibit II (5) references the access agreements signed by the property owners and DOE before remedial action was initiated. The affected property owners are listed here by address with the exception of the Ballod property. There is also an access agreement between the Borough of Maywood and DOE. The agreement was necessary because the Borough of Maywood owns the property between the sidewalk and the street of each property; however, remedial action on that section of the Maywood properties is included with the listed properties.

10 Grove Avenue	454 Davison Street	58 Trudy Drive
22 Grove Avenue	459 Davison Street	59 Trudy Drive
26 Grove Avenue	460 Davison Street	61 Trudy Drive
30 Grove Avenue	464 Davison Street	64 Trudy Drive
34 Grove Avenue	468 Davison Street	59 Avenue C
38 Grove Avenue	459 Latham Street	121 Avenue F
42 Grove Avenue	461 Latham Street	123 Avenue F
86 Park Way	467 Latham Street	3 Hancock Street
90 Park Way	Ballod Associates	

The following reports describe the extent of the remedial action and document the successful decontamination of the 26 subject properties. These reports are included by reference in Exhibit II (6).

Bechtel National, Inc. Post-Remedial Action Report for the Ballod Associates Property, DOE/OR/20722-82, Revision 1, Oak Ridge, TN, November 1986.

Bechtel National, Inc. Post-Remedial Action Report for the Residential Properties on Davison and Latham Streets, DOE/OR/20722-77, Oak Ridge, TN, February 1986.

Bechtel National, Inc. Post-Remedial Action Report for the Residential Properties on Grove Avenue and Parkway, DOE/OR/20722-83, Oak Ridge, TN, March 1986.

Bechtel National, Inc. Post-Remedial Action Report for the Lodi Residential Properties, DOE/OR/20722-89, Oak Ridge, TN, August 1986.

Exhibit II (7) contains the documents listed below that are related to the successful decontamination of the subject properties. These documents consist of interim verification letters to property owners as well as verification reports for each property.

Letter, B.A. Berven, RASA Program Manager, Oak Ridge National Laboratory, to A.J. Whitman, Division of Remedial Action Projects, Office of Nuclear Energy, Department of Energy Headquarters. "Verification Statement for Parcels Block 18, Lot 1 and Block 19A, Lot 1 at the Ballod Property in Rochelle Park, New Jersey," November 6, 1985.

Letter, M.G. Yalcintas, Radiological Survey Activities, Oak Ridge National Laboratory, to A.J. Whitman, Division of Remedial Action Projects, Office of Nuclear Energy, Department of Energy Headquarters. "Statement on Verification to be Added to the Post-Remedial Action Report," December 16, 1985.

Letter, M.G. Yalcintas, Oak Ridge National Laboratory, Radiological Survey Activities, to E.G. DeLaney, Director, Division of Facility and Site Decommissioning Projects, Office of Nuclear Energy, Department of Energy Headquarters. "Verification Statement for Maywood Properties," February 18, 1986.

Letter, M.G. Yalcintas, Radiological Survey Activities, Oak Ridge National Laboratory, to E.G. DeLaney, Director, Division of Facility and Site Decommissioning, Office of Nuclear Energy, Department of Energy. "Verification Statement for Lodi Properties," February 18, 1986.

Letter, M.G. Yalcintas, Radiological Survey Activities, Oak Ridge National Laboratory, to E.G. DeLaney, Division of Facility and Site Decommissioning, Office of Nuclear Energy, Department of Energy. "Verification Statement for Lodi Properties," February 28, 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 459 Davison Street, Maywood, New Jersey (MJ14L), ORNL/RASA-86/60, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 460 Davison Street, Maywood, New Jersey (MJ15L), ORNL/RASA-86/61, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 464 Davison Street, Maywood, New Jersey (MJ16L), ORNL/RASA-86/62, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 468 Davison Street, Maywood, New Jersey (MJ17L), ORNL/RASA-86/63, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 461 Latham Street, Maywood, New Jersey (MJ11L), ORNL/RASA-86/58, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 467 Latham Street, Maywood, New Jersey (MJ12L), ORNL/RASA-86/59, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 10 Grove Avenue, Rochelle Park, New Jersey (MJ03L), ORNL/RASA-86/42, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 22 Grove Avenue, Rochelle Park, New Jersey (MJ04L), ORNL/RASA-86/43, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 26 Grove Avenue, Rochelle Park, New Jersey (MJ05L), ORNL/RASA-86/44, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 30 Grove Avenue, Rochelle Park, New Jersey (MJ06L), ORNL/RASA-86/45, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 34 Grove Avenue, Rochelle Park, New Jersey (MJ07L), ORNL/RASA-86/46, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 38 Grove Avenue, Rochelle Park, New Jersey (MJ08L), ORNL/RASA-86/47, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 42 Grove Avenue, Rochelle Park, New Jersey (MJ09L), ORNL/RASA-86/48, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 86 Park Way, Rochelle Park, New Jersey (MJ02L), ORNL/RASA-86/41, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 90 Park Way, Rochelle Park, New Jersey (MJ01L), ORNL/RASA-86/18, Oak Ridge, TN, July 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 454 Davison Street, Maywood, New Jersey (MJ13L), ORNL/RASA-86/75, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 459 Latham Street Maywood, New Jersey (MJ10L), ORNL/RASA-86/74, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 59 Avenue C, Lodi, New Jersey (LN008V), ORNL/RASA-86/72, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 121 Avenue F, Lodi, New Jersey (LN006V), ORNL/RASA-86/70, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 123 Avenue F, Lodi, New Jersey (LN007V), ORNL/RASA-86/71, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 3 Hancock Street, Lodi, New Jersey (LN005V), ORNL/RASA-86/69, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at the Ballod Associates Property, Rochelle Park, New Jersey (MJ18V), ORNL/RASA-86/64, Oak Ridge, TN, November 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 58 Trudy Drive, Lodi, New Jersey (LN001V), ORNL/RASA-86/65, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 59 Trudy Drive, Lodi, New Jersey (LN002V), ORNL/RASA-86/66, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 61 Trudy Drive, Lodi, New Jersey (LN003V), ORNL/RASA-86/67, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 64 Trudy Drive, Lodi, New Jersey (LN004V), ORNL/RASA-86/68, Oak Ridge, TN, December 1986.

The State of New Jersey was kept fully informed of all DOE activities. Copies of many reports, including the post-remedial action reports, were transmitted to the New Jersey Department of Environmental Protection (NJDEP).

The information in Exhibit II (9) clarifies the extent of remedial action at the Ballod property.

The Federal Register notice notifies the public of DOE's intent to certify that the subject properties comply with applicable DOE standards and criteria. It is included in Exhibit II (10).

Baublitz, J.E., Acting Director, Office of Remedial Action and Waste Technology, Office of Nuclear Energy, Department of Energy Federal Register notice: "Department of Energy Office of Environmental Protection, Safety, and Emergency Preparedness, Certification of Remedial Action at Properties Located in Maywood, Rochelle Park, and Lodi, New Jersey," December 21, 1988.

The documents listed below validate the final certification of the subject properties and are included in Exhibit II (11).

Memorandum, J.J. Fiore, Director, Division of Facility and Site Decommissioning, Office of Nuclear Energy, Department of Energy, to J.E. Baublitz, Acting Director, Office of Remedial Action and Waste Technology, Office of Nuclear Energy, Department of Energy, NE-20. "Recommendation for Certification of Remedial Action at Properties Associated with the Former Maywood Chemical Works, Maywood, New Jersey," December 12, 1988.

P.J. Gross, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy, "Statement of Certification: Remedial Action at Properties Associated with the Former Maywood Chemical Works," (one statement for each property).

Cost data covering the entire remedial action at the vicinity properties are included in Exhibit I of this docket.

Exhibit 1 Summary of Remedial Action Activities

EXHIBIT I

SUMMARY OF REMEDIAL ACTION ACTIVITIES

DECEMBER 1988

Prepared for

UNITED STATES DEPARTMENT OF ENERGY

OAK RIDGE OPERATIONS OFFICE

Under Contract No. DE-AC05-81OR20722

By

Bechtel National, Inc.

Oak Ridge, Tennessee

Bechtel Job No. 14501

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ABBREVIATIONS

cm	centimeter
cm^2	square centimeter
dpm	disintegrations per minute
ft	foot
m^2	square meter
MeV	million electron volts
mg/cm^2	milligrams per square centimeter
mrad/h	millirad per hour
mrem	millirem
mrem/yr	millirem per year
pCi/g	picocuries per gram
WL	working level

LIST OF ACRONYMS

AEC	Atomic Energy Commission
BNI	Bechtel National, Inc.
DOE	Department of Energy
FUSRAP	Formerly Utilized Sites Remedial Action Program
IVC	Independent verification contractor
MISS	Maywood Interim Storage Site
NJDEP	New Jersey Department of Environmental Protection
NRC	Nuclear Regulatory Commission
ORAU	Oak Ridge Associated Universities
ORNL	Oak Ridge National Laboratory
PIC	Pressurized ionization chamber
SC	Stepan Company (formerly Stepan Chemical Company)
TLD	Thermoluminescent dosimeter

1.0 INTRODUCTION

Exhibit I summarizes the activities supporting the certification that radiological conditions at the properties discussed in this docket are in compliance with applicable guidelines and that the properties can be authorized for unrestricted release. These activities were conducted by the Department of Energy (DOE) under the Formerly Utilized Sites Remedial Action Program (FUSRAP) (Ref. 1). This summary includes a discussion of the remedial action process at these properties: the characterization of their radiological status, their designation as requiring remedial action, the remedial action performed, and verification that the radioactivity has been removed. Further detail on each activity can be found in the referenced documents, many of which are included in the docket.

The properties addressed in this docket include residential properties in Maywood, New Jersey (on Davison and Latham Streets); in Rochelle Park, New Jersey (on Grove Avenue and Parkway); in Lodi, New Jersey (on Trudy Drive, Hancock Street, and Avenues C and F); and a commercial property (the Ballod Associates property) in Rochelle Park, New Jersey (Figure 1-1).

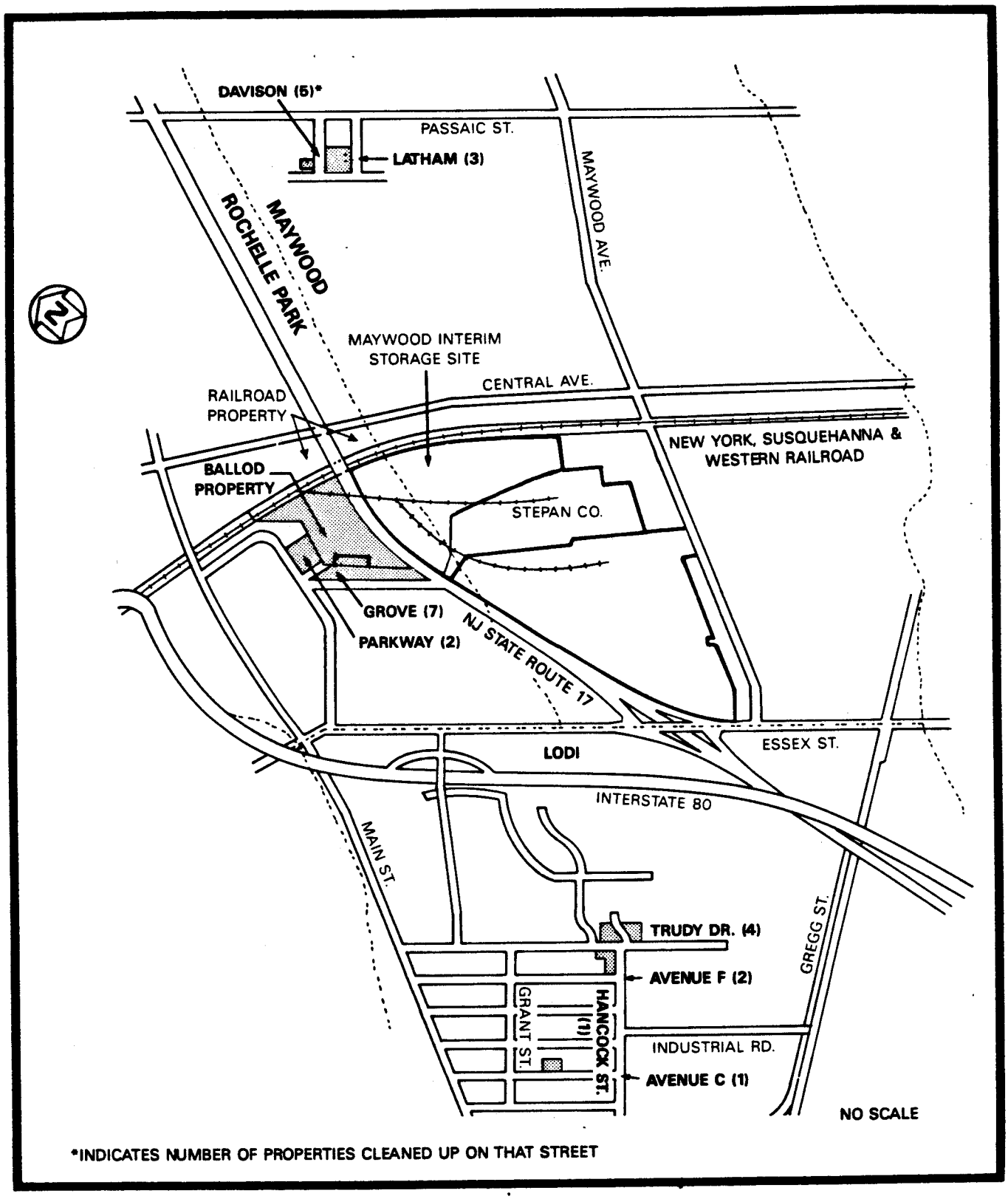

FIGURE 1-1 LOCATION OF PROPERTIES

2.0 SITE HISTORY

The Maywood Chemical Works was founded in 1895. During World War I (in 1916), the company began processing thorium from monazite sand for use in manufacturing gas mantles for various lighting devices. The company continued this work until 1956. Process wastes from manufacturing operations were pumped to two areas surrounded by earthen dikes (northern and southern diked areas) on property west of the plant. Subsequently, some of the contaminated wastes migrated onto adjacent properties on Grove Avenue and Parkway. In 1932, Route 17 was built through the Maywood Chemical Works property, separating the disposal area from the remainder of the property. Several access roads were constructed under Route 17, apparently to allow continued access to the disposal area (Refs. 2 - 5).

Over a period of time, some of the residues from the processing operations were moved from the company's property and used as landfill in nearby low-lying areas. In 1928, the Maywood Chemical Works allowed process wastes to be removed from the processing site to nearby properties for use as mulch and fill. Again between 1944 and 1946, some of the waste was trucked from the plant site to a then vacant lot (464 Davison Street) to raise the grade at the lot and to fill in a ditch that traversed the back of several lots between Davison and Latham Streets. The fill material consisted of tea and cocoa leaves mixed with other material resulting from operations at the plant, and apparently also contained thorium process wastes. Several nearby residents used the material dumped at 464 Davison Street in their lawns and gardens. Subsequently, the lot at 464 Davison was sold and a house was constructed on it in 1967 (Refs. 2 - 5).

Unlike the Davison and Latham properties in Maywood, it is not known for certain how the properties in Lodi were contaminated. According to an area resident, fill from an unknown source was brought to Lodi and spread over large portions of the previously low-lying and

swampy area. For several reasons, however, a more plausible explanation is that the contamination migrated along a drainage ditch originating on the Maywood Chemical Works property. It can be seen from photographs and tax maps of the area that the course of a previously existing stream known as Lodi Brook, which originated at the former Maywood Chemical Works, generally coincides with the path of contamination in Lodi. The brook was subsequently replaced by a storm drain system as the area was developed. Secondly, samples taken from Lodi properties indicate elevated concentrations of a series of elements known as rare earths. Rare earth elements are typically found in monazite sands, which also include thorium. This type of sand was feedstock at the Maywood Chemical Works, and elevated levels are known to exist in the by-product of the extraction process. Third, the ratio of thorium to other radionuclides found in Lodi is comparable to the ratio of those found in Maywood and Rochelle Park. And finally, long-time residents of Lodi recall chemical odors in and around the brook in Lodi, and have seen steam rising off the water. These observation suggest discharges of contaminants occurring upstream.

In 1954, the Atomic Energy Commission (AEC) issued a license to the Maywood Chemical Works to possess, process, manufacture, and distribute radioactive materials. This license allowed manufacturing activities to continue under the Atomic Energy Act of 1954 (Refs. 2 - 5).

The Stepan Chemical Company [now called the Stepan Company (SC)] purchased Maywood Chemical Works in 1959. The Stepan Company itself has never been involved in the manufacture or processing of any radioactive materials (Refs. 2 - 5).

In 1961, the SC was issued an AEC radioactive materials storage license. Based on AEC inspections of and information related to the property on the western side of Route 17, the SC agreed to take remedial action in that area and began in 1963 to clean up piles of thorium waste. As a result, residues and tailings (also known as slurry pile) on the property west of Route 17 (the Ballod property)

were partially stabilized. In 1966, waste was removed from the area west of Route 17 and buried east of the highway in an area that is now under a lawn on the SC property. In 1967, waste was removed from the same general area and buried under what is now a plant parking lot. In 1968, the SC obtained permission from the AEC to relocate additional waste from west of Route 17. This waste was taken from the southern diked area and buried in an area where a warehouse was later built.

At the request of the SC, a radiological survey of the company's property east of Route 17 was made by the AEC in 1968. Based on the findings of that survey, clearance was granted for unrestricted release of the property. At the time of the survey, however, the AEC was not aware of waste material still present west of Route 17. Late in 1968, the property west of the highway was sold by SC and in the late 1970s was resold to Ballod Associates. Until the remedial action in 1985, the area had been used for unauthorized trash disposal by the local residents and by local youths who played there (Refs. 2 - 5).

3.0 SITE DESCRIPTION

The properties discussed in this report are referred to as four distinct groups of properties because of either their location or the timing of the remedial action. These properties are described briefly below.

3.1 BALLOD ASSOCIATES PROPERTY

The Ballod Associates property is a vacant tract of approximately 7 acres located in Rochelle Park, New Jersey. This property is bounded on the east by New Jersey State Highway 17, on the north by the New York, Susquehanna and Western Railroad, and on the south and west by residential properties on Grove Avenue and Parkway.

3.2 GROVE AVENUE AND PARKWAY PROPERTIES

Remedial action was performed at nine residential properties on Grove Avenue and Parkway that border the Ballod property on the south (Grove Avenue) and the west (Parkway). These properties are:

10 Grove Avenue	86 Parkway
22 Grove Avenue	90 Parkway
26 Grove Avenue	
30 Grove Avenue	
34 Grove Avenue	
38 Grove Avenue	
42 Grove Avenue	

3.3 LODI PROPERTIES

During the course of various radiological surveys performed in areas near the SC plant, contamination was found at eight residences in Lodi, New Jersey, located southeast of the SC plant. These properties are:

59 Avenue C	58 Trudy Drive
121 Avenue F	59 Trudy Drive
123 Avenue F	61 Trudy Drive
3 Hancock Street	64 Trudy Drive

3.4 DAVISON AND LATHAM PROPERTIES

Eight residential properties were decontaminated and restored on Davison and Latham Streets located north of the SC plant. These properties are:

454 Davison Street	459 Latham Street
459 Davison Street	461 Latham Street
460 Davison Street	467 Latham Street
464 Davison Street	
468 Davison Street	

4.0 RADIOLOGICAL HISTORY AND STATUS

The radiological history presented covers the period from 1980 to the completion of remedial action. Details of the 1968 AEC inspections and surveys of the SC property and the property east of Route 17 are not addressed.

4.1 RADIOLOGICAL SURVEYS

The first indication that additional radioactive material was present in the vicinity of the SC plant came on September 29, 1980. The New Jersey Department of Environmental Protection (NJDEP) received a letter from a private citizen, who reported that he had found radioactive contamination near Route 17 in Rochelle Park. The man had been searching for a sealed radioactive source that was thought to have been lost in the area. The NJDEP conducted a radiological survey in the area, both on SC property and west of Route 17 and south of Central Avenue (i.e., the Ballod property). An analysis of its samples identified the presence of radioactive material in the form of thorium-232 and radium-226. The Region I office of the Nuclear Regulatory Commission (NRC) was notified of these findings on November 5, 1980 (Ref. 2). (The AEC was replaced by the NRC and the Energy Research and Development Administration in 1974, with the NRC assuming regulatory responsibilities.)

NRC inspectors conducted additional surveys of the SC and the Ballod properties in November and December 1980 and in January 1981. The results confirmed the existence of contamination in the area. On the SC property, thorium-232 concentrations of up to 3000 pCi/g were found in the soil samples. In the formerly diked areas on the Ballod property, soil samples contained as much as 3975 pCi/g of thorium-232 (Ref. 2).

As a result of these findings, the NRC requested a comprehensive survey of the SC property and vicinity. An aerial radiological survey of a 4-square-mile area centered on the SC plant was conducted by EG&G in late January 1981 (Ref. 6), and a separate

ground survey of the Ballod property was performed by Oak Ridge Associated Universities (ORAU) in February 1981 (Ref. 3). The ORAU survey resulted in the designation of the Ballod property for remedial action (Ref. 7). In addition to the contamination on the SC plant and Ballod properties, the EG&G survey identified anomalous concentrations of thorium-232 to the north of the SC plant (the Davison and Latham properties) and to the south. The ORAU survey of the Ballod property showed results similar to the NRC survey -- soil samples contained 2500 pCi/g of thorium-232.

In a separate survey, the SC commissioned Henry W. Morton and Nuclear Safety Associates to conduct a survey of the SC and Ballod properties (Ref. 4). This survey was conducted in June 1981 and corroborated previous survey results.

To investigate the EG&G measurements from the Davison and Latham properties, DOE requested Oak Ridge National Laboratory (ORNL) to conduct a ground survey of the area. The survey was performed in June 1981 and confirmed the elevated concentrations of thorium-232 (Refs. 8 - 15). The contamination was found primarily where soil had been used for fill and in gardens as mulch. At one property (464 Davison), however, it was learned that many truckloads of fill had been taken from the plant site to raise the grade of the lot and to fill in a ditch that traversed the back of several lots on Davison and Latham Streets. The property was a vacant lot when the fill was placed, and remained so until 1967 when a house was built on it. As a result of the ORNL survey (thorium-232 measurements ranging from 7 to 5500 pCi/g), eight properties were designated for remedial action (Refs. 7 - 16).

In late 1983, Bechtel National, Inc. (BNI) conducted a radiological survey of the Grove Avenue and Parkway properties to determine whether contamination had migrated from the Ballod property onto these residential lots (Refs. 17 - 25). On the basis of this survey, nine properties were designated for remedial action (Refs. 26 and 27). BNI also performed a characterization of the Ballod property from November 1984 to March 1985 (Ref. 28).

In June 1984 ORNL conducted a "drive by" survey of Lodi using its "scanning van." Although not comprehensive, the survey indicated areas requiring further investigation (Ref. 29). Based on these results, ORNL and BNI conducted more thorough surveys of the area (Refs. 30 - 38). Of the 10 properties surveyed, eight were designated for remedial action (Refs. 39 - 41).

4.2 REMEDIAL ACTION GUIDELINES

The radioactive contamination on these properties consisted primarily of thorium-232, with lesser amounts of radium-226 and uranium-238. Table 4-1 summarizes the DOE guidelines for residual contamination; the complete guidelines are provided in Appendix A. DOE used the thorium-232 and radium-226 limits listed in Table 4-1 to determine the need for remedial action at these properties. DOE implemented these guidelines on the basis of their compatibility with the criteria used by the Environmental Protection Agency (Ref. 42). The design criteria document for FUSRAP contains additional information regarding applicable federal regulations (Ref. 43).

4.3 POST-REMEDIAL ACTION STATUS

As shown in the post-remedial action reports for these properties (Refs. 44 - 47), the soil samples taken after removing the radioactive materials show that there is no area on them where radioactive contamination exceeds DOE guidelines. An independent review of the remedial action performed on the parcels discussed in this report has been conducted by an independent verification contractor (IVC), the Radiological Survey Activities Group of ORNL. The purpose of its assessment was to verify the data supporting the adequacy of the remedial action performed by BNI and to confirm the site's compliance with remedial action criteria.

Based on all data collected, these parcels conform to all applicable DOE radiological guidelines established for the unrestricted release of these properties (Refs. 48 - 73).

TABLE 4-1

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES

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

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

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 has no radiological restrictions its 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 that has no radiological restrictions on its use shall not exceed the background level by more than 20 uR/h.

Indoor/Outdoor Structure Surface Contamination

Radionuclide[f]	Allowable Surface Residual Contamination[e] (dpm/100 cm^2) 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

TABLE 4-1

(continued)

Indoor/Outdoor Structure Surface Contamination (continued)

Radionuclide[f]	Allowable Surface Residual 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 allowable 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 over 100 m^2 is not exceeded.

[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.

5.0 SUMMARY OF REMEDIAL ACTION

The following subsections briefly describe the remedial action process and measures taken to protect the public and the environment.

5.1 PRE-REMEDIAL ACTION ACTIVITIES

Based on the radiological survey results, DOE "designated" properties for remedial action, i.e., when radionuclide concentrations exceed the guidelines listed in Table 4-1, contamination is removed from the property until the concentrations are within guideline values.

Alternatives to the remedial action and methods for performing the remedial action were then considered. For these properties, two alternatives were evaluated (Ref. 74).

One alternative was to take no action. This would have resulted in continued exposure of people living on the contaminated properties to elevated levels of radioactivity and continued adverse social impacts such as concerns about health effects and property values (Ref. 74).

A second alternative was to excavate the contaminated soil and transport it as well as any other contaminated materials from the property. This alternative was chosen (Ref. 74).

Before the Project Management Contractor, BNI, performed remedial action, however, access agreements had to be obtained from individual property owners authorizing entry to the property and granted permission to do the work. The agreement, designated a Memo Agreement, granted DOE and its contractors the right to perform the remedial action. It also stated the scope of work, DOE responsibilities, and the plan to restore the properties to an "as was" condition. Concurrently, BNI began engineering design work and related activities to hire local subcontractors to perform the cleanup work (Refs. 75 and 76).

5.2 DECONTAMINATION ACTIVITIES

After the access agreements had been reached, the design work completed, and a subcontract awarded, the local subcontractor began work. The subcontractor excavated the property based on drawings showing the extent of the contamination for each property. The subcontractor then removed the soil as indicated in the drawings, placed it in watertight dump trucks, and transported it to an interim storage pile at the Maywood Interim Storage Site (MISS), which is adjacent to Stepan Company plant. The MISS is an engineered storage facility developed to store the contaminated material from properties in the area until a permanent disposal site is selected (Ref. 77). It is designed to provide safe, stable storage of the contaminated materials for up to 25 years. An environmental monitoring program is in effect for the facility. The program monitors all potential release pathways from the facility, and an environmental monitoring report for the MISS is issued each year by DOE.

After the radioactively contaminated materials were removed, the properties were restored to their original condition. This included backfilling the excavation followed by sodding and/or seeding. If shrubbery or trees were removed during the cleanup, they were replaced or alternative arrangements were made with the individual property owners. In some cases, removing the contamination necessitated alterations to buildings, fences, or pavement. If this occurred, the affected structures were restored.

During the cleanup, several procedures were implemented to control the radioactive materials being removed from the properties. These procedures were designed to minimize the exposure of workers and residents.

The primary pathway by which residents could be exposed to radiation was from dust released during the excavation. To minimize this, the subcontractor was required to keep all excavations and work areas

free from dust by keeping the soil moistened. Air sampling was performed at the perimeter of the excavation areas to demonstrate compliance with DOE and NJDEP standards for airborne radioactivity. These samples are collected by pulling large quantities of air through a filter. Airborne dust, which could potentially contain radioactive materials, is captured by the filter. The filters are then removed and analyzed for radioactivity. Because the amount of air drawn through the filter is known, the concentration of radioactivity in the air can be calculated. None of the measured radioactivity concentrations in air exceeded the applicable DOE guidelines and NJDEP standards.

To keep uncontaminated areas clean during excavation work, trucks were draped with tarpaulins before they were filled. This prevented the contaminated dirt from getting on the truck exterior and later falling off on clean property. If trucks were to be loaded on a clean area, the ground was covered with a tarpaulin before the truck pulled onto it for loading. If contaminated soil was spilled during the loading of the truck, this tarpaulin prevented the contamination of clean ground. Finally, all trucks hauling radioactively contaminated soil were loaded only to about 80 percent of their capacity and truck beds were covered before moving. This too prevented soil from falling or being blown out of the truck onto clean ground or roadways while being transported.

After the trucks had dumped the contaminated soil at the MISS, they were decontaminated before being permitted on any public road. This procedure ensured that no contamination was brought back onto roads or to the residences.

Using this combination of procedures, the subcontractor controlled the contamination and prevented its spread outside controlled areas.

The remedial action at the 26 properties resulted in a total of 34,895 yd^3 waste material that is in interim storage at the MISS.

5.3 POST-REMEDIAL ACTION SAMPLING

After the soil containing the radioactive contaminants was removed, another radiological survey was conducted to ensure that the property was clean (no radionuclide concentrations in excess of DOE guidelines). This survey used the techniques outlined below.

5.3.1 Surface Gamma Radiation Scans

Two types of gamma radiation scans were conducted to determine whether all radioactively contaminated soil was removed. The first was a "walkover" scan. In this type of survey, the technician holds the radiation detector a few inches above the surface and moves it slowly from side to side as he walks over the excavated area. The purpose of a walkover scan is to quickly detect areas of residual contamination. The advantage of this type of survey is that the detector quickly scans the area as the excavation proceeds.

The second gamma radiation scan was performed after all contamination detected by the walkover scan was removed. This survey used a lead-shielded detector to ensure that the only radiation detected was coming from the ground under the detector. Measurements were made on each property at 10-ft intervals to ensure that the property had been cleaned of radioactively contaminated soil.

5.3.2 Soil Sampling

The primary method of ensuring compliance with DOE cleanup guidelines was to take soil samples. These samples were analyzed in a laboratory to determine the concentrations of thorium-232, radium-226, and uranium-238.

5.3.3 Exposure Rate Measurements

Pressurized ionization chamber (PIC) readings were taken to measure the gamma radiation exposure rate after removal of the

contamination. The PIC measurements were taken at various locations on the properties.

Exposure to gamma radiation was also measured by placing thermoluminescent dosimeters (TLD) in some homes. A TLD is a radiation measuring device left in place for an extended period, typically a month, and then removed and sent to a laboratory for analysis. This analysis determines how much gamma radiation was absorbed by the TLD, and this dose is an indication of the radiation exposure of the resident.

Measured gamma radiation exposure rates were used to calculate annual doses assuming a conservative period of exposure at the point of measurement. A background radiation contribution of 100 mrem/yr was subtracted from the calculated dose. For comparison, the DOE radiation protection standard is 100 mrem/yr above the background level. None of the PIC or TLD readings exceeded this level.

5.3.4 Radon Monitoring

Because radium was one of the radioactive materials found in the wastes, radon and radon decay products were monitored inside some of the homes. Radon is produced from the radioactive decay of radium and can be used as an indicator of the presence of radium. Based on post-remedial sampling, none of the levels at the properties exceeded guidelines.

5.4 VERIFICATION ACTIVITIES

The independent verification contractor (IVC) is responsible for preparing a generic plan outlining the procedures to be used during verification activities. The IVC may conduct two types of verification reviews (Types A and B) at a site or group of properties. Type A verification reviews include a review of the remedial action and radiological contractors' data and possibly the analyses of some samples. Type B verification reviews include an

on-site visit and survey involving direct measurements and sampling and/or split sample analyses. The IVC may increase or decrease the scope of the verification survey on the basis of field data.

In addition to the surveys that have been performed on behalf of DOE (see Section 4.3), measures were taken by the NJDEP to monitor remedial action activities. During the 1984 and 1985 remedial action activities, NJDEP representatives made weekly visits to the sites. They observed construction procedures and techniques and compared them to previously published descriptions (Refs. 75 and 76). BNI worked closely with NJDEP representatives, and used several suggestions from them to revise the procedures of the radiological support contractor. Additionally, copies of the post-remedial action reports were transmitted to the NJDEP for its review.

After remedial action was complete, NJDEP officials conducted an independent analysis of soil samples. Archived soil samples were requested from DOE and analyzed.

5.5 PUBLIC AND OCCUPATIONAL EXPOSURES

5.5.1 Public Exposure

As shown in the post-remedial action reports for each of the vicinity properties (Refs. 44 - 47), the radiological exposure to the residents following remedial action is less than 100 mrem/yr above the background level. This is true for the total dose from all pathways.

5.5.2 Occupational Exposure

A health physics program was conducted during remedial action using contamination control, management of occupational exposures, and radiological monitoring.

All occupational exposures were within DOE guidelines. The maximum dose equivalent measured from TLDs was less than 3 percent of the DOE guidelines. The maximum bioassay results were 56 percent of the DOE guidelines from radium-226 and 33 percent of the DOE guidelines for total uranium. There was no detectable thorium-232.

Data from the post-remedial action radiological monitoring of each property is presented in detail in the post-remedial action reports (Refs. 44 - 47). A summary of airborne radiological monitoring from these reports is presented in Table 5-1.

5.6 COST

The final subcontract bid item quantities and cost for the remedial action are given in Tables 5-2, 5-3, and 5-4. Table 5-2 gives the costs for the cleanup of the Davison and Latham and Grove and Parkway properties, and a small part of the Ballod property. Table 5-3 provides the costs for the major Ballod cleanup performed in 1985. Table 5-4 lists the costs for the cleanup of the Lodi properties.

TABLE 5-1

POST-REMEDIAL ACTION AIR MONITORING SUMMARY

	Units	Number of Measurements	Average	Range	DOE Guidelines	Percentage of DOE Standard
Air radon	pCi/l	11	0.73	0-1.3	3.0	24.0
Air radon decay products	WL	56	0.003	<0.001-0.020	0.02	15.0
Air particulates	10^{-14}uCi/ml	216	1.3	0.05-2.3	100	1.3

TABLE 5-2

REMEDIAL ACTION COSTS AT DAVISON AND LATHAM STREETS, GROVE AVENUE AND PARKWAY, AND PART OF THE BALLOD PROPERTY[a]

Description	Final Quantity	Unit Price ($)	Final Amount ($)
Mobilization	ls[b]	59,000.00	59,000.00
Clearing	ls	24,000.00	24,000.00
Removal and replacement of fencing	ls	7,000.00	7,000.00
Removal and restoration of fencing	ls	2,000.00	2,000.00
Additional fence	465 lf	10.00	4,650.00
Temporary security fence	ls	5,500.00	5,500.00
Haul road	ls	23,000.00	23,000.00
Traffic control	ls	11,000.00	11,000.00
Operation of vehicle decontamination facility	ls	12,500.00	12,500.00
Basement insulation and preparation at 464 Davison	ls	4,300.00	4,300.00
Contaminated concrete and bituminous concrete breakup	ls	33,000.00	33,000.00
Basement floor breakup	ls	11,300.00	11,300.00
Excavation of contaminated material	ls	75,000.00	75,000.00
Contaminated excavation under basement floor slab	ls	15,500.00	15,500.00
Repair and replacement of utility lines	ls	5,000.00	5,000.00
Backfill	ls	80,000.00	80,000.00
Topsoil	ls	23,000.00	23,000.00
Hot spot topsoil	183.7 yd^2	49.70	9,129.89
Sodding	ls	43,000.00	43,000.00
Additional sod	9923 ft^2	1.71	16,968.00
Grass establishment	ls	2,450.00	2,450.00
Landscaping	ls	27,000.00	27,000.00
Demobilization	ls	2,500.00	2,500.00
Furnishing and installing low permeability membrane	23,310 ft^2	1.50	34,965.00
Concrete work	85.25 yd^3	160.00	13,640.00
Bituminous concrete	439 yd^2	45.00	19,755.00
Soil Sterilization	16,500 ft^2	.10	1,667.00
Surface Water diversion	650 lf	22.50	14,625.00

TABLE 5-2
(continued)

Description	Final Quantity	Unit Price ($)	Final Amount ($)
Remedial work at 10 Grove Avenue	ls	10,937.23	10,937.23
Remove and replace brickwall	ls	4,397.07	4,397.07
Remedial work at 38 Grove Avenue	ls	10,814.38	10,814.38
Drainage improvement	ls	2,919.00	2,919.00
Hot spot contaminated material excavation	1969 yd^3	30.00	59,070.00
Backfill	1623 yd^3	26.00	42,198.00
House jacking and wall removal/replacement	ls	67,500.00	67,500.00
Concrete sidewalk	290 ft^2	3.50	1,015.00
House painting	ls	2,000.00	2,000.00
		TOTAL	782,300.57

[a]See Figure 1-1 for section of Ballod property that is included in this table.

[b]Lump sum is abbreviated as "ls."

TABLE 5-3

REMEDIAL ACTION COSTS AT THE BALLOD PROPERTY

Description	Final Quantity	Unit Price ($)	Final Amount ($)
Mobilization	ls	19,740.00	19,740.00
Haul roads	ls	9,800.00	9,800.00
Remove hypalon liner (app. 27,000 ft^2)	ls	5,000.00	5,000.00
Removal and reinstallation of power poles (3)	ls	4,500.00	4,500.00
Relocate existing contaminated stockpile (app. 4,700 yd^3)	ls	2,000.00	2,000.00
Demobilization	ls	7,119.60	7,119.60
Relocated existing organic stockpile	ls	800.00	800.00
Clearing	9.2 acres	500.00	4,600.00
Reroute water line	559 lf	30.00	16,770.00
Construct leachate collection system			
A. Silty sand	1,740.1 yd^3	7.00	12,180.70
B. New hypalon liner	95,060.5 ft^2	0.45	42,777.23
C. Sand	1,740.1 yd^3	10.00	17,401.00
D. Sump	3 ea	1,413.25	4,239.75
Grass establishment	0.9 acres	2,000.00	1,800.00
Excavate uncontaminated material	1,900 yd^3	18.47	35,093.00
Excavate uncontaminated material	1,509 yd^3	13.47	20,326.23
Excavate contaminated material	14,000 yd^3	32.47	454,580.00
Backfill			
A. On-site source	3,409 yd^3	2.00	6,818.00
B. Off-site source	16,900 yd^3	5.00	84,500.00
Stockpiling contaminated material delivered by others	496 yd^3	1.00	496.00
Soil sterilization	76,233 ft^2	0.02	1,524.66
Furnish and install hypalon stockpile cover	76,233 ft^2	0.45	34,304.85
Silt fence	215 lf	3.25	698.75
Construct temporary fence	ls	3,636.00	3,636.00
Off-site backfill	4,848 yd^3	5.00	24,240.00
Excavation of contaminated material	15,709 yd^3	28.00	439,852.00
Clearing and grubbing	ls	7,500.00	7,500.00
Cover leachate	ls	730.00	730.00
Tree removal	ls	340.00	340.00
Hot spots and exploratory holes	ls	4,050.00	4,050.00
		TOTAL	1,267,417.77

TABLE 5-4

REMEDIAL ACTION COSTS AT THE LODI PROPERTIES

Description	Final Quantity	Unit Price ($)	Final Amount ($)
Mobilization	ls	2,000.00	2,000.00
Traffic control	ls	600.00	600.00
Gravel	6.1 yd^3	50.00	305.00
Topsoil	74.5 yd^3	55.00	4,097.50
Sodding	1,364.8 yd^3	14.00	19,107.20
Excavate contaminated material	400 yd^3	130.00	52,000.00
Hand excavation	95.2 yd^3	225.00	21,420.00
Backfill	417 yd^3	39.00	16,263.00
Remove and replace concrete	965.3 ft^2	8.25	7,963.73
Remove and replace bituminous concrete	287 ft^2	11.50	3,300.50
Fence	82 lf	12.00	984.00
Masonry wall	11 lf	50.00	550.00
Clearing	ls	4,000.00	4,000.00
Trees (2)	ls	500.00	500.00
Trees (3)	ls	1,000.00	1,000.00
Temporary fence	ls	1,500.00	1,500.00
Remove sod	1,617.6 ft^2	1.35	2,183.76
Remove tree at 3 Hancock Street	100%	500.00	500.00
PVC pipe	81 lf	8.00	648.00
Concrete curb	ls	850.00	850.00
		TOTAL	139,772.69

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GLOSSARY

Alpha-emitting - See radiation.

Background Radiation - Background radiation refers to naturally occurring radiation emitted from either cosmic (e.g., from the sun) or terrestrial (e.g., from the earth) sources. Exposure to this type of radiation is unavoidable and its level varies greatly depending on geographic location; e.g., New Jersey typically receives 100 mrem/yr, Colorado receives about 300 mrem/yr, and some areas in South America receive up to 7000 mrem/yr. Naturally occurring terrestrial radionuclides include uranium, radium, potassium, thorium, etc. These dose levels do not include the concentrations of naturally occurring radon inside buildings.

Beta radiation - See radiation.

Counts per minute - A count is the unit of measurement registered by a radiation detection instrument when radiation imparts its energy within the sensitive range of the detector probe. The number of counts registered per minute can be related to the number of disintegrations per minute occurring from a radioactive material.

Disintegrations per minute - Disintegrations per minute is the measurement indicating the amount of radiation being released from a substance per minute. See the definition of picocurie.

Dose - Dose as used in this report is actually dose equivalent and is used to relate absorbed dose (mrad) to an effect on the body. Dose is measured in mrem. Examples of dose are: a dose of 500,000 mrem to the whole body in a short time causes death in 50 percent of the people who receive it; a dose of 5,000,000 mrem may be delivered to a cancerous tumor during radiation treatment; normal background radiation results in an annual dose of about 100 mrem; DOE radiation protection standards limit the dose to members of the general public to 100 mrem/yr above background levels; living in a brick house results in a dose of about 75 mrem/yr above background.

Exposure rate - Exposure rate is the rate at which radiation imparts energy to the air. Exposure is typically measured in microroentgens (uR) and the exposure rate is typically given as uR/h. The dose to the whole body can be approximated by multiplying the exposure rate by the number of hours of exposure. For example, if an individual were exposed to gamma radiation at a rate of 20 uR/h for 168 hours per week (continuous exposure) for 52 weeks per year, the whole-body dose would be 170 mrem.

Gamma Radiation - See radiation.

Gram - A gram is a metric unit for weight. It takes 454 grams to make 1 pound; 1 ounce equals 28 grams.

Leaching - Leaching is a chemical process whereby the radionuclides from the ore residues were dissolved in water (runoff following precipitation) and seeped into the surrounding soil. Storage piles of radioactive materials are usually covered with waterproof materials to prevent leaching.

Liter - A liter (l) is a metric unit of volume or capacity. One liter equals 1.057 quarts of liquid.

Meter - A meter is a metric unit of measurement for length; 1 meter is equal to approximately 39 inches.

Microcurie - A microcurie is 1,000,000 picocuries (see picocuries for additional explanation).

Microroentgen - A microroentgen (uR) is a unit used to measure radiation exposure. For further information, see the definition of exposure rate.

Milliliter - A milliliter is a unit of measure for volume. There are 3785 ml in 1 gallon.

Millirad - Millirad is a measure of the amount of energy imparted by radiation to a unit of mass. An absorbed dose rate is generally expressed in terms of mrad/h.

Millirem - millirem is the unit used to measure radiation doses to man. The DOE limit is 100 mrem above background radiation levels for members of the general public in any one year. Naturally occurring radioactive substances in the ground result in a yearly exposure to everyone of about 100 mrem. To date, no difference can be detected in the health of population groups exposed to 100 mrem/yr above background and in the health of groups who are not exposed.

Monazite - Monazite is a mineral which contains unusually high concentrations of thorium and rare earth metals. Monazite is often found in sand and gravel deposits.

Picocurie - A picocurie is the unit of measure for radioactivity just as an ounce is a unit to measure weight. One picocurie means that one radioactive particle is released on the average of every 27 seconds.

Radiation - There are three primary types of radiation: alpha, beta, and gamma. Alpha radiation travels less than an inch in air before it stops. Alpha radiation cannot penetrate the outer layer of skin on the body. Beta radiation can penetrate the outer layers of skin, but cannot reach the internal organs of the body. Gamma radiation is the most penetrating type and can usually reach the internal organs.

Radioactive decay - Radioactive decay is the nuclear transformation of an element from one state into another and may include the change in the number protons, a change in neutrons, or a change in energy state. For example, the following chain describes the radioactive decay of uranium-238: uranium-238 -- thorium-234 -- protactinium-234 -- uranium-234 -- thorium-230 -- radium-226 -- radon-222 -- polonium-218 -- lead-214 -- bismuth-214 -- polonium-214 -- lead-210 -- bismuth-210 -- polonium-210 -- lead-206. Lead-206 is stable; therefore the original atom of uranium-238 has become one of lead-206 and is no longer radioactive.

Radionuclide - A radionuclide is another word meaning a particular radioactive element. For example, uranium-235 is a radionuclide, uranium-238 is another, thorium-232 another, and so on.

Radium-226 - Radium-226 is a naturally occurring, radioactive material that spontaneously emits alpha radiation.

Radon - Radon is a noble gas generated when radium-226 radioactively decays. Because it is a gas, it seeps out of the soil containing the radium-226 and concentrates in confined areas. The presence of radon can be used to infer the presence of radium-226.

Radon daughters - When radon undergoes radioactive decay, it emits alpha radiation. After this occurs, it is no longer radon and has become polonium. This is also radioactive and decays to radioactive lead by emitting alpha radiation. This process continues (see radioactive decay) until the material becomes stable lead and is no longer radioactive. The "parent" radionuclide for this chain of radioactive decay was the radon. All radioactive material resulting from the decay of the radon are called radon daughters.

Rare Earths - Rare earths refers to various types of metals present in the monazite sands. These were extracted from the monazite for their value. Rare earth metals include cerium, lanthanum, praseodymium, and neodymium.

Remedial Action - Remedial action is a general term used to mean "cleanup of contamination that exceeds DOE guidelines." It refers to any action required so that a property can be authorized for unrestricted release. In practice, this may mean removing grass and soil, cutting trees, removing asphalt, etc. Remedial action also includes restoring remediated properties to their original conditions, to the extent that this is possible.

Thorium - Thorium is a naturally occurring element which is recovered from monazite for commercial purposes. Monazite contains from 3 to 9 percent thorium oxide. The principal use of thorium to date has been in the manufacture of gas lantern mantles because thorium oxide burns with a brilliant white light. Thorium oxide is also commonly found in high quality glasses and camera lenses because of its good optical characteristics.

Unrestricted Release - Unrestricted release means that the radiological condition of a property is such that no restrictions need be placed on the property to ensure that individuals using the site will not be exposed to levels of residual radioactivity that will result in doses in excess of guidelines or applicable limits.

Uranium - Uranium is a naturally occurring, radioactive element. The principal use of uranium -- when refined -- is for the production of fuel for nuclear reactors. Uranium in its natural form is not suitable for use as a fuel source.

Working Level - Working level is a unit to measure the energy expended in air by radon or its radioactive decay products. The term was derived to measure radon progeny concentrations to which uranium miners were exposed.

APPENDIX A

U.S. DEPARTMENT OF ENERGY
GUIDELINES FOR RESIDUAL RADIOACTIVITY AT
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM
AND
REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

U.S. DEPARTMENT OF ENERGY GUIDELINES
FOR RESIDUAL RADIOACTIVITY AT
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM
AND
REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

(Rev. 1, July 1985)

A. INTRODUCTION

This document presents U.S. Department of Energy (DOE) radiological protection guidelines for cleanup of residual radioactive materials and management of the resulting wastes and residues. It is applicable to sites identified by the Formerly Utilized Sites Remedial Action Program (FUSRAP) and remote sites identified by the Surplus Facilities Management Program (SFMP).* The topics covered are basic dose limits, guidelines and authorized limits for allowable levels of residual radioactivity, and requirements for control of the radioactive wastes and residues.

Protocols for identification, characterization, and designation of FUSRAP sites for remedial action; for implementation of the remedial action; and for certification of a FUSRAP site for release for unrestricted use are given in a separate document (U.S. Dept. Energy 1984). More detailed information on applications of the guidelines presented herein, including procedures for deriving site-specific guidelines for allowable levels of residual radioactivity from basic dose limits, is contained in a supplementary document--referred to herein as the "supplement" (U.S. Dept. Energy 1985).

"Residual radioactivity" includes: (1) residual concentrations of radionuclides in soil material,** (2) concentrations of airborne radon decay products, (3) external gamma radiation level, and (4) surface contamination. A "basic dose limit" is a prescribed standard from which limits for quantities that can be monitored and controlled are derived; it is specified in terms of the effective dose equivalent as defined by the International Commission on Radiological Protection (ICRP 1977, 1978). Basic dose limits are used explicitly for deriving guidelines for residual concentrations of radionuclides in soil material, except for thorium and radium. Guidelines for

*A remote SFMP site is one that is excess to DOE programmatic needs and is located outside a major operating DOE research and development or production area.

**The term "soil material" refers to all material below grade level after remedial action is completed.

residual concentrations of thorium and radium and for the other three quantities (airborne radon decay products, external gamma radiation level, and surface contamination) are based on existing radiological protection standards (U.S. Environ. Prot. Agency 1983; U.S. Nucl. Reg. Comm. 1982). These standards are assumed to be consistent with basic dose limits within the uncertainty of derivations of levels of residual radioactivity from basic limits.

A "guideline" for residual radioactivity is a level of residual radioactivity that is acceptable if the use of the site is to be unrestricted. Guidelines for residual radioactivity presented herein are of two kinds: (1) generic, site-independent guidelines taken from existing radiation protection standards, and (2) site-specific guidelines derived from basic dose limits using site-specific models and data. Generic guideline values are presented in this document. Procedures and data for deriving site-specific guideline values are given in the supplement.

An "authorized limit" is a level of residual radioactivity that must not be exceeded if the remedial action is to be considered completed. Under normal circumstances, expected to occur at most sites, authorized limits for residual radioactivity are set equal to guideline values. Exceptional conditions for which authorized limits might differ from guideline values are specified in Sections D and F. A site may be released for unrestricted use only if the residual radioactivity does not exceed guideline values at the time remedial action is completed. Restrictions and controls on use of the site must be established and enforced if the residual radioactivity exceeds guideline values. The applicable controls and restrictions are specified in Section E.

DOE policy requires that all exposures to radiation be limited to levels that are as low as reasonably achievable (ALARA). Implementation of ALARA policy is specified as procedures to be applied after authorized limits have been set. For sites to be released for unrestricted use, the intent is to reduce residual radioactivity to levels that are as far below authorized limits as reasonable considering technical, economic, and social factors. At sites where the residual radioactivity is not reduced to levels that permit release for unrestricted use, ALARA policy is implemented by establishing controls to reduce exposure to levels that are as low as is reasonably achievable. Procedures for implementing ALARA policy are described in the supplement. ALARA policies, procedures, and actions must be documented and filed as a permanent record upon completion of remedial action at a site.

B. BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 500 mrem/yr for a period of exposure not to exceed 5 years and an average of 100 mrem/yr over a lifetime. The committed effective dose equivalent, as defined in ICRP Publication 26 (ICRP 1977) and calculated by dosimetry models described in ICRP Publication 30 (ICRP 1978), shall be used for determining the dose.

C. GUIDELINES FOR RESIDUAL RADIOACTIVITY

C.1 Residual Radionuclides in Soil Material

Residual concentrations of radionuclides in soil material shall be specified as above-background concentrations averaged over an area of 100 m^2. If the concentration in any area is found to exceed the average by a factor greater than 3, guidelines for local concentrations shall also be applicable. These "hot spot" guidelines depend on the extent of the elevated local concentrations and are given in the supplement.

The generic guidelines for residual concentrations of Th-232, Th-230, Ra-228, and Ra-226 are:

- 5 pCi/g, averaged over the first 15 cm of soil below the surface
- 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface

These guidelines take into account ingrowth of Ra-226 from Th-230 and of Ra-228 from Th-232, and assume secular equilibrium. If either Th-230 and Ra-226 or Th-232 and Ra-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. Explicit formulas for calculating residual concentration guidelines for mixtures are given in the supplement.

The guidelines for residual concentrations in soil material of all other radionuclides shall be derived from basic dose limits by means of an environmental pathway analysis using site-specific data. Procedures for deriving these guidelines are given in the supplement.

C.2 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.* 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.

C.3 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.

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

C.4 Surface Contamination

The following generic guidelines, adapted from standards of the U.S. Nuclear Regulatory Commission (1982), are applicable only to existing structures and equipment that will not be demolished and buried. They apply to both interior and exterior surfaces. If a building is demolished and buried, the guidelines in Section C.1 are applicable to the resulting contamination in the ground.

Radionuclides†2	Allowable Total Residual Surface Contamination (dpm/100 cm^2)†1		
	Average†3,†4	Maximum†4,†5	Removable†4,†6
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
U-Natural, U-235, U-238, and associated decay products	5,000α	15,000α	1,000α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000β-γ	15,000β-γ	1,000β-γ

†1 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 measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

†2 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.

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

†4 The average and maximum dose rates 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.

†5 The maximum contamination level applies to an area of not more than 100 cm^2.

†6 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.

D. AUTHORIZED LIMITS FOR RESIDUAL RADIOACTIVITY

The remedial action shall not be considered complete unless the residual radioactivity is below authorized limits. Authorized limits shall be set equal to guidelines for residual radioactivity unless: (1) exceptions specified in Section F of this document are applicable, in which case an authorized limit may be set above the guideline value for the specific location or condition to which the exception is applicable; or (2) on the basis of site-specific data not used in establishing the guidelines, it can be clearly established that limits below the guidelines are reasonable and can be achieved without appreciable increase in cost of the remedial action. Authorized limits that differ from guidelines must be justified and established on a site-specific basis, with documentation that must be filed as a permanent record upon completion of remedial action at a site. Authorized limits differing from the guidelines must be approved by the Director, Oak Ridge Technical Services Division, for FUSRAP and by the Director, Richland Surplus Facilities Management Program Office, for remote SFMP--with concurrence by the Director of Remedial Action Projects for both programs.

E. CONTROL OF RESIDUAL RADIOACTIVITY AT FUSRAP AND REMOTE SFMP SITES

Residual radioactivity above the guidelines at FUSRAP and remote SFMP sites must be managed in accordance with applicable DOE Orders. The DOE Order 5480.1A requires compliance with applicable federal, state, and local environmental protection standards.

The operational and control requirements specified in the following DOE Orders shall apply to interim storage, interim management, and long-term management.

a. 5440.1B, Implementation of the National Environmental Policy Act

b. 5480.1A, Environmental Protection, Safety, and Health Protection Program for DOE Operations

c. 5480.2, Hazardous and Radioactive Mixed Waste Management

d. 5480.4, Environmental Protection, Safety, and Health Protection Standards

e. 5482.1A, Environmental, Safety, and Health Appraisal Program

f. 5483.1, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities

g. 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements

h. 5484.2, Unusual Occurrence Reporting System

i. 5820.2, Radioactive Waste Management

E.1 Interim Storage

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years.

b. Above-background Rn-222 concentrations in the atmosphere above facility surfaces or openings shall not exceed: (1) 100 pCi/L at any given point, (2) an annual average concentration of 30 pCi/L over the facility site, and (3) an annual average concentration of 3 pCi/L at or above any location outside the facility site (DOE Order 5480.1A, Attachment XI-1).

c. Concentrations of radionuclides in the groundwater or quantities of residual radioactive materials shall not exceed existing federal, state, or local standards.

d. Access to a site shall be controlled and misuse of onsite material contaminated by residual radioactivity shall be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These control features should be designed to ensure, to the extent reasonable, an effective life of at least 25 years. The federal government shall have title to the property.

E.2 Interim Management

a. A site may be released under interim management when the residual radioactivity exceeds guideline values if the residual radioactivity is in inaccessible locations and would be unreasonably costly to remove, provided that administrative controls are established to ensure that no member of the public shall receive a radiation dose exceeding the basic dose limit.

b. The administrative controls, as approved by DOE, shall include but not be limited to periodic monitoring, appropriate shielding, physical barriers to prevent access, and appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactivity or cause it to migrate.

c. The owner of the site or appropriate federal, state, or local authorities shall be responsible for enforcing the administrative controls.

E.3 Long-Term Management

Uranium, Thorium, and Their Decay Products

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years.

b. Control and stabilization features shall be designed to ensure that Rn-222 emanation to the atmosphere from the waste shall not: (1) exceed an annual average release rate of 20 pCi/m^2/s, and (2) increase the annual average Rn-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L. Field verification of emanation rates is not required.

c. Prior to placement of any potentially biodegradable contaminated wastes in a long-term management facility, such wastes shall be properly conditioned to ensure that (1) the generation and escape of biogenic gases will not cause the requirement in paragraph b of this section (E.3) to be exceeded, and (2) biodegradation within the facility will not result in premature structural failure in violation of the requirements in paragraph a of this section (E.3).

d. Groundwater shall be protected in accordance with 40 CFR 192.20(a)(2) and 192.20(a)(3), as applicable to FUSRAP and remote SFMP sites.

e. Access to a site should be controlled and misuse of onsite material contaminated by residual radioactivity should be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These controls should be designed to be effective to the extent reasonable for at least 200 years. The federal government shall have title to the property.

Other Radionuclides

f. Long-term management of other radionuclides shall be in accordance with Chapters 2, 3, and 5 of DOE Order 5820.2, as applicable.

F. EXCEPTIONS

Exceptions to the requirement that authorized limits be set equal to the guidelines may be made on the basis of an analysis of site-specific aspects of a designated site that were not taken into account in deriving the guidelines. Exceptions require approvals as stated in Section D. Specific situations that warrant exceptions are:

a. Where remedial actions would pose a clear and present risk of injury to workers or members of the general public, notwithstanding reasonable measures to avoid or reduce risk.

b. Where remedial actions--even after all reasonable mitigative measures have been taken--would produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near affected sites, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

c. Where the cost of remedial actions for contaminated soil is unreasonably high relative to long-term benefits and where the residual radioactive materials do not pose a clear present or future risk after taking necessary control measures. The likelihood that buildings will be erected or that people will spend long periods of time at such a site should be considered in evaluating this risk. Remedial actions will generally not

be necessary where only minor quantities of residual radioactive materials are involved or where residual radioactive materials occur in an inaccessible location at which site-specific factors limit their hazard and from which they are costly or difficult to remove. Examples are residual radioactive materials under hard-surface public roads and sidewalks, around public sewer lines, or in fence-post foundations. In order to invoke this exception, a site-specific analysis must be provided to establish that it would not cause an individual to receive a radiation dose in excess of the basic dose limits stated in Section B, and a statement specifying the residual radioactivity must be included in the appropriate state and local records.

d. Where the cost of cleanup of a contaminated building is clearly unreasonably high relative to the benefits. Factors that shall be included in this judgment are the anticipated period of occupancy, the incremental radiation level that would be effected by remedial action, the residual useful lifetime of the building, the potential for future construction at the site, and the applicability of remedial actions that would be less costly than removal of the residual radioactive materials. A statement specifying the residual radioactivity must be included in the appropriate state and local records.

e. Where there is no feasible remedial action.

G. SOURCES

Limit or Guideline	Source
Basic Dose Limits	
Dosimetry Model and Dose Limits	International Commission on Radiological Protection (1977, 1978)
Generic Guidelines for Residual Radioactivity	
Residual Concentrations of Radium and Thorium in Soil Material	40 CFR 192
Airborne Radon Decay Products	40 CFR 192
External Gamma Radiation	40 CFR 192
Surface Contamination	Adapted from U.S. Nuclear Regulatory Commission (1982)
Control of Radioactive Wastes and Residues	
Interim Storage	DOE Order 5480.1A
Long-Term Management	DOE Order 5480.1A; 40 CFR 192

H. REFERENCES

International Commission on Radiological Protection. 1977. Recommendations of the International Commission on Radiological Protection (Adopted January 17, 1977). ICRP Publication 26. Pergamon Press, Oxford. [As modified by "Statement from the 1978 Stockholm Meeting of the ICRP." Annals of the ICRP, Vol. 2, No. 1, 1978.]

International Commission on Radiological Protection. 1978. Limits for Intakes of Radionuclides by Workers. A Report of Committee 2 of the International Commission on Radiological Protection. Adopted by the Commission in July 1978. ICRP Publication 30. Part 1 (and Supplement), Part 2 (and Supplement), Part 3 (and Supplements A and B), and Index. Pergamon Press, Oxford.

U.S. Environmental Protection Agency. 1983. Standards for Remedial Actions at Inactive Uranium Processing Sites; Final Rule (40 CFR Part 192). Fed. Regist. 48(3):590-604 (January 5, 1983).

U.S. Department of Energy. 1984. Formerly Utilized Sites Remedial Action Program. Summary Protocol: Identification - Characterization - Designation - Remedial Action - Certification. Office of Nuclear Energy, Office of Terminal Waste Disposal and Remedial Action, Division of Remedial Action Projects. April 1984.

U.S. Department of Energy. 1985. Supplement to U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites. A Manual for Implementing Residual Radioactivity Guidelines. Prepared by Argonne National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest Laboratory for the U.S. Department of Energy. (In preparation.)

U.S. Nuclear Regulatory Commission. 1982. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material. Division of Fuel Cycle and Material Safety, Washington, DC. July 1982.

Exhibit II *Documents Supporting the Certification of the Remedial Action at Properties in Maywood, Rochelle Park, and Lodi, New Jersey, in 1984 and 1985*

EXHIBIT II

DOCUMENTS SUPPORTING THE CERTIFICATION OF

REMEDIAL ACTION AT THE PROPERTIES IN

MAYWOOD, ROCHELLE PARK, AND LODI,

NEW JERSEY, IN 1984 AND 1985

PREFACE

For the convenience of the reader, Exhibit II is paginated continuously with the prefix "II-" to distinguish the page numbers of the exhibit from the pagination of specific documents. The Contents of Exhibit II listed on Page ii provides the page number that begins a particular section of the exhibit. Additionally, the page numbers for specific documents included in this report appear next to the document listing. Documents that are included by reference are listed without a page number.

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Exhibit II (1) - Decontamination or Stabilization Criteria

The following documents contain the guidelines that determine the need for remedial action. The subject properties have been decontaminated to comply with these guidelines. The first document listed is included as Appendix A of Exhibit I; the second is included on the following pages.

Page

U.S. Department of Energy. "U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites," Rev. 1, July 1985.

U.S. Department of Energy. Design Criteria for Formerly Utilized Sites Remedial Action Program (FUSRAP) and Surplus Facilities Management Program (SFMP), 14501-00-DC-01, Rev. 3, Oak Ridge, TN, February 1986. II-2

ADVANCED TECHNOLOGY DIVISION

35271

REVISION NOTICE NO. 3

DESIGN CRITERIA

PAGE 1 OF 1

DEPARTMENT OF ENERGY
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM
BECHTEL JOB 14501 (FUSRAP)

ISSUE DATE: 03/07/86

TO: Tech Writer MANUAL NUMBER 15

Please replace Table of Contents, Rev. 2 in your Design Criteria for Formerly Utilized Sites Remedial Action Program (FUSRAP) and Surplus Facilities Management Program (SFMP) which has a typographical error and format change, with the attached corrected Table of Contents, Rev. 2.

Please sign this revision notice in duplicate, retaining one copy for the front of your folder, returning one copy to the address indicated below:

PLEASE NOTE: As indicated on Table of Contents, Appendicies A, B, and D are still at Rev. 0.

PLEASE SIGN, DATE, AND RETURN THIS ENTIRE SHEET TO:

Bechtel National, Inc.
800 Oak Ridge Turnpike
Oak Ridge, TN 37830 ATTN: B. WOOD

ACKNOWLEDGEMENT:

MY COPY HAS BEEN BROUGHT TO CURRENT STATUS AND SUPERSEDED MATERIAL HAS BEEN REMOVED AND DESTROYED

☒ MY ADDRESS IS THE SAME

☐ MY ADDRESS IS AS FOLLOWS

SIGNATURE Jeannette M. Hoffman DATE 4/3/86 MANUAL NO. 15 VERIFY

14501-00-DC-01
REV. 1

DESIGN CRITERIA FOR FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP) AND SURPLUS FACILITIES MANAGEMENT PROGRAM (SFMP)

FEBRUARY 1986

Prepared by
U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS OFFICE

14501-00-DC-01

Rev. 1

DESIGN CRITERIA
FOR
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP)
AND
SURPLUS FACILITIES MANAGEMENT PROGRAM (SFMP)

(ISSUED FOR CLIENT APPROVAL)

FEBRUARY 1986

Approved by: E. L. Keller, Director
Technical Services Division
Oak Ridge Operations Office

2-24-86
Date

Approved by: John T. Milloway
Assistant Manager for
Construction and Engineering
Oak Ridge Operations Office

2-24-86
Date

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PREFACE TO DESIGN CRITERIA

These design criteria have been written in a generic form that summarizes criteria applicable for remedial action and long-term management activities associated with the radioactive wastes at the FUSRAP and SFMP sites. Site-specific information is provided in the appendices to this generic document. As a specific scope of work for a site is determined, design bases and work plans for each of the sites will be developed.

Appendix A contains definitions of terms used in these design criteria and referenced documents. Appendix B provides a listing of FUSRAP and SFMP sites by WBS number and contains estimated waste quantities at the sites. Appendix C contains the residual contamination and waste control criteria. Appendix D lists site information for specific sites which will be required as a remedial action for the specific site is developed. This information will be included in the work plan for each site.

The design criteria will be referenced by the designation 14501-00-DC-01.

These design criteria will be periodically revised, as appropriate, to reflect new practices, additional information, revisions of applicable regulations, and standard revisions.

1.0 INTRODUCTION

1.1 SCOPE

This document defines the design criteria for the identification of materials, evaluation of remedial action alternatives, selection of design parameters for site cleanup remedial actions and interim storage, and long-term management methods for handling FUSRAP and SFMP radioactive wastes.

1.2 OBJECTIVE

The primary objective of the Formerly Utilized Sites Remedial Action Program (FUSRAP) and Surplus Facilities Management Program (SFMP) projects is to stabilize, decontaminate, and/or dispose of FUSRAP and SFMP derived wastes in such a manner as to minimize the radiological risks posed by these wastes and to enable certification of the cleaned up FUSRAP and SFMP sites for unrestricted future use. At some sites, remedial action may be in situ long-term management with monitoring as necessary to detect any contaminant migration from the site in excess of radiological design criteria. At other sites, an interim storage program may be established until a decision for final disposition is made.

1.3 DEFINITIONS

Appendix A contains definitions of terms that are used in these design criteria as well as in the referenced documents.

1.4 CHANGES TO CRITERIA

The criteria for FUSRAP and SFMP remedial actions set forth in this document are based on elements of various federal orders, regulations, and standards that may be subject to change. This document will be revised to reflect changed criteria as authorized and approved by DOE.

2.0 APPLICABLE DOCUMENTS

2.1 GENERAL

The intent of these design criteria is to use DOE Orders where applicable. Applicable orders, regulations and standards, and sections thereof, as well as industry standards, will be investigated on a site-specific basis to formulate the design bases for the specific site.

2.2 FEDERAL ORDERS, REGULATIONS, AND STANDARDS

The following federal orders, regulations, and standards contain elements that are generally applicable to the FUSRAP and SFMP projects, and are summarized for these criteria.

2.2.1 Quality Assurance

DOE Order 5700.6A--Quality Assurance and DOE/OR-FUSRAP-82-001 Plan for Quality Assurance. The Project Quality Assurance Program complies with DOE Order 5700.6A, and the FUSRAP Plan for Quality Assurance (DOE/OR-FUSRAP-82-001).

For each remedial action site, and interconnecting activities (such as transportation), a formal evaluation (Quality Assurance Assessment) will be made of the consequences of failure of equipment and facilities to perform satisfactorily in service. This Assessment, which will be an adjunct to design engineering with subsequent modifications as may be required, will give full consideration to safety, environment, costs, schedule delays, programmatic goals, public reaction, or any other factor important to achieving project objectives.

When the formal evaluation indicates that consequences of failure may be unacceptable, significant, or unknown and the probability of failure is high or unknown, additional deliberate actions to find

and prevent quality problems are mandatory. The additional actions to assure quality of design and engineering, and particularly to assure implementation of that design and engineering, will be documented using a Quality Action Plan.

2.2.2 Radiation Protection

DOE Order 5480.1A. This order establishes control over the environmental protection, safety, and health protection programs. Chapter XI, Requirements for Radiation Protection, Attachment XI-1, defines radiation protection guides for concentration in air and water above natural background which will be used as criteria for releases from DOE's FUSRAP and SFMP operations. Chapter XII, Prevention, Control, and Abatement of Environmental Pollution, provides requirements for the control of sources of environmental pollution in accordance with the substantive and procedural aspects of all applicable federal, state, and local pollution control standards.

DOE Order 5480.2--Hazardous and Radioactive Mixed Waste Management. This order establishes hazardous waste management procedures for facilities operated under authority of the Atomic Energy Act of 1954, as amended (AEA). The procedures will follow, to the extent practicable, regulations issued by the Environmental Protection Agency (EPA) pursuant to the Resource Conservation and Recovery Act of 1976 (RCRA).

DOE Order 5481.1--Safety Analysis and Review System. This DOE Order establishes requirements for the preparation and review of safety analyses for each DOE operation, including: identification of hazards and their elimination or control; assessment of risk; documented management authorization of operation; and transportation of hazardous materials.

2.2.3 Land Disposal of Radioactive Wastes

Elements of the DOE Orders and federal regulations mentioned in the following sections provide technical guidelines for long-term, near-surface land burial facilities and ancillary facilities.

DOE Order 6430.1--General Design Criteria Manual. This order contains basic architectural and engineering design requirements for new DOE facilities; provides technical specification requirements; and outlines planning and design requirements for new facilities, facility additions, facility alterations, and building acquisitions to achieve economy of construction, operation, and maintenance.

40 CFR 192--Standards for Remedial Action at Inactive Uranium Processing Sites. This regulation defines remedial action criteria for inactive uranium processing sites. Some elements of these standards are applicable to the FUSRAP and SFMP programs. Service life of a mill tailings disposal site is defined in this regulation and has been adopted for FUSRAP and SFMP projects. Specific service life and release control requirements for interim storage sites and long-term management sites are noted in Section 3.2 of these Design Criteria.

2.2.4 Handling, Transportation, and Storage

DOE Order 1540.1--Materials Transportation and Traffic Management. Hazardous materials at FUSRAP and SFMP sites shall be shipped in accordance with DOE Order 1540.1. This document outlines DOE's policies and procedures for the management of materials transportation to ensure that it is accomplished in a manner commensurate with:

(1) Operational requirements for transportation services

(2) Established practices and procedures for transportation safety, economy, efficiency, and cargo security

(3) The National Transportation Policy as established by Congress and cognizant federal agencies

(4) Applicable federal, state, local, and international transportation regulations.

Intra-building and intra-site transfers are excluded from the provisions of this order.

DOE Order 5480.1A--Environmental Protection, Safety, and Health Protection Program for DOE Operations. Chapter 3 of this Order contains safety requirements for packaging of fissile and radioactive material. It also defines the requirements for design, evaluation, and testing of containers used for the transport of DOE's fissile and radioactive materials.

49 CFR 171-179--Transportation of Hazardous Materials. These regulations specify requirements for bulk shipments of uranium or thorium ores and physical or chemical concentrations of those ores and uranium metal or natural thorium metal, or alloys of these materials.

2.2.5 Health and Safety

Occupational Safety and Health Administration (OSHA) 29 CFR 1910. This section contains the health and safety regulations for general industry.

Occupational Safety and Health Administration (OSHA) 29 CFR 1926. This section establishes the general health and safety regulations for construction.

2.2.6 Surveys

Surveys for characterization and remedial action will be performed in accordance with the following specifications.

National Oceanic and Atmospheric Administration (NOAA).

- "Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys"
- "Specification to Support Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys"
- "Manual of Geodetic Triangulation," "Specification Publication No. 247

U.S. Department of Interior (USDI) "Manual of Instructions for the Survey of Public Lands of the United States," 1973, Bulletin 6.

2.2.7 Weather

National Oceanic and Atmospheric Administration. "Comparative Climatic Data for the United States through 1982," 1983.

2.3 STATE AND LOCAL REGULATIONS

State and local regulations governing handling, transportation, and storage of radioactive materials generally follow federal orders and regulations, but may vary depending on whether the particular state is an "Agreement State" under the Atomic Energy Act of 1954, as amended. DOE regulations will be followed, and state and local regulations will be reviewed on a site-specific basis.

2.4 DESIGN CODES, GUIDES, AND STANDARDS

The following industry and national codes, standards, and guides, as applicable, will also serve as guidelines for the Design Criteria for FUSRAP and SFMP:

- American Association of State Highway and Transportation Officials (AASHTO)
- American Concrete Institute (ACI)

- American Conference of Government Industrial Hygienists (ACGIH)
- American Institute of Steel Construction (AISC)
- American National Standards Institute (ANSI)
- American Nuclear Society (ANS)
- American Petroleum Institute (API)
- American Railway Engineering Association (AREA)
- American Society for Testing and Materials (ASTM)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- American Society of Mechanical Engineers (ASME)
- American Water Works Association (AWWA)
- American Welding Society (AWS)
- Institute of Electrical and Electronic Engineers (IEEE)
- Interstate Commerce Commission (ICC)
- Illuminating Engineering Society (IES)
- National Electrical Code (NEC)
- National Electrical Manufacturers' Association (NEMA)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA) "National Fire Code"
- National Geodetic Survey (NGS)
- National Standard Plumbing Code (NSPC)
- Occupational Safety and Health Standards (OSHA)
- Underwriters' Laboratory (UL)
- Uniform Building Code (UBC)
- U.S. Army Corps of Engineers Dredging Documents
- U.S. Geological Survey (USGS)

3.0 DESIGN REQUIREMENTS

3.1 GENERAL

FUSRAP work may involve remedial action at a number of sites. The currently designated FUSRAP and SFMP sites are listed in Appendix B; waste characteristics and estimated volumes at each site are also given.

Additional sites may be added or deleted with passage of federal legislation; therefore, the list of sites may be subject to revision. The specific type and quantity of contaminated material at each site, as well as geologic, meteorologic, and other site conditions affecting the design and design approach, differ from site to site.

3.2 RADIOLOGICAL DESIGN CRITERIA

The proposed DOE Interim Residual Contamination and Waste Control Guidelines for FUSRAP and SFMP sites are summarized in Appendix C. This criteria should be followed in defining cleanup requirements, developing remedial action plans, and performing and verifying field remedial actions.

3.3 SPECIFIC SITE CONDITIONS

The following information is required for each site and will be completed before or during detailed design and engineering of disposal facilities.

3.3.1 Scope of Work

The Scope of Work for the needed remedial actions must be clearly defined. This may be initiated with the preparation of the Preliminary Engineering Evaluation Report for each site with a

Design Basis, or as a separate document. It will be in accordance with the waste management plan outlined in Section 3.3.4 of these Design Criteria.

3.3.2 State and Local Regulations

In consultation with appropriate DOE-ORO personnel, applicable state and local regulations and ordinances will be reviewed to determine requirements to achieve compliance with health, safety, and environmental regulations. Construction permits and local property access agreements will be obtained as required. Any permits, licenses, or other authorization required by federal, state, or local environmental protection statutes, or any other legal authorizations required by DOE, will be obtained by DOE, Oak Ridge Operations.

3.3.3 Site Information

Define the site conditions for each site as necessary for design decisions. Parameters that may be needed include the following (see Appendix D for detailed requirements):

- Property surveys, easements, and datum
- Water levels
- Precipitation
- Humidity
- Groundwater table
- Frost penetration
- Ice conditions
- Air temperature
- Noise levels
- Winds
- Seismology

- Soil and foundation conditions
- Site historical information (including past and current use; as-built design drawings of buried utilities, structures, and systems; and existing monitoring systems).

3.3.4 Waste Characterization

Complete information on the type, quantity, and existing disposition of the radioactive wastes at any given site will usually be required prior to initiation of the Preliminary Engineering Evaluation Report or detailed design. If data and information in existing reports is not complete, or possibly out of date, additional characterization survey work may be required. Examples of additional characterization, to be planned by Bechtel and approved by DOE on a site specific basis and according to a predetermined need, include the following:

- Location and depth of buried wastes.
- Radiological, physical, and chemical characteristics of wastes in ponds, under surface water, and/or in groundwater.
- Extent of radiological migration, groundwater flow patterns, and seasonal variations.
- Wastes/contamination in building structures that may be scheduled for dismantlement or demolition.

3.3.5 Support Facilities

The identification of the needed temporary and/or permanent support facilities will be made and may include the following:

- Security
- Contamination control
- Structures
- Equipment
- Water treatment and control

- Utilities
- Access routes
- Monitoring system
- Document control
- Administration

3.3.6 Waste Transportation

The following facets for transporting the waste materials will be investigated as applicable:

- Waste form and quantity to be transported
- Mode of transportation
- Packaging and control
- Transportation routes
- Local traffic patterns and impact on community.

APPENDIX A

DEFINITIONS

Abbreviations/Terms	Definitions
AEC	Atomic Energy Commission
alpha particle	A positively charged particle emitted from certain radioactive material. It consists of two protons and two neutrons, hence is identical with the nucleus of the helium atom. It is the least penetrating of common radiation, hence is not dangerous unless alpha-emitting substances have entered the body.
background radiation	Naturally occurring low-level radiation to which all life is exposed. Background radiation levels vary from place to place on the earth.
beta particle	A particle emitted from some atoms undergoing radioactive decay. A negatively charged beta particle is identical to an electron. A positively charged beta particle is called a position. Beta radiation can cause skin damage, and beta emitters are harmful if they enter the body.
BNI	Bechtel National, Inc.

buffer zone	A portion of the land disposal site that is controlled by the licensee and that lies between the disposal unit and the boundary of the site.
CFR	Code of Federal Regulations
Ci	Curie (the unit of radioactivity of any nuclide, which decays at a rate of 3.7×10^{10} disintegrations/second)
contamination	The radioactive substance which is not a portion of the material into and onto which it is now dispersed.
daughter product	The nuclide remaining after a radioactive atom (parent) has undergone radioactive decay. A daughter atom also may be radioactive, producing further daughter products.
decontamination	The removal of radioactive material by chemical or mechanical means from an undesirable location and placement of the removed radioactive material in an acceptable form and location.
dismantlement	The organized manner by which a system or structure is segmented into component pieces which can be managed.

disposal	Isolation of waste from the biosphere with no intent of retrieval in a manner which does not permit easy access to the waste after its emplacement, and does not require perpetual maintenance and monitoring.
disposal site	A portion of a land disposal facility which is used for disposal of waste. It consists of disposal units and a buffer zone.
disposal unit	For near-surface disposal, a "disposal unit" means a discrete portion of the disposal site into which waste is placed for disposal.
DOE	Department of Energy
dpm	Disintegrations per minute
egr	External gamma radiation (gamma radiation emitted from a source(s) external to the body, as opposed to internal gamma radiation emitted from ingested or inhaled sources)
engineered barrier	Man-made structures or devices that are intended to prevent an intruder from inadvertent exposure to radiation from certain waste or to prevent escape of radionuclides to the environment.
EPA	Environmental Protection Agency
exposure	Magnitude of radiation. It is defined and measured in terms of electrical charge produced per unit mass of air.

FUSRAP	Formerly Utilized (MED/AEC) Sites Remedial Action Program
gamma background	Natural gamma ray activity everywhere present, originating from two sources: (1) cosmic radiation bombarding the earth's atmosphere continually, and (2) terrestrial radiation. Whole body absorbed dose equivalent in the U.S. due to natural gamma background ranges from about 60 to 125 mrem/yr.
gamma ray	High energy electromagnetic radiation emitted from the nucleus of a radioactive atom, with specific energies for the atoms of different elements and having high penetrating power.
ground water	Subsurface water in the zone of full saturation.
half-life	The period of time required for one-half of the original amount of a radioisotope to decay into a daughter product.
health effect	An adverse physiological response to environmental pollutants. While physiological responses include sickness, genetic defects, and death, for FUSRAP/SFMP one health effect is defined as one death resulting from cancer caused by exposure to radiation.

hydrogeologic unit	Any soil or rock unit or zone which, by virtue of its porosity or permeability or lack thereof, has a distinct influence on the storage or movement of ground water.
inadvertent intruder	A person who might occupy the disposal site unknowingly after closure and engage in normal activities, such as agriculture, dwelling construction, and other pursuits in which the person might be exposed to radiation from the waste.
interim storage	A short-term disposal having control and stabilization features designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years at which time ultimate disposal will be made.
intruder barrier	A sufficient depth of cover over the waste that exposure to radiation by an inadvertent intruder will meet the standards for protection against radiation specified in DOE Manual 5820.1 and in 10 CFR 61, or engineered structures that provide equivalent protection to the inadvertent intruder.
land disposal facility	The land, buildings, and equipment which are intended to be used for the disposal of radioactive wastes beneath the surface of the land.

long-term management	A form of ultimate disposal and storage involving near-surface burial of FUSRAP and SFMP radioactive wastes. Includes monitoring and corrective action, as necessary, to ensure that contaminants are not migrating from the site in excess of design criteria, and an institutional control period not less than that specified in 40 CFR 192. Control and stabilization features are designed to ensure to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years.
LSA	Low Specific Activity - A class of radioactive material as defined in 49 CFR 173.389(c).
umhos/cm	Micromhos per centimeter (10^{-6} mho/cm)
uR/hr	Microroentgens per hour (10^{-6} R/hr)
mR/hr	Milliroentgens per hour (10^{-3} R/hr)
mrad/hr	Millirads per hour (10^{-3} rad/hr)
MED	Manhattan Engineer District
mho	A unit of electrical conductance, the reciprocal of electrical resistance.
MPC	Maximum permissible concentration as defined per 10 CFR 20.103.

near-surface disposal facility	A land disposal facility in which radioactive waste is disposed within the upper 15-20 meters of the earth's surface.
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
nuclide	A general term applicable to all atomic forms of the elements; nuclides comprise all the isotopic forms of all the elements. Nuclides are distinguished by their atomic number, atomic mass, and energy state.
pCi/l	Picocurie per liter (10^{-12} Ci/l)
R	Roentgen (a unit of exposure to ionizing radiation). It is that amount of gamma or x-rays required to produce an electrical charge that is numerically equal to 2.58 x 10^{-4} coulombs/kg.
rad	The basic unit of absorbed dose of ionizing radiation. A dose of one rad means the absorption of 100 ergs of radiation energy per gram of absorbing material.
radioactivity	The spontaneous decay or disintegration of an unstable atomic nucleus, usually accompanied by the emission of ionizing radiation.

radioactive decay chain	A succession of nuclides, each of which transforms by radioactive disintegration into the next, until a stable nuclide results. The first member is called the parent, the intermediate members are called daughters, and the final stable member is called the end product.
radon	A radioactive, chemically inert gas having a half-life of 3.8 days (radium-222); formed as a daughter product of radium (radium-226).
radon background	Low levels of radon gas found in an area due to the presence of uranium or radium in soil and building materials.
radon daughter	One of the several short-lived radioactive daughter products of radon. (Several of the daughters emit alpha particles.)
remedial action	Steps and processes that are undertaken to physically identify, decontaminate, stabilize, or otherwise provide long-term management of radioactive materials to permit certification for unrestricted public use of the area or site.
rdc	Radon daughter concentration (the concentration in air of short-lived radon daughters, usually expressed in pCi/l; also measured in terms of working level (WL).

rem	Roentgen equivalent man. The unit of dose equivalence for all types of ionizing radiation which expresses the effectiveness of the absorbed dose on a common scale. The rem is the basic unit used to record the accumulated dose equivalent to personnel.
site closure and stabilization	Those actions that are taken upon completion of operations that prepare the disposal site for custodial care and that assure that the disposal site will remain stable and will not need ongoing, active maintenance.
SFMP	Surplus Facilities Management Program
surveillance	Observation of the disposal site for purposes of visual detection of need for maintenance, custodial care, evidence of intrusion, and compliance with other license and regulatory requirements.
WL	Working level. A unit of radon daughter exposure, equal to any combination of short-lived radon daughters in 1 liter of air, that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy. This level is equivalent to the energy produced in the decay of the daughter products that are present under equilibrium conditions in a liter of air containing 100 pCi of radium-222. It does not include decay of lead-210 (22-year half-life) and subsequent daughter products.

WLM	Working Level Month - An exposure to a one-WL concentration for 170 hours per month.
WBS NO.	Work Breakdown Structure identification sequence number designated by DOE. (See Appendix B for list of identification numbers for the specific sites.)

APPENDIX B

LIST OF FUSRAP AND SFMP SITES AND ESTIMATED WASTE QUANTITIES(7/82)

FUSRAP SITES

WBS No.	Site Name	State	Radioisotope	Estimated Volume (yd^3)	Concentration (pCi/g)	Radioactivity (Ci)	References	Remarks
101	Acid/Pueblo	NM	Plutonium-239	390*	110	4.8×10^{-2}	Remedial Action Completed	Soils
102	Albany Research	OR	Natural Uranium Uranium-238 Natural Uranium Radium-226	3,000[b]	a	a	b	Radiological characterization not complete
104	Bayo Canyon	NM	Strontium-90	1,520*	-	-	FB&DU 409-317	No Excavation Required - Marker Placed
105	Chupadera	NM	-	N/A	-	-	Remedial Action Not Required	
108	E. I. duPont	NJ	Uranium-238 Uranium-238 Uranium-238	7,000	1,400 1,100 6,600	2.7 0.5 0.9	DOE/EV-0005/8	Contam. Soils & Drainage Ditch
114	Kellex	NJ	-	175*	-	-		Completed
115	Niagara Falls Vicinity Properties	NY	Radium-226	48,000	a	a	BMI-2045, 2061, 2074	
117	Middlesex Landfill	NJ	Radium-226	33,000	11	1.4	DOE/EV-0005/20	
118	Middlesex Sampling Plant	NJ	Radium-226 Radium-226	- 57,000	- -	3.5 10.5 -	DOE/EV-0005/1	
121	Palos Park	IL	Hydrogen-3	4,030	-	3.0×10^3	DOE/EV-0005/7	
153	St. Louis Airport	MO	Radium-226	86,000	30	3.8	DOE/EV-0005/16	

APPENDIX B (Cont'd)

FUSRAP SITES

WBS No.	Site Name	State	Radioisotope	Estimated Volume (yd^3)	Concentration (pCi/g)	Radioactivity (Ci)	References	Remarks
125	Shpack	MA	Radium-226 Uranium-238	400	109 125	5.5 6.3	ORNL-5799 DOE/EV-0005/31	
126	Universal Cylops	PA	-	30	-	-	ORO-777	
129	Linde Air Products	NY	Radium-226 Uranium-238 Actinium-227	26,000	9.3 349 2.3	8.0×10^{-2} 2.88 2.0×10^{-2}	DOE/EV-0005/5 FB&DU 409-323	
130	Univ. of Calif.	CA	-	30*	-	-	Completed 9/82	
131	Univ. of Chicago	IL	-	75*	-	-		
134	SLAPSS (Vic. Prop)	MO	-	13,000	-	-		
137	Wayne/Pequannock	NJ	Uranium-238 Thorium-232 Thorium-228 Radium-226	50,000	a	a		
138	Maywood	NJ	Uranium-238 Uranium-235 Uranium-234 Thorium-230 Thorium-232 Thorium-228 Radium-226	218,000	a	a		
139	Colonie	NY	Uranium-238	30,000	a	a		Radiological Characterization Not Complete
140	Hazelwood	MO	Thorium-230 Radium-226 Uranium-238 Uranium-235 Uranium-234	61,000	a	a		Radiological Survey Not Available
			Total Volume FUSRAP	638,650				

APPENDIX B (Cont'd)

SFMP SITES

WBS No.	Site Name	State	Radioisotope	Estimated Volume (yd^3)	Concentration (pCi/g)	Radioactivity (Ci)	References	Remarks
201	Weldon Spring Storage Site	MO						
	o Raffinate Pits		Natural Uranium and Thorium, Radium-226	220,500	-	824	DOE/OR/20722-5	Sludge volume
	o Quarry		Natural Uranium and Thorium, Radium-226	130,800	-	-	-	
	o Vicinity Properties		Natural Uranium Radium-226	102,00	-	-	-	
202	Niagara Falls Storage Site	NY	Radium-226 Uranium-238	218,000	-	940	DOE/OR/20722-1	(Includes contaminated residues, soils and rubble)
		Total Volumes SFMP		671,300				

[a]Actual waste volume

[b]Volumes are from Project Plan

[c]Information is unknown at this time.

APPENDIX C

U.S. DEPARTMENT OF ENERGY GUIDELINES FOR RESIDUAL RADIOACTIVITY AT FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM AND REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

(Rev. 1, July 1985)

A. INTRODUCTION

This document presents U.S. Department of Energy (DOE) radiological protection guidelines for cleanup of residual radioactive materials and management of the resulting wastes and residues. It is applicable to sites identified by the Formerly Utilized Sites Remedial Action Program (FUSRAP) and remote sites identified by the Surplus Facilities Management Program (SFMP).* The topics covered are basic dose limits, guidelines and authorized limits for allowable levels of residual radioactivity, and requirements for control of the radioactive wastes and residues.

Protocols for identification, characterization, and designation of FUSRAP sites for remedial action; for implementation of the remedial action; and for certification of a FUSRAP site for release for unrestricted use are given in a separate document (U.S. Dept. Energy 1984). More detailed information on applications of the guidelines presented herein, including procedures for deriving site-specific guidelines for allowable levels of residual radioactivity from basic dose limits, is contained in a supplementary document--referred to herein as the "supplement" (U.S. Dept. Energy 1985).

"Residual radioactivity" includes: (1) residual concentrations of radionuclides in soil material,** (2) concentrations of airborne radon decay products, (3) external gamma radiation level, and (4) surface contamination. A "basic dose limit" is a prescribed standard from which limits for quantities that can be monitored and controlled are derived; it is specified in terms of the effective dose equivalent as defined by the International Commission on Radiological Protection (ICRP 1977, 1978). Basic dose limits are used explicitly for deriving guidelines for residual concentrations of radionuclides in soil material, except for thorium and radium. Guidelines for

*A remote SFMP site is one that is excess to DOE programmatic needs and is located outside a major operating DOE research and development or production area.

**The term "soil material" refers to all material below grade level after remedial action is completed.

residual concentrations of thorium and radium and for the other three quantities (airborne radon decay products, external gamma radiation level, and surface contamination) are based on existing radiological protection standards (U.S. Environ. Prot. Agency 1983; U.S. Nucl. Reg. Comm. 1982). These standards are assumed to be consistent with basic dose limits within the uncertainty of derivations of levels of residual radioactivity from basic limits.

A "guideline" for residual radioactivity is a level of residual radioactivity that is acceptable if the use of the site is to be unrestricted. Guidelines for residual radioactivity presented herein are of two kinds: (1) generic, site-independent guidelines taken from existing radiation protection standards, and (2) site-specific guidelines derived from basic dose limits using site-specific models and data. Generic guideline values are presented in this document. Procedures and data for deriving site-specific guideline values are given in the supplement.

An "authorized limit" is a level of residual radioactivity that must not be exceeded if the remedial action is to be considered completed. Under normal circumstances, expected to occur at most sites, authorized limits for residual radioactivity are set equal to guideline values. Exceptional conditions for which authorized limits might differ from guideline values are specified in Sections D and F. A site may be released for unrestricted use only if the residual radioactivity does not exceed guideline values at the time remedial action is completed. Restrictions and controls on use of the site must be established and enforced if the residual radioactivity exceeds guideline values. The applicable controls and restrictions are specified in Section E.

DOE policy requires that all exposures to radiation be limited to levels that are as low as reasonably achievable (ALARA). Implementation of ALARA policy is specified as procedures to be applied after authorized limits have been set. For sites to be released for unrestricted use, the intent is to reduce residual radioactivity to levels that are as far below authorized limits as reasonable considering technical, economic, and social factors. At sites where the residual radioactivity is not reduced to levels that permit release for unrestricted use, ALARA policy is implemented by establishing controls to reduce exposure to levels that are as low as is reasonably achievable. Procedures for implementing ALARA policy are described in the supplement. ALARA policies, procedures, and actions must be documented and filed as a permanent record upon completion of remedial action at a site.

B. BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 500 mrem/yr for a period of exposure not to exceed 5 years and an average of 100 mrem/yr over a lifetime. The committed effective dose equivalent, as defined in ICRP Publication 26 (ICRP 1977) and calculated by dosimetry models described in ICRP Publication 30 (ICRP 1978), shall be used for determining the dose.

C. GUIDELINES FOR RESIDUAL RADIOACTIVITY

C.1 Residual Radionuclides in Soil Material

Residual concentrations of radionuclides in soil material shall be specified as above-background concentrations averaged over an area of 100 m^2. If the concentration in any area is found to exceed the average by a factor greater than 3, guidelines for local concentrations shall also be applicable. These "hot spot" guidelines depend on the extent of the elevated local concentrations and are given in the supplement.

The generic guidelines for residual concentrations of Th-232, Th-230, Ra-228, and Ra-226 are:

- 5 pCi/g, averaged over the first 15 cm of soil below the surface
- 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface

These guidelines take into account ingrowth of Ra-226 from Th-230 and of Ra-228 from Th-232, and assume secular equilibrium. If either Th-230 and Ra-226 or Th-232 and Ra-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. Explicit formulas for calculating residual concentration guidelines for mixtures are given in the supplement.

The guidelines for residual concentrations in soil material of all other radionuclides shall be derived from basic dose limits by means of an environmental pathway analysis using site-specific data. Procedures for deriving these guidelines are given in the supplement.

C.2 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.* 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.

C.3 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.

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

C.4 Surface Contamination

The following generic guidelines, adapted from standards of the U.S. Nuclear Regulatory Commission (1982), are applicable only to existing structures and equipment that will not be demolished and buried. They apply to both interior and exterior surfaces. If a building is demolished and buried, the guidelines in Section C.1 are applicable to the resulting contamination in the ground.

Radionuclides†[2]	Allowable Total Residual Surface Contamination (dpm/100 cm^2)†[1]		
	Average†[3],†[4]	Maximum†[4],†[5]	Removable†[4],†[6]
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
U-Natural, U-235, U-238, and associated decay products	5,000α	15,000α	1,000α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000β-γ	15,000β-γ	1,000β-γ

†[1] 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 measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

†[2] 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.

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

†[4] The average and maximum dose rates 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.

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

†[6] 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.

D. AUTHORIZED LIMITS FOR RESIDUAL RADIOACTIVITY

The remedial action shall not be considered complete unless the residual radioactivity is below authorized limits. Authorized limits shall be set equal to guidelines for residual radioactivity unless: (1) exceptions specified in Section F of this document are applicable, in which case an authorized limit may be set above the guideline value for the specific location or condition to which the exception is applicable; or (2) on the basis of site-specific data not used in establishing the guidelines, it can be clearly established that limits below the guidelines are reasonable and can be achieved without appreciable increase in cost of the remedial action. Authorized limits that differ from guidelines must be justified and established on a site-specific basis, with documentation that must be filed as a permanent record upon completion of remedial action at a site. Authorized limits differing from the guidelines must be approved by the Director, Oak Ridge Technical Services Division, for FUSRAP and by the Director, Richland Surplus Facilities Management Program Office, for remote SFMP--with concurrence by the Director of Remedial Action Projects for both programs.

E. CONTROL OF RESIDUAL RADIOACTIVITY AT FUSRAP AND REMOTE SFMP SITES

Residual radioactivity above the guidelines at FUSRAP and remote SFMP sites must be managed in accordance with applicable DOE Orders. The DOE Order 5480.1A requires compliance with applicable federal, state, and local environmental protection standards.

The operational and control requirements specified in the following DOE Orders shall apply to interim storage, interim management, and long-term management.

a. 5440.1B, Implementation of the National Environmental Policy Act

b. 5480.1A, Environmental Protection, Safety, and Health Protection Program for DOE Operations

c. 5480.2, Hazardous and Radioactive Mixed Waste Management

d. 5480.4, Environmental Protection, Safety, and Health Protection Standards

e. 5482.1A, Environmental, Safety, and Health Appraisal Program

f. 5483.1, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities

g. 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements

h. 5484.2, Unusual Occurrence Reporting System

i. 5820.2, Radioactive Waste Management

E.1 Interim Storage

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years.

b. Above-Background Rn-222 concentrations in the atmosphere above facility surfaces or openings shall not exceed: (1) 100 pCi/L at any given point, (2) an annual average concentration of 30 pCi/L over the facility site, and (3) an annual average concentration of 3 pCi/L at or above any location outside the facility site (DOE Order 5480.1A, Attachment XI-1).

c. Concentrations of radionuclides in the groundwater or quantities of residual radioactive materials shall not exceed existing federal, state, or local standards.

d. Access to a site shall be controlled and misuse of onsite material contaminated by residual radioactivity shall be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These control features should be designed to ensure, to the extent reasonable, an effective life of at least 25 years. The federal government shall have title to the property.

E.2 Interim Management

a. A site may be released under interim management when the residual radioactivity exceeds guideline values if the residual radioactivity is in inaccessible locations and would be unreasonably costly to remove, provided that administrative controls are established to ensure that no member of the public shall receive a radiation dose exceeding the basic dose limit.

b. The administrative controls, as approved by DOE, shall include but not be limited to periodic monitoring, appropriate shielding, physical barriers to prevent access, and appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactivity or cause it to migrate.

c. The owner of the site or appropriate federal, state, or local authorities shall be responsible for enforcing the administrative controls.

E.3 Long-Term Management

Uranium, Thorium, and Their Decay Products

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years.

b. Control and stabilization features shall be designed to ensure that Rn-222 emanation to the atmosphere from the waste shall not: (1) exceed an annual average release rate of 20 pCi/m^2/s, and (2) increase the annual average Rn-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L. Field verification of emanation rates is not required.

c. Prior to placement of any potentially biodegradable contaminated wastes in a long-term management facility, such wastes shall be properly conditioned to ensure that (1) the generation and escape of biogenic gases will not cause the requirement in paragraph b of this section (E.3) to be exceeded, and (2) biodegradation within the facility will not result in premature structural failure in violation of the requirements in paragraph a of this section (E.3).

d. Groundwater shall be protected in accordance with 40 CFR 192.20(a)(2) and 192.20(a)(3), as applicable to FUSRAP and remote SFMP sites.

e. Access to a site should be controlled and misuse of onsite material contaminated by residual radioactivity should be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These controls should be designed to be effective to the extent reasonable for at least 200 years. The federal government shall have title to the property.

Other Radionuclides

f. Long-term management of other radionuclides shall be in accordance with Chapters 2, 3, and 5 of DOE Order 5820.2, as applicable.

F. EXCEPTIONS

Exceptions to the requirement that authorized limits be set equal to the guidelines may be made on the basis of an analysis of site-specific aspects of a designated site that were not taken into account in deriving the guidelines. Exceptions require approvals as stated in Section D. Specific situations that warrant exceptions are:

a. Where remedial actions would pose a clear and present risk of injury to workers or members of the general public, notwithstanding reasonable measures to avoid or reduce risk.

b. Where remedial actions--even after all reasonable mitigative measures have been taken--would produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near affected sites, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

c. Where the cost of remedial actions for contaminated soil is unreasonably high relative to long-term benefits and where the residual radioactive materials do not pose a clear present or future risk after taking necessary control measures. The likelihood that buildings will be erected or that people will spend long periods of time at such a site should be considered in evaluating this risk. Remedial actions will generally not

be necessary where only minor quantities of residual radioactive materials are involved or where residual radioactive materials occur in an inaccessible location at which site-specific factors limit their hazard and from which they are costly or difficult to remove. Examples are residual radioactive materials under hard-surface public roads and sidewalks, around public sewer lines, or in fence-post foundations. In order to invoke this exception, a site-specific analysis must be provided to establish that it would not cause an individual to receive a radiation dose in excess of the basic dose limits stated in Section B, and a statement specifying the residual radioactivity must be included in the appropriate state and local records.

d. Where the cost of cleanup of a contaminated building is clearly unreasonably high relative to the benefits. Factors that shall be included in this judgment are the anticipated period of occupancy, the incremental radiation level that would be effected by remedial action, the residual useful lifetime of the building, the potential for future construction at the site, and the applicability of remedial actions that would be less costly than removal of the residual radioactive materials. A statement specifying the residual radioactivity must be included in the appropriate state and local records.

e. Where there is no feasible remedial action.

G. SOURCES

Limit or Guideline	Source
Basic Dose Limits	
Dosimetry Model and Dose Limits	International Commission on Radiological Protection (1977, 1978)
Generic Guidelines for Residual Radioactivity	
Residual Concentrations of Radium and Thorium in Soil Material	40 CFR 192
Airborne Radon Decay Products	40 CFR 192
External Gamma Radiation	40 CFR 192
Surface Contamination	Adapted from U.S. Nuclear Regulatory Commission (1982)
Control of Radioactive Wastes and Residues	
Interim Storage	DOE Order 5480.1A
Long-Term Management	DOE Order 5480.1A; 40 CFR 192

H. REFERENCES

International Commission on Radiological Protection. 1977. Recommendations of the International Commission on Radiological Protection (Adopted January 17, 1977). ICRP Publication 26. Pergamon Press, Oxford. [As modified by "Statement from the 1978 Stockholm Meeting of the ICRP." Annals of the ICRP, Vol. 2, No. 1, 1978.]

International Commission on Radiological Protection. 1978. Limits for Intakes of Radionuclides by Workers. A Report of Committee 2 of the International Commission on Radiological Protection. Adopted by the Commission in July 1978. ICRP Publication 30. Part 1 (and Supplement), Part 2 (and Supplement), Part 3 (and Supplements A and B), and Index. Pergamon Press, Oxford.

U.S. Environmental Protection Agency. 1983. Standards for Remedial Actions at Inactive Uranium Processing Sites; Final Rule (40 CFR Part 192). Fed. Regist. 48(3):590-604 (January 5, 1983).

U.S. Department of Energy. 1984. Formerly Utilized Sites Remedial Action Program. Summary Protocol: Identification - Characterization - Designation - Remedial Action - Certification. Office of Nuclear Energy, Office of Terminal Waste Disposal and Remedial Action, Division of Remedial Action Projects. April 1984.

U.S. Department of Energy. 1985. Supplement to U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites. A Manual for Implementing Residual Radioactivity Guidelines. Prepared by Argonne National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest Laboratory for the U.S. Department of Energy. (In preparation.)

U.S. Nuclear Regulatory Commission. 1982. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material. Division of Fuel Cycle and Material Safety, Washington, DC. July 1982.

APPENDIX D

SITE INFORMATION FOR SPECIFIC SITES
(See Design Criteria, Section 3.3.3)

1.0 GENERAL

This appendix is a general outline of the information that will be obtained for a FUSRAP/SFMP site through historical research and/or field investigation activities during site characterization. This information will be used as a starting point for preparation of Design Bases for the sites. The data unique to a particular site are enclosed between single asterisks (*..*).

2.0 SURVEYS AND DATUM

Information on site description, surveys, plant coordinates, plant datum, plant grade, horizontal and vertical survey control points, plant grid north, site boundary, access roads, railroads, etc., will be obtained.

3.0 WATER LEVELS

For sites located on rivers, lakes, or at the ocean, the probable maximum and minimum water levels and their fluctuations will be obtained. The design maximum flood elevations, as noted below, will be investigated and recorded for the site:

	Elevation Above Mean Sea Level (MSL) (*..*)
Maximum recorded high water	ft
100-year projected flood	ft
Probable maximum flood	ft
Maximum projected water level for plant safety	ft
Design high water	ft
Design low water	ft

(In general, the 100-year flood shall be used for design.)

4.0 PRECIPITATION (*..*)

Rainfall

Average annual	in.
Daily maximum	in.
Design hourly maximum (100-year storm)	in.
Probable maximum precipitation (PMP) per hour	in.

Flash floods caused by thunderstorm may occur and are to be considered in the design. (Note value to be used in flood design as *..* in. per hour.)

SNOWFALL (*..*)

Average annual	in.
Season maximum	in.
Maximum for month of *..*	in.
Daily maximum	in.
Design snow load	lb/sq. ft.

5.0 GROUNDWATER TABLE

The high water table to be used in design will be stated.

For the design of all underground structures, the high water table will be assumed as elevation *..* ft.

Average groundwater level is approximately at *..* ft.

6.0 FROST PENETRATION

Depth below grade *..* in.

7.0 ICE

If applicable, ice pack formation will be described giving appropriate design loads.

8.0 AIR TEMPERATURE (*..*)

Maximum design	°F
Minimum design	°F
Average annual	°F
Average wet bulb	°F
Average dry bulb	°F

9.0 NOISE LEVELS

Noise level measurement and monitoring during construction will be maintained for sites as required by local authorities.

10.0 WINDS

Based on 100-year recurrence interval, the design wind velocity shall be *..* mph at *..* feet above grade in accordance with the Uniform Building Code (UBC). The prevailing wind is in *..* direction. Wind velocity will be adjusted as appropriate for structure height and gust factors. The effects of tornadoes will be investigated as required by site conditions.

11.0 SEISMOLOGY

The site is in UBC Zone *..*. Seismic loads shall be considered in accordance with Section 2312 of UBC criteria.

Verification of whether a higher zoning than that required by UBC may be more appropriate for the particular site will be made.

12.0 GEOTECHNICAL INVESTIGATIONS

Subsurface investigations will provide a description of the soil and geological and hydrological conditions and other data for the preparation of "Soil and Geological Investigation Report". The design basis will list from the report the hydraulic gradient of ground water, soil profile, location of bedrock, determination of confined and unconfined aquifers, establishment of monitoring wells, test results of soil and rock properties, allowable bearing and/or pile capacities (as applicable) for foundation design, active and passive lateral earth pressure, etc. Compaction criteria and maximum slopes for excavation will also be specified.

13.0 GUIDELINES FOR RESIDUAL RADIOACTIVITY

To be developed for each site. Refer to Appendix C.

Exhibit II (2) - Designation or Authorization Documentation

The following documents authorized or designated the 26 subject properties for remedial action. A copy of each follows.

Page

Letter, F.E. Coffman, Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to J. LaGrone, Manager, Oak Ridge Operations Office, Department of Energy. "R&D Decontamination Projects Under the Formerly Utilized Sites Remedial Action Program (FUSRAP)," August 3, 1983. II-48

Memorandum, E.G. DeLaney, Manager, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Radiological Survey for Maywood Vicinity Properties on Grove Avenue and Park Way," April 30, 1984. II-49

Memorandum, A.J. Whitman, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Designation for Remedial Action at 454 Davison Avenue, Maywood, New Jersey," August 16, 1984. II-53

Memorandum, A.J. Whitman, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations

Exhibit II (2) - Designation or Authorization Documentation (continued)

	Page
Office, Department of Energy. "Radiological Survey Data for 38 Grove Avenue, Rochelle Park, New Jersey," September 4, 1984.	II-54
Memorandum, W.R. Voigt, Jr., Acting Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to J. LaGrone, Manager, Oak Ridge Operations Office, Department of Energy. "Authorization to Conduct Remedial Action Vicinity Properties in Lodi, New Jersey," October 19, 1984.	II-55
Memorandum, W.R. Voigt, Jr., Acting Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to J. LaGrone, Manager, Oak Ridge Operations Office, Department of Energy. "Authorization to Conduct Remedial Action of Vicinity Properties at Lodi, New Jersey," May 6, 1985.	II-56
Memorandum, E.G. DeLaney, Manager, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Authorization for Remedial Action - 123 Avenue F, Lodi, New Jersey," May 13, 1985.	II-57

Completed Alphabetical file

AUG 3 1983

NE-24

R&D Decontamination Projects Under the Formerly Utilized Sites Remedial Action Program (FUSRAP)

J. LaGrone, Manager
Oak Ridge Operations Office

As a result of the House-Senate Conference Report and the Energy and Water Appropriations Act for FY 1984, and based on the data in the attached reports indicating radioactive contamination in excess of acceptable guidelines, the sites listed in the attachment and their respective vicinity properties (contaminated with radioactive materials from these sites) are being designated as decontamination research and development projects under the FUSRAP. Each site and the associated vicinity properties should be treated as a separate project.

The objective of each project is to decontaminate the vicinity properties and the site. The projects should be given priority over other FUSRAP sites, except for the Niagara Falls Storage Site project. The approach for each project should be to decontaminate the vicinity properties and store the waste on the site pending long-term disposal. Control measures should be taken on the site to prevent recontamination offsite. Environmental monitoring, site surveillance, and security measures should be taken to assure the stored waste is controlled. Studies of options for decontaminating the sites and disposing of the wastes should be initiated. These studies should have a lower priority than accomplishing cleanup and control of the offsite contamination as soon as possible.

Information which we have on these sites is attached. In coordination with the staff of the OR Technical Services Division, we are meeting with the congressional representatives, the site owners, the Nuclear Regulatory Commission, and the involved states to clarify and provide a firm basis for your planning the work on these sites. We expect to complete these meetings in early August. Please call Mr. J. Baublitz (FTS 233-5272) or Mr. E. DeLaney (FTS 233-4716) for further information on these sites.

Original Signed
Franklin E. Coffman

Franklin E. Coffman, Director
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

bcc: w/o attach.
E. Keller, OR
B. Berven, ORNL
A. Whitman, NE-24
Aerospace
NE-73 (5)
NE-24 RF Whitman RF

Attachments

NE-24:AWhitman:ph:353-5439:8/2/83:V-5-B-7/12/8/8:3.32.10
3.30.4
3.30.6
3.25.3

8/2/83

CONCURRENCES

RTG SYMBOL	INITIALS/SIG.	DATE
NE-24	DeLaney	8/2/83
NE-24	Baublitz	8/2/83
NE-20	Coffman	8/3/83

II-48

OFFICIAL FILE COPY

Sec 18923

D OF E 1325.10

Department of Energy

ited States Government

memorandum

DATE: APR 30 1984

PLY TO ATTN OF: NE-24

BJECT: Radiological Survey for Maywood Vicinity Properties on Grove Avenue and Park Way

TO: E. L. Keller, Director
Technical Services Division
Oak Ridge Operations Office

In response to your memorandum to DeLaney/Whitman dated 3/21/84, we are in agreement with your consideration of 8 of the 15 properties for remedial action for the reasons stated. Although the rationale for remedial action is stated in the transmittal memorandum, it should not appear in the property report. Therefore, please reword the last paragraph in the reports of those properties requiring remedial action to reflect this philosophy. Also, delete and/or rewrite the sentences in the reports that state the results exceed the criteria, e.g., page 14, paragraph 4, last sentence, page 24, same as page 14, page 19, paragraph 3, last sentence, etc.

The statement in the various property reports indicating the NRC 10 CFR 20.105 as permitting 60 uR/h (about 500 mrem/yr) continuous exposure is not correct. The exposure rate noted in this regulation is not for continuous exposure. This statement should be reworded to correctly reflect the intent of 10 CFR 20.105.

The results of the various properties should be compiled so that they may "stand alone" (similar to the Middlesex Phase II reports), that is, so they may be sent to the individual property owners without including information on other properties. Each individual property report should include the Introduction, Survey Methods, Summary of Results and a sketch of the property with surveyed areas and results noted.

If there are any questions, call Arthur Whitman on FTS 233-5439.

Edward DeLaney

Edward G. DeLaney, Manager
FUSRAP/Surplus Facilities Group
Division of Remedial Action Projects
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

21330

INFORMATION ON R&D DECONTAMINATION PROJECTS

The following information and/or data are being furnished for the sites:

1. Stepan Chemical Co., Maywood, New Jersey

   a. Onsite - The onsite radiological survey reports were done by Oak Ridge Associated Universities (ORAU) for the Nuclear Regulatory Commission (NRC); therefore, they can be obtained from Mr. J. Berger, ORAU.

   b. Offsite - One each of the following are attached:

      (1) Radiological Survey Reports

         (a) 459 Latham Street, Maywood, New Jersey
         (b) 461 Latham Street, Maywood, New Jersey
         (c) 459 Davison Avenue, Maywood, New Jersey
         (d) 460 Davison Avenue, Maywood, New Jersey
         (e) 464 Davison Avenue, Maywood, New Jersey
         (f) 467 Davison Avenue, Maywood, New Jersey
         (g) 468 Davison Avenue, Maywood, New Jersey

      (2) "Thorium Contamination in Maywood, New Jersey," Stepan Chemical Company Vicinity Summary of Survey Data, (NRC Document), May 4-5, 1981.

      (3) "An Aerial Radiologic Survey of the Stepan Chemical Company and Surrounding Area, Maywood, New Jersey," January 26, 1981 (NRC-8109).

2. National Lead Industries, Colonie, New York

   Although there is additional radiological survey work to be done to better define the offsite problem, there is sufficient data in documents supplied by NRC and National Lead (NL) Industries for designation and planning purposes. These documents are attached as follows:

   a. Onsite

      (1) NL Industries internal memo dated June 3, 1982, re: NL Cost and Pricing Proposal for the Decontamination of the NL Industries, Inc., Albany, New York, Facility, dated June 1, 1982, and June 2, 1982, submitted to U.S. Army Armament R&D Command.

      (2) "Engineering Estimate for the Decontamination of the NL Industries Facility Located at 1130 Central Avenue, Albany, New York," submitted by Teledyne Isotopes, July 23, 1981.

(3) "Engineering Estimate for the Partial Decontamination of the NL Industries Facility Located at 1130 Central Avenue, Albany, New York," submitted by Teledyne Isotopes, August 12, 1981.

(4) "Proposal for Professional Services Related to Low Level Radioactivity at the Albany, New York, Plant," proposed by Roy F. Weston, Inc., April 20, 1982.*

(5) "Preliminary Assessment of Existing Data at a Depleted Uranium Processing Facilities in Albany, New York," submitted by FBDU, March 24, 1982.

(6) Letter dated March 12, 1982, to Fred Baser, NL Industries from Harry Browne, Vice President, Manager of Business Development and Planning, Bechtel National, Inc., enclosing a proposal (Technical Service Agreement) to assist NL Industries in determining the extent of radionuclide contamination at the Albany, New York, Plant.

(7) "A Survey of Uranium in Soils Surrounding the NL Bearings Plant," prepared by Teledyne Isotopes, October 31, 1980.*

(8) "Subsurface Uranium on the Grounds of NL Bearings, Albany, New York," December 7, 1981.

(9) "Detailed Plan for Removal of Uranium Bearing Soil in the Vicinity of NL Industries, Albany, New York, Facility," February 1981.

b. Offsite

(1) "Proposal for Detailed Survey and Selective Removal of Uranium-Contaminated Soil in the Vicinity of NL Bearings, Albany, New York," submitted by Teledyne Isotopes, January 13, 1981.

(2) "Proposal to Provide Recommendations for and Decontamination of the Lands Surrounding the NL Bearing, Albany, New York," Facility," prepared by Radiation Management Corporation, April 23, 1982.

(3) "Preliminary Radiological Assessment of Offsite Properties Adjacent to A Depleted Uranium Processing Facilities in Albany, New York," by FBDU, April 26, 1982.

* These reports are applicable to onsite and offsite conditions.

3. W. R. Grace and Co., Pompton Plains, New Jersey

a. Onsite - The onsite radiololgical survey activities were done by ORAU for NRC; therefore, you will have to get the radiological data from ORAU, as was done previously.

b. Offsite - Other than the attached reports, the radiological data for the vicinity properties at this site can be obtained from ORAU.

(1) "Results of the Mobile Gamma Scanning Activities at Wayne, New Jersey, and Surrounding Communities," prepared by ORNL, January 1983.

(2) "An Aerial Radiological Survey of Wayne Township, New Jersey, and Surrounding Area," prepared by EG&G (EP-F-006), October 1982.

4. Latty Avenue, Hazelwood, Missouri

Characterization and monitoring data have been forwarded to Mr. E. L. Keller from Mr. E. G. DeLaney in a memorandum dated August 16, 1982. The following reports were attached to the memorandum:

- "Preliminary Radiological Survey of Proposed Street Right of Way at Futura Coatings, Inc., 9200 Latty Avenue, Hazelwood, Missouri," prepared by ORAU for NRC, dated December 1981.

- "Radiological Evaluation of Decontamination Debris Located at the Futura Chemical Co. Facility, 9700 Latty Avenue, Hazelwood, Missouri," prepared by ORAU, dated September 9, 1981.

Any additional information or data received on the four sites will be forwarded to Mr. E. L. Keller upon receipt.

DOE F 1325.8
(8-83)

~~Eastman~~
file-Maywood

United States Government | Department of Energy

memorandum

DATE: AUG 16 1984

REPLY TO
ATTN OF: NE-24

SUBJECT: Designation for Remedial Action at 454 Davison Avenue, Maywood, New Jersey

TO: E. L. Keller, Director
Technical Services Division
Oak Ridge Operations Office

The draft radiological survey of the subject property (a copy was forwarded to you by Barry Berven) indicates that there are only three spots, i.e. MJB49 (226-Ra guideline) and MJB50 (232-Th guideline) and MJB48 (232-Th guideline) that exceed the radium and/or thorium guidelines. Although the concentration of radionuclides in the remainder of the strip adjacent to 460 Davison is elevated above background, the strip, except for the three isolated spots, does not exceed the appropriate guidelines, therefore, does not warrant remedial action.

Based on the report data, the property at 454 Davison Avenue, Maywood, New Jersey, is designated for remedial action which should be limited to the three isolated spots (MJB48, 49 and 50) noted in the subject report.

I believe that the remedial action indicated will fully meet the ALARA principle, provide ample protection for the public health and the occupants of the property in question, and be consistent with the direction of Congress to conduct a decontamination research and development project.

Arthur J. Whitman
FUSRAP/Surplus Facilities Group
Division of Remedial Action Projects
Office of Nuclear Energy

DOE F 1325.8
(8-83)

Chester
~~Eastman~~
File: Maywood

United States Government
Department of Energy

memorandum

DATE: SEP 4 1984

REPLY TO
ATTN OF: NE-24

SUBJECT: Radiological Survey Data for 38 Grove Avenue, Rochelle Park, New Jersey

TO: E. L. Keller, Director
Technical Services Division
Oak Ridge Operations Office

The radiological survey data for the subject vicinity property has been reviewed by the Division of Remedial Action Projects personnel. Based on these data and the reasons stated in your memorandum to DeLaney/Whitman dated 8/27/84, we concur in the proposed remedial action at the subject site (38 Grove Avenue, Rochelle Park, New Jersey) and designate it for remedial action as noted in your memorandum dated 8/27/84.

I believe that the remedial action implemented at this property will fully meet the ALARA principles, provide ample protection for the public's health and the occupants of the property in question, and be consistent with the direction of Congress to conduct a decontamination research and development project.

If there are any questions, call me on FTS 233-5439.

Arthur J. Whitman
FUSRAP/Surplus Facilities Group
Division of Remedial Action Projects
Office of Nuclear Energy

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DOE F 1325.8
(8-83)

Millaway/Jim see OCT 26 1984
EASTMAN
File Lodi (Maywood)

United States Government — Department of Energy

memorandum

0178

DATE: OCT 19 1984

REPLY TO
ATTN OF: NE-24

SUBJECT: Authorization to Conduct Remedial Action at Vicinity Properties in Lodi, New Jersey

TO: J. LaGrone, Manager
Oak Ridge Operations Office

Based on the designation survey conducted by ORNL (Attachments 1-6), the following properties are being authorized for remedial action. It should be noted that the attached survey data are for designation purposes only and that Bechtel should conduct appropriate comprehensive characterization surveys to determine the extent and magnitude of contamination on these properties:

L.J. 001	170 Gregg Street, Lodi, New Jersey
L.J. 002	61 Trudy Drive, Lodi, New Jersey
L.J. 003	59 Trudy Drive, Lodi, New Jersey
L.J. 004	58 Trudy Drive, Lodi, New Jersey
L.J. 006	59 Avenue C, Lodi, New Jersey
L.J. 007	New Jersey State Inspection Station, Lodi, New Jersey 8 Mill Street, Lodi, New Jersey

It is suggested that BNI discuss these data with ORNL to get a better feel for the areas delineated in the reports, especially 58 and 59 Trudy Drive. These reports are for internal use only and are not to be disseminated.

If there are any questions, please call Arthur Whitman on FTS 233-5439.

William R. Voigt, Jr.
Acting Director
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

Attachments

000150

DOE F 1325.8
(12-84)

HTKIN

United States Government

Department of Energy

memorandum

DATE: MAY 8 1985

1871

REPLY TO ATTN OF: NE-24

SUBJECT: Authorization for Remedial Action of Residential Vicinity Properties at Lodi, New Jersey

TO: Joe LaGrone, Manager
Oak Ridge Operations Office

The data in the attached draft Radiological Survey Reports conducted by Bechtel National, Inc. (BNI) indicates that the soil concentration on these vicinity properties exceed the Department of Energy remedial action guidelines. Based on these data, the following residential vicinity properties are authorized for remedial action.

121 Avenue F, Lodi, NJ
64 Trudy Drive, Lodi, NJ
3 Hancock Street, Lodi, NJ

Although these are draft reports, the data on which these authorizations are based is not expected to change. The property at 123 Avenue F, Lodi, New Jersey, is not being authorized because it does not meet the 100-square meter criteria as denoted in 40 CFR 192.

If there are any questions, please call Arthur Whitman on FTS 233-5439.

for Coleman (for)
William R. Voigt, Jr.
Acting Director
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

4 Attachments

001813

United States Government Department of Energy

memorandum

~~Affend~~
File

DATE: MAY 13 1985

REPLY TO ATTN OF: NE-24

SUBJECT: Authorization for Remedial Action - 123 Avenue F, Lodi, New Jersey

TO: E. L. Keller, Director
Technical Services Division
Oak Ridge Operations Office

We recently authorized cleanup at three vicinity properties at Lodi, New Jersey (121 Avenue F, 3 Hancock Street, and 64 Trudy Drive) in our memorandum to J. LaGrone dated May 6, 1985, but did not authorize work on the property at 123 Avenue F. The authorization for the three properties was based on the total area of contamination on the property being approximately 100 square meters and the fact that past experience has shown that when remedial action (excavation) is done, the contamination is found to be significantly more than the authorization or characterization surveys. We have given further consideration to the property at 123 Avenue F and are now authorizing remedial work on that property. The additional cost for cleaning up this property should be small when the contractor is cleaning up the adjacent property at 121 Avenue F, and cleanup is therefore consistent with the ALARA guidance in DOE Order 5480.1A.

If there are any questions, please call me on FTS 233-4716 or Arthur Whitman on FTS 233-5439.

E. DeLaney

Edward G. DeLaney, Manager
FUSRAP/Surplus Facilities Group
Division of Remedial Action Projects
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

0015:7

Exhibit II (3) - Radiological Characterization Reports

The documents listed in this section address the pre-remedial action status of the 26 subject properties.

The document listed below is included in this section.

Page

Memorandum, E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy, to E.G. DeLaney, Manager, FUSRAP/Surplus Facilities Group, Division of Remedial Action Projects, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters. "Radiological Survey Data for 38 Grove Avenue, Rochelle Park, New Jersey," August 27, 1984. II-63

The following documents are included in this docket by reference.

U.S. Nuclear Regulatory Commission Office of Inspection and Enforcement, Region I. Inspection Report No. 40-8610/80-01, February 18, 1981.

Oak Ridge Associated Universities. Radiological Assessment of Ballod Associates Property (Stepan Chemical Company) Maywood, New Jersey, Oak Ridge, TN, July, 30, 1981.

EG&G Energy Measurements Group. An Aerial Radiologic Survey of the Stepan Chemical Company and Surrounding Area, Maywood, New Jersey, NRC-8109, Oak Ridge, TN, September 1981.

Morton, Henry W. Natural Thorium in Maywood, New Jersey, Nuclear Safety Associates, Inc., Potomac, MD, September 29, 1982.

NUS Corporation. Radiological Study of Maywood Chemical, Maywood, New Jersey, November 1983.

Oak Ridge National Laboratory. Results of the Radiological Survey 454 Davison Avenue, Maywood, New Jersey, ORNL/RASA-85/2, Oak Ridge, TN, February 1986.

Oak Ridge National Laboratory. Results of the Radiological Survey at 459 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 460 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 464 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 468 Davison Avenue, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 459 Latham Street, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 461 Latham Street, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Oak Ridge National Laboratory. Results of the Radiological Survey at 467 Latham Street, Maywood, New Jersey, Oak Ridge, TN, September 1981.

Exhibit II (3) - Radiological Characterization Reports (continued)

Bechtel National, Inc. Radiological Survey Report for 10 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-34, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 22 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-37, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 26 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-38, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 30 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-39, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 34 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-40, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 38 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-41, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 42 Grove Avenue, Rochelle Park, New Jersey, DOE/OR/20722-42, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 86 Park Way, Rochelle Park, New Jersey, DOE/OR/20722-32, Oak Ridge, TN, September 1984.

Bechtel National, Inc. Radiological Survey Report for 90 Park Way, Rochelle Park, New Jersey, DOE/OR/20722-33, Oak Ridge, TN, September 1984.

Oak Ridge National Laboratory. Results of the Mobile Gamma Scanning Activities in Lodi, New Jersey, ORNL/RASA-84/3, Oak Ridge, TN, October 1984.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 64 Trudy Drive, Lodi, New Jersey, DOE/OR/20722-66, Oak Ridge, TN, May 1985.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 121 Avenue F, Lodi, New Jersey, DOE/OR/20722-67, Oak Ridge, TN, May 1985.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 123 Avenue F, Lodi, New Jersey, DOE/OR/20722-64, Oak Ridge, TN, May 1985.

Bechtel National, Inc. Radiological Survey Report for the Residential Property at 3 Hancock Street, Lodi, New Jersey, DOE/OR/20722-65, Oak Ridge, TN, May 1985.

Oak Ridge National Laboratory. Results of the Radiological Survey at 59 Avenue C (LJ006), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Oak Ridge National Laboratory. Results of the Radiological Survey at 58 Trudy Drive (LJ004), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Oak Ridge National Laboratory. Results of the Radiological Survey at 59 Trudy Drive (LJ003), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Oak Ridge National Laboratory. Results of the Radiological Survey at 61 Trudy Drive (LJ002), Lodi, New Jersey, Oak Ridge, TN, October 1984.

Letter, J.F. Nemec, Bechtel National, Inc., to E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy. "Lodi Survey Results," CCN 27283, May 7, 1985.

Letter, G.P. Crotwell, Bechtel National, Inc., to R.G. Atkin, Site Manager, Technical Services Division, Department of Energy, Oak Ridge Operations Office. "Ballod Characterization Report," CCN 28153, June 12, 1985.

The document listed below is included in Exhibit II (4).

Argonne National Laboratory. Action Description Memorandum, Proposed 1984 Remedial Actions at Maywood, New Jersey, Argonne, IL, June 8, 1984.

DOE F 1325.8
(8-83)

United States Government

Department of Energy

Oak Ridge Operations

Memorandum

DATE: August 27, 1984

REPLY TO ATTN OF: CE-53:Eastman

SUBJECT: RADIOLOGICAL SURVEY FOR 38 GROVE AVENUE, ROCHELLE PARK, NEW JERSEY

TO: E. G. DeLaney/A. J. Whitman, NE-24, GTN

Attached for your review is a copy of the results of a radiological survey of the backyard at 38 Grove Avenue, Rochelle Park, New Jersey. This survey was conducted by Bechtel National, Inc. to determine if Th-232 in the upper 15cm of the soil exceeded the new thorium guidelines.

As will be noted, two small areas contain a thin subsurface layer of Th-232 that exceeds the guidelines. These areas are shaded on the attached figure. The estimated volume of contaminated soil to be removed is 30 yd3. Remedial action is considered appropriate for this property for the following reasons:

1. The proximity of the contamination to the surface and the ease with which decontamination of this small amount of material (30 yd3) involved could be accomplished make it's removal compatible with ALARA philosophy as well as the interest of this R&D program.

2. The residents of this property are very aware and greatly concerned about the contamination and desire its removal.

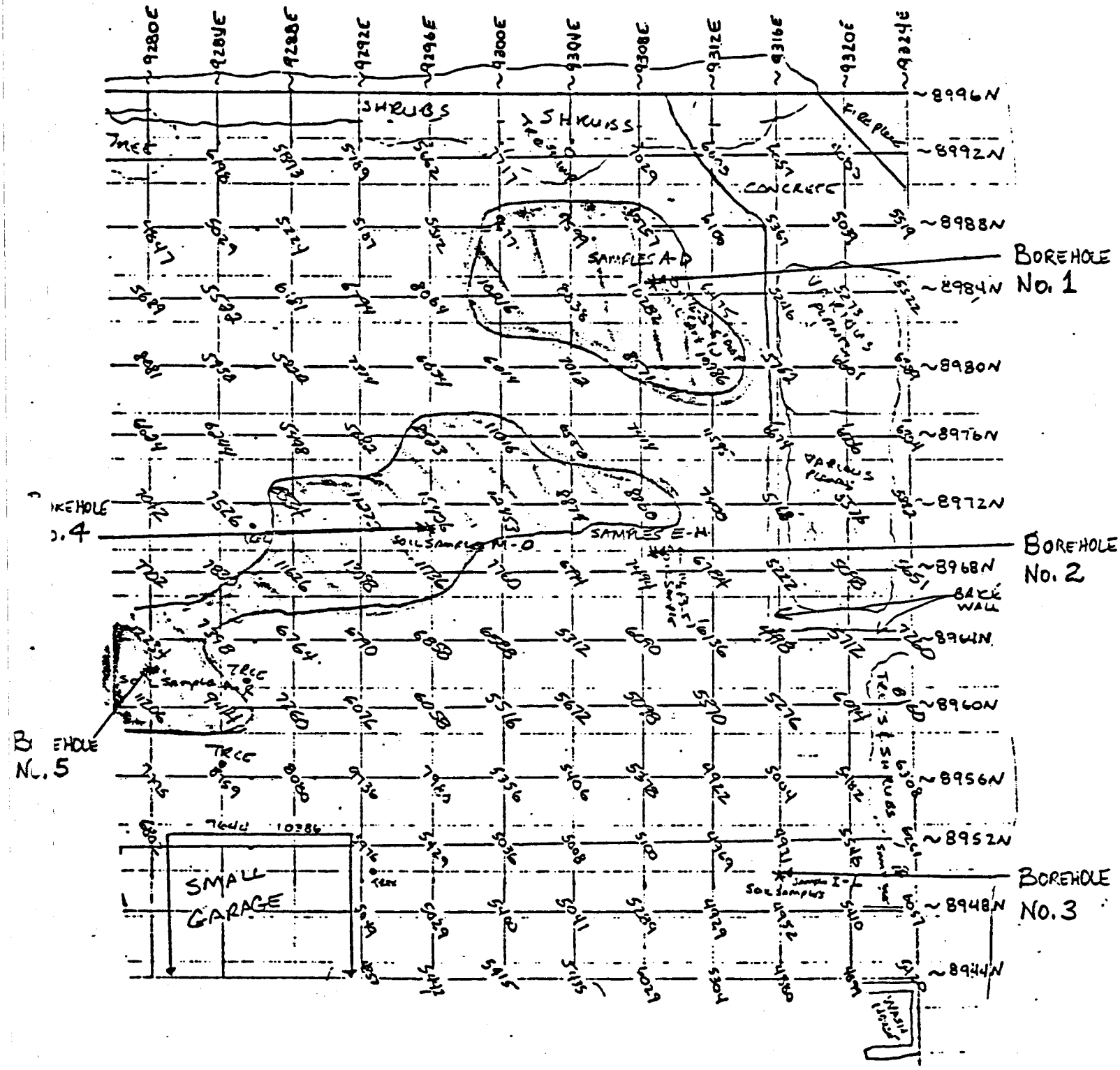
Your early review and concurrence would be appreciated for the cleanup work in the Grove Avenue/Park Way area is scheduled to begin within 2 weeks. For your information, an access agreement has been reached with the property owners of 38 Grove Avenue.

E. L. Keller

E. L. Keller, Director
Technical Services Division

Attachment:
As stated

38 GROVE AVENUE - NEAR SURFACE GAMMA DATA - SUBSURFACE SAMPLING LOCATIONS



AUGUST 13, 1984 SUBDEMARCATION SURVEY

38 GROVE AVENUE - SOIL SAMPLE RESULTS
FROM AUGUST 13, 1984
SUPPLEMENTAL SURVEY

BOREHOLE NUMBER*	DEPTH	GAMMA LOG (CPM)	SOIL SAMPLE NUMBER	SOIL RESULT TH-232 PC/g	COMMENTS
1	SURFACE	28,903	101	1.9	
1	18"	77,138	102	16.8	EXCEEDS GUIDELINE
1	36"	21,345	103	3.3	
1	60"	10,016	104	<1.3	
2	SURFACE	16,435	105	<0.9	
2	18"	21,476	106	1.8	
2	36"	9,196	107	1.1	
2	60"	8,141	108	<0.8	
3	SURFACE	10,549	109	1.6	
3	18"	9,296	110	1.1	
3	36"	9,010	111	1.5	
3	60"	10,116	112	0.8	
4	SURFACE	24,546	113	1.7	
4	18"	60,147	114	23.8	EXCEEDS GUIDELINE
4	32"	13,924	115	<0.7	
5	SURFACE	14,743	116	2.6	
5	18"	12,290	117	<0.8	
5	36"	[illegible]	[illegible]	[illegible]	

Exhibit II (4) - NEPA Documents

The documents listed in this section are those that fulfill the NEPA requirements for the subject properties. Both documents are included in this section of the docket.

	Page
Memorandum, F.E. Coffman, Director, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to File. "Action Description Memorandum (ADM) Review: Proposed Remedial Action of Vicinity Properties, Maywood, New Jersey," June 1, 1984.	II-67
Argonne National Laboratory. Action Description Memorandum, Proposed 1984 Remedial Actions at Maywood, New Jersey, Argonne, IL, June 8, 1984.	II-69

United States Government | Department of Energy

memorandum

DATE: JUN 1 1984

REPLY TO ATTN OF: NE-20

SUBJECT: Action Description Memorandum (ADM) Review: Proposed Remedial Action of Vicinity Properties, Maywood, New Jersey

TO: File

After reviewing all of the pertinent facts including the attached Action Description Memorandum (ADM), I have determined that the remedial action described in the subject ADM is an action which in and of itself will have a clearly insignificant impact on the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq.

The Conference Report accompanying the Energy and Water Appropriation Act for FY 1984 directed the Department of Energy (DOE) to give priority to the undertaking of a decontamination research and development project at the Stepan Company site at Maywood, New Jersey, and the vicinity properties which became contaminated from the site. The Conference Report directed $2,000,000 to be used to initiate the work in fiscal year 1984. The Secretary has included the project in the Formerly Utilized Sites Remedial Action Program.

The general approach to the project at this site is, in the initial phase, to decontaminate the vicinity properties and store the waste on the Stepan site. During the first phase DOE will take corrective actions as necessary to prevent further offsite contamination from the site. DOE will also restore the vicinity properties to a physical condition equivalent to that before the remedial action. In a second phase, subject to congressional direction and funding, the waste buried on the site and the stored vicinity property waste would be removed and transported to a permanent disposal site in New Jersey.

Separate environmental reviews will be prepared to support future decisions on remedial action at other vicinity properties, permanent disposition of the contaminated materials or other remedial actions that may impact the

quality of the human environment within the meaning of the NEPA, 42 U.S.C. 4321 et seq.

/s/ Coffman

Franklin E. Coffman, Director
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

NE-24
DeLaney
5/17/84
NE-24
Babblit
5/30/84
NE-29
Coffman
5/30/84

Attachment

cc: w/attach.
R. Stern, PE-25
S. Greenleigh, GC-30

bcc:
A. Whitman, NE-24
Aerospace

NE-73 (5)
NE-24 RF
Whitman RF

NE-24:AWhitman:ph:353-5439:5/29/84:IBM:41370019:3.30.6

ACTION DESCRIPTION MEMORANDUM

PROPOSED 1984 REMEDIAL ACTIONS AT MAYWOOD, NEW JERSEY

Prepared by

Environmental Research Division
Argonne National Laboratory
Argonne, Illinois

June 8, 1984

Prepared for

U.S. Department of Energy
Oak Ridge Operations
Technical Services Division
Oak Ridge, Tennessee

ACTION DESCRIPTION MEMORANDUM

PROPOSED 1984 REMEDIAL ACTIONS AT MAYWOOD, NEW JERSEY

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Environmental Research Division
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Argonne, Illinois

June 8, 1984

Prepared for

U.S. Department of Energy
Oak Ridge Operations
Technical Services Division
Oak Ridge, Tennessee

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1. SUMMARY OF PROPOSED ACTIONS AND RELATED ACTIVITIES

As part of a specially authorized research and development project (U.S. Congress 1983), the U.S. Department of Energy (DOE) proposes to carry out some remedial actions during 1984 at various sites near Maywood, New Jersey (Figures 1.1 and 1.2). The work will be conducted under DOE's Formerly Utilized Sites Remedial Action Program (FUSRAP). The proposed 1984 actions include cleanup of several vicinity properties and interim storage of the contaminated materials at a property to be acquired by DOE. The major proposed actions include:

- Removal of about 1000 m^3 (1300 yd^3) of radioactively contaminated soils from seven residential properties on Davison Street and Latham Street.
- Removal of about 230 m^3 (300 yd^3)* of contaminated soils from eight residential properties on Grove Street and Park Way.
- Removal of part of the contaminated soils (about 8700 m^3 [11,400 yd^3])* that are located on an empty lot known as the Ballod property
- Construction of access roads, a vehicle decontamination area, and other support facilities on an empty lot that will be acquired by DOE (termed herein, the Maywood Storage Site)
- Placement of the 10,000 m^3 (13,000 yd^3)* of contaminated soils in an interim-storage pile on the Maywood Storage Site.

Details of the various activities are given in Section 4 (Proposed Action and Alternatives).

The contaminated materials will be removed from the vicinity properties according to DOE's radiological guidelines for residual radionuclide concentrations in soil at FUSRAP sites (Appendix A). Following removal of contaminated materials, DOE will certify the properties for future use, as appropriate.

The proposed 1984 actions are the beginning of remedial actions involving cleanup of several contaminated sites in the Maywood area (Figure 1.2).

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*These volumes are being revised as detailed engineering progresses. As of March 11, 1984, the estimates for volumes have been reduced as follows: Grove Street/Park Way, 80 m^3 (100 yd^3); Ballod property, 8000 m^3 (10,000 yd^3); and total to be placed at the Maywood Storage Site, 9,000 m^3 (12,000 yd^3).

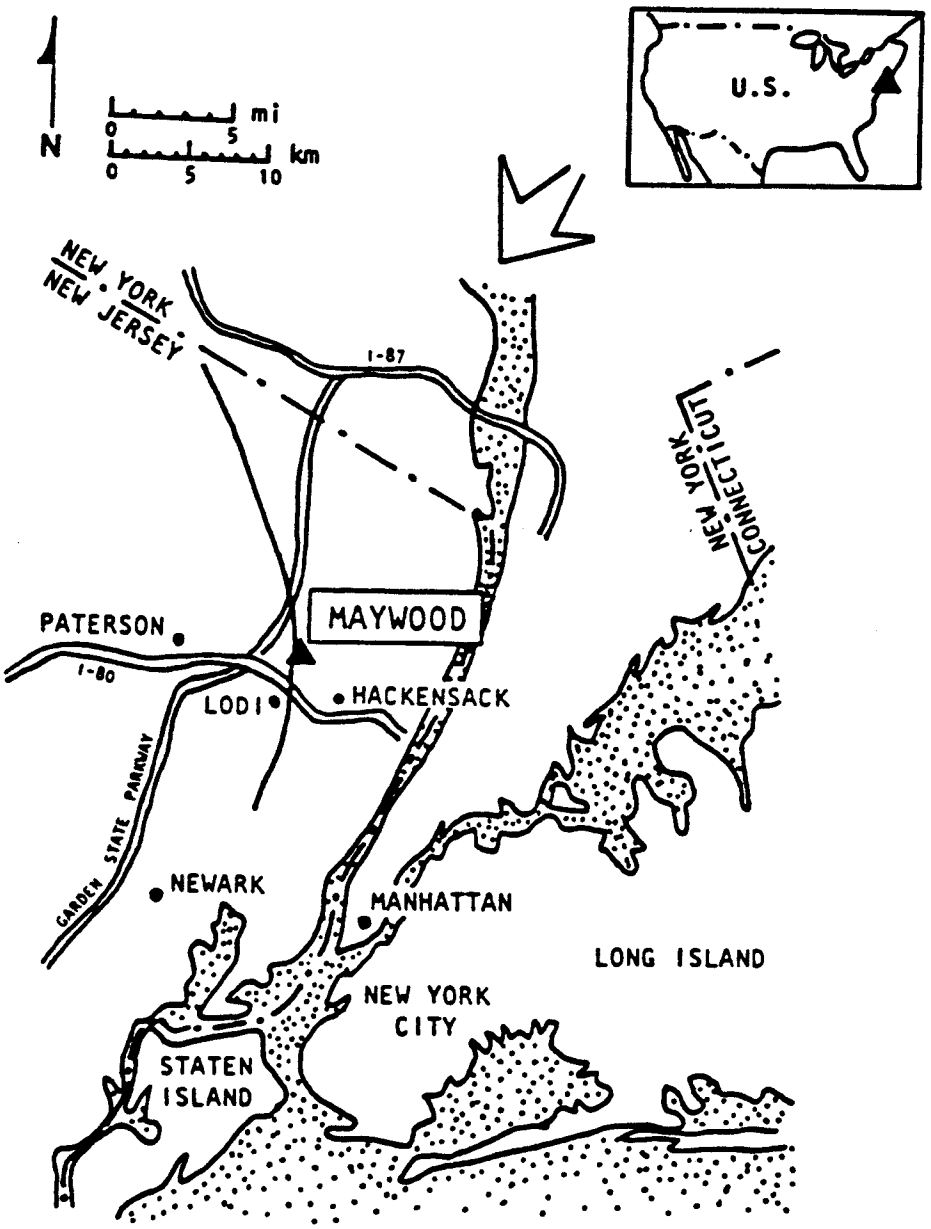

Figure 1.1. Location of Maywood, New Jersey.

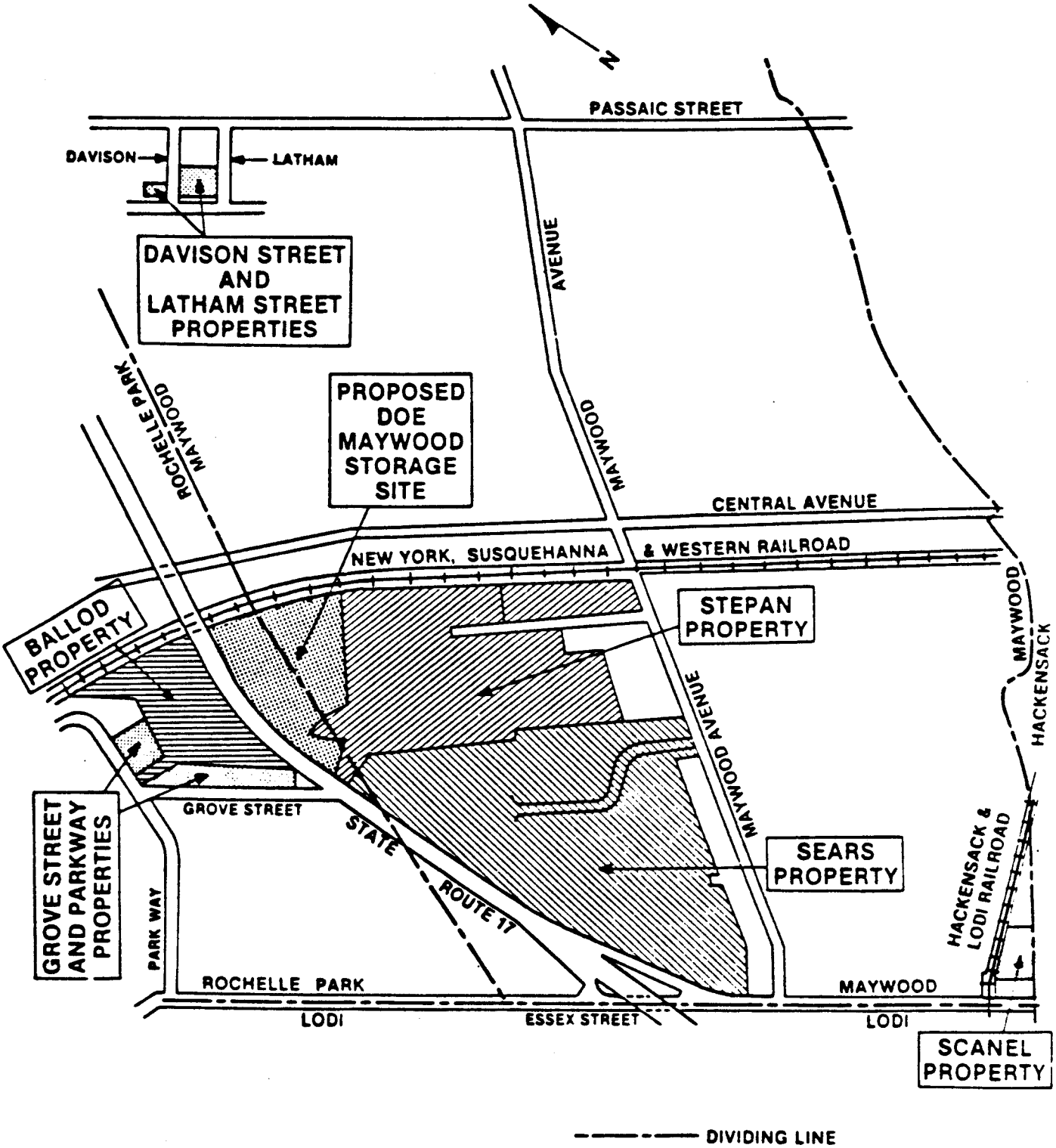

Figure 1.2. Location of Contaminated Properties Near Maywood, New Jersey. Adapted from drawing by Bechtel National, Inc.

Congress has appropriated money for FY 1984 to initiate work. The decision to be made now is how to carry out this initial work. Depending on future funding, there will be separate future decisions on cleanup of additional properties. Because a disposal site is not now available, current plans call for interim storage on the Maywood Storage Site. Another future decision will have to be made relative to permanent disposition of the contaminated materials. Separate environmental analyses will be prepared to support future decisions.

2. HISTORY AND NEED FOR ACTION

2.1 GENERAL SETTING

Maywood, New Jersey, is located in a densely populated urban area about 19 km (12 mi) north-northwest of downtown Manhattan (New York City), 21 km (13 mi) northeast of Newark, New Jersey, and 8 km (5 mi) east of Paterson, New Jersey (Figure 1.1). There are several properties in the Borough of Maywood and adjacent Rochelle Park Township (both in Bergen County) that have been identified as being radioactively contaminated as a result of previous processing of thorium ores (monazite sands) at the Maywood Chemical Works (now owned by Stepan Company). These properties (Figure 1.2) and the corresponding radiological survey(s) are:

- Stepan Chemical Plant site (Morton 1981)
- Sears Warehouse property (NUS Corp. 1983)
- Scanel property (including a Chinese restaurant and car wash) (NUS Corp. 1983)
- Maywood Storage Site* (Morton 1981)
- Ballod property (Cole 1981; Morton 1981)
- Seven residential properties on Davison Street and Latham Street (Oak Ridge Natl. Lab. 1981a-g).
- Eight residential properties on Grove Street and Park Way (Bechtel Natl. 1984a).

In addition, a length of the New York, Susquehanna and Western Railroad right-of-way adjacent to the northern boundaries of the Maywood Storage Site and the Stepan and Ballod properties is also contaminated. A radiological survey of this area has recently been completed (Bechtel Natl. 1984b). Soils underneath N.J. Route 17 may also be contaminated.

2.2 HISTORY

The Maywood Chemical Works was founded in 1895. Processing of thorium for use as coatings in the manufacture of gas lamp mantles began in 1916 and ended in 1957. Process wastes were pumped to lower-lying areas west of the

---

*Negotiations are currently under way to transfer ownership of this property from Stepan Company to DOE for use as an interim-storage site for the contaminated materials to be excavated from the Maywood/Rochelle Park properties.

processing facilities. Two earthen dikes were constructed on what is now the Ballod property (Figure 2.1) to control distribution of the wastes (Cole 1981). Some of the contaminated wastes were apparently eroded onto adjacent properties on Grove Street and Park Way (Beck 1984).

In 1932, N.J. Route 17 was built through the process waste disposal area. Stepan Chemical Company (now Stepan Company) acquired Maywood Chemical Works in 1959 (Oak Ridge Natl. Lab. 1981a). From 1966-1968, Stepan removed about 15,000 m^3 (19,000 yd^3) of radioactively contaminated wastes from the area west of Route 17 to three burial sites on the main Stepan property. Stepan then requested that the Atomic Energy Commission (AEC--whose regulatory functions are now carried out by the Nuclear Regulatory Commission [NRC]) release the area west of Route 17 for unrestricted use (Anon. 1981). The AEC granted the request and, late in 1968, Stepan sold 3.5 ha (8.7 acres) of property west of Route 17 to Mr. A. Baresi who in turn sold it to Ballod Associates in the late 1970s. Over the past few years the area has been used primarily by local residents for unauthorized trash disposal and by local youths who play in the area (Cole 1981).

About 1928, the Maywood Chemical Works apparently allowed process wastes to be removed from the processing site to nearby properties for use as mulch and fill. Again, between 1944 and 1946, many truckloads of fill were taken from the Stepan site and deposited at 464 Davison Street (then a vacant lot), primarily for fill in a ditch that traversed the back of several lots between Davison Street and Latham Street. The fill material consisted of tea and cocoa leaves mixed with other material resulting from operations at the Stepan plant, and apparently also contained thorium process wastes. Several nearby residents used the material dumped at 464 Davison Street in their lawns and gardens. The lot at 464 Davison was sold, and a house was constructed on it in 1967 (Oak Ridge Natl. Lab. 1981a).

2.3 RADIOLOGICAL CONTAMINATION AND NEED FOR ACTION

The properties that have been identified for cleanup during 1984 (Davison Street/Latham Street properties, Grove Street/Park Way properties, and portions of the Ballod property) have soils that are contaminated to levels exceeding DOE guidelines for residual radionuclide concentrations at FUSRAP sites. These guidelines are summarized for the radionuclides occurring at the Maywood sites in Table 2.1; the complete guidelines are given in Appendix A.

2.3.1 Ballod Property

Two radiological surveys of the Ballod property were conducted at about the same time. Oak Ridge Associated Universities (Cole 1981) identified two major areas of contamination: (1) the northeast section of the property behind the north dike, and (2) the southern part of the property behind the south dike (Figure 2.1). In the north dike area, thorium-232* concentrations are as high as 2500 pCi/g of soil and radium-226* concentrations are as high as 240 pCi/g. Concentrations in the south dike area are as high as 200 pCi/g for thorium-232 and 20 pCi/g for radium-226. In addition, isolated small areas of contamination ("hot spots") are also present (Figure 2.1).

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*See the thorium-232 and uranium-238 radioactive decay chains in Section 5. Radium-226 is an intermediate decay product in the uranium-238 decay chain.

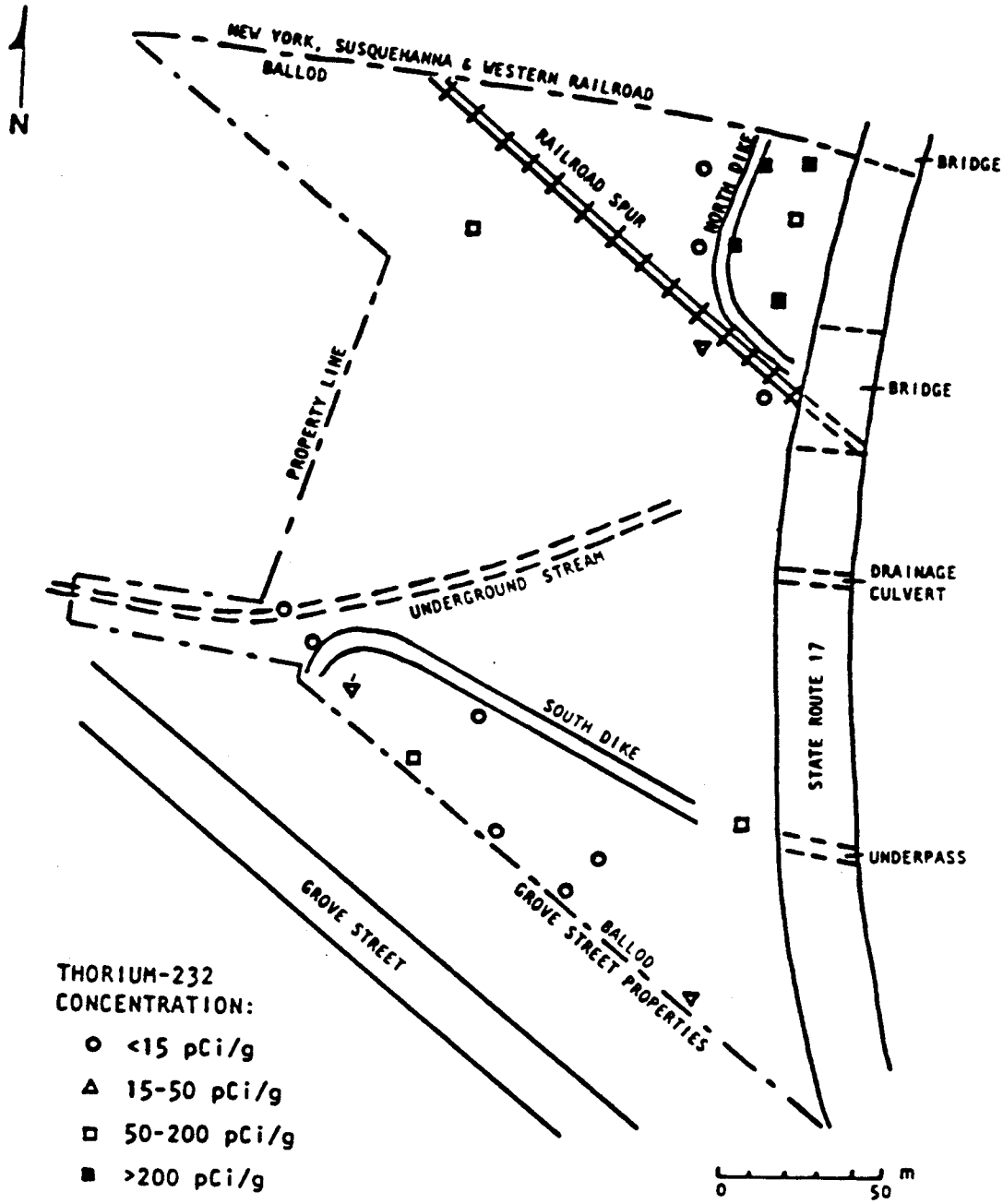

Figure 2.1. Location of Radioactively Contaminated Areas on the Ballod Property. Source: Cole (1981).

Table 2.1. DOE Radiological Guidelines for Residual Radionuclide Concentrations in Soil at FUSRAP Sites

Radionuclide	Allowable Concentration Above Background (pCi/g)
Uranium-natural†[1]	75
Uranium-238†[2]	150
Uranium-234†[2]	150
Thorium-230	15
Radium-226	5/15†[3]
Thorium-232	15

†[1] One curie of natural uranium means the sum of 3.7×10^{10} disintegrations/second (dis/s) over any 15-cm-thick layers from U-238 plus 3.7×10^{10} dis/s from U-234 plus 1.7×10^{9} dis/s from U-235.

†[2] Assumes no other uranium isotopes are present.

†[3] 5 pCi/g averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over 15-cm-thick soil layers more than 15 cm below the surface and less than 1.5 m below the surface.

A second survey was carried out for Stepan by Nuclear Safety Associates (Morton 1981). Samples taken on the Ballod property in December 1980 revealed a third major contaminated area in the southern part of the property (Figure 2.2).

Based on these radiological surveys, particularly the Morton (1981) report, Bechtel National, Inc., has identified two areas on the Ballod property to be excavated in 1984 (Figure 2.2): Area A to a depth of about 1.8 m (6 ft), and Area B to a depth of about 2.4 m (8 ft). It is anticipated that 8,700 m^3 (11,000 yd^3)* will be removed from these two areas (Table 2.1). Based on the amount of contaminated soil to be removed in 1984 and the Morton (1981) data, it is estimated that 0.4 Ci of thorium-232 will be removed from Area A and 0.5 Ci will be removed from Area B (Robertson 1984). Another 2.6 Ci of thorium-232 is located in the north diked area, but this area is not proposed for excavation in 1984.

*Estimated volumes of material to be excavated are being revised as detailed engineering progresses. As of March 11, 1984, the estimated volume to be excavated on the Ballod property has been revised to 8,000 m^3 (10,000 yd^3).

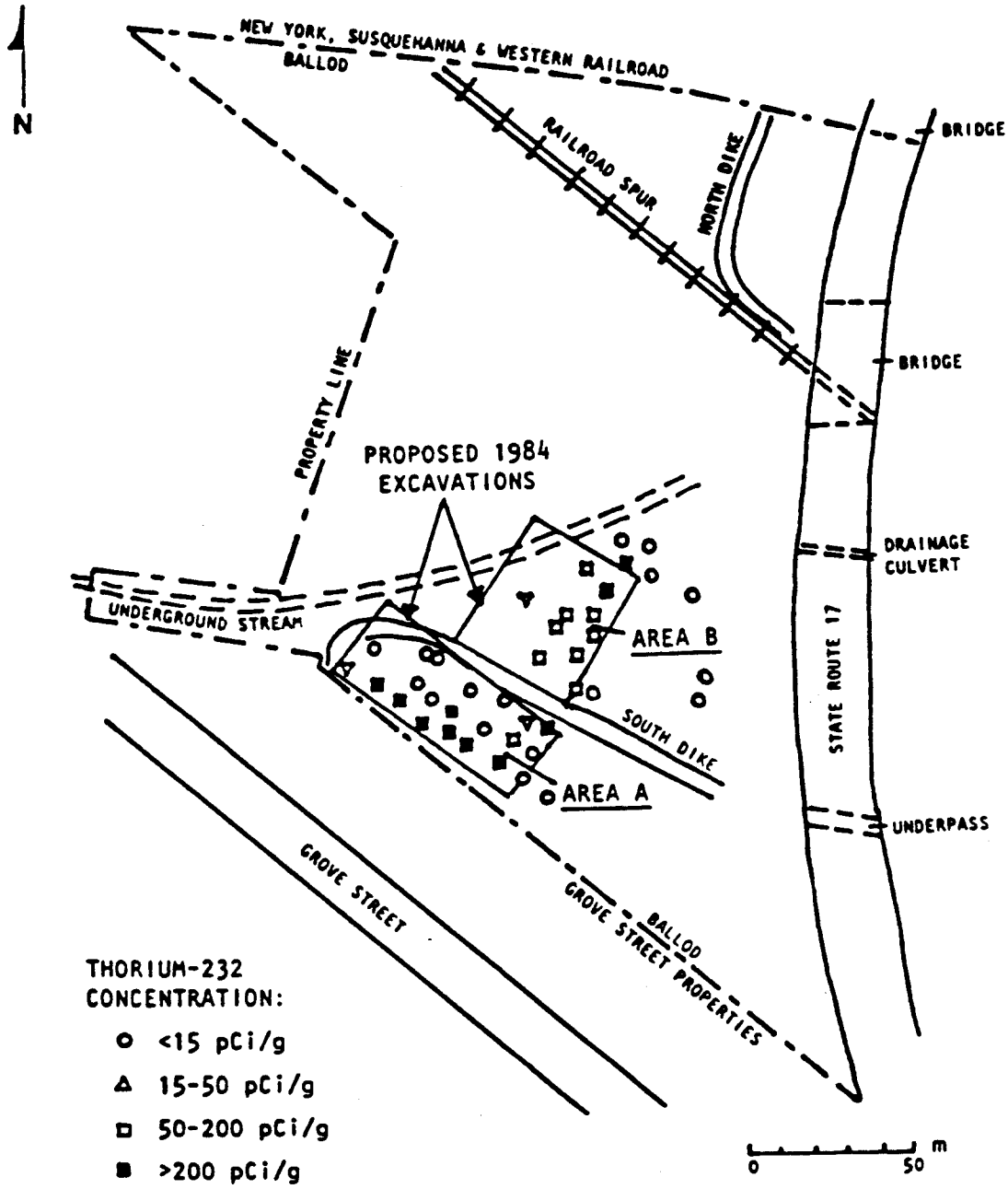

Figure 2.2. Areas on the Ballod Property Proposed for Excavation in 1984. Sources: Morton (1981) and preliminary drawing by Bechtel National, Inc.

2.3.2 Grove Street and Park Way Properties

Along the eastern and southern boundaries of the Ballod property are 15 residential properties fronting on Grove Street and Park Way. Eberline, Inc., recently surveyed these properties for radiological contamination (Bechtel Natl. 1984a). Eight properties are proposed for cleanup (Beck 1984). Contamination is mostly superficial and extends to a depth of approximately 15 cm (6 in.). Contaminated areas are primarily in the backyards near the Ballod property line (Figure 2.3). The estimated total volume needing excavation is 230 m^3 (300 yd^3)* (Table 2.2).

2.3.3 Davison Street and Latham Street Properties

Seven residential properties on Davison Street and Latham Street are contaminated (Figure 2.4). Based on the Oak Ridge National Laboratory (1981a-g) data, it is estimated that approximately 1,000 m^3 (1,300 yd^3) of contaminated soils containing 0.28 Ci of thorium-232 and 0.064 Ci of radium-226 will be removed from these properties during the proposed 1984 actions (Table 2.3). Uranium-238 concentrations are below the criterion limit and radium-226 concentrations are usually below the criterion limit. Thorium-232 accounts for most of the radioactivity. The majority of thorium-232 (80%) and radium-226 (78%) is present on the 464 Davison property.

---

*Estimated volumes of material to be excavated are being revised as detailed engineering progresses. As of March 11, 1984, the estimated volumes to be excavated on the Grove Street and Park Way properties have been reduced to 80 m^3 (100 yd^3).

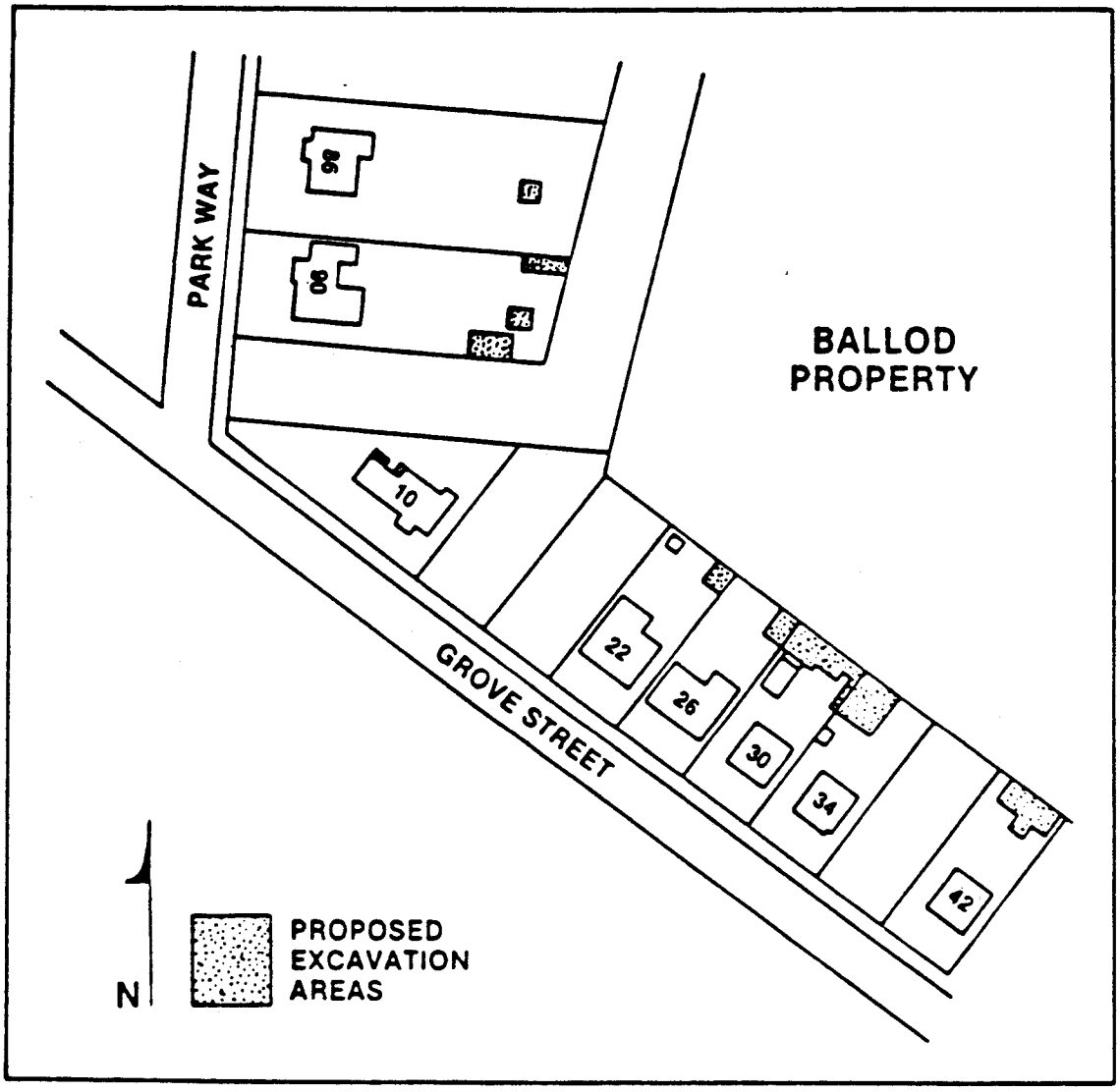

Figure 2.3. Proposed Excavation at the Grove Street and Park Way Properties. Adapted from preliminary drawing by Bechtel National, Inc.

Table 2.2. Estimated Volumes and Radiological Characteristics of Materials Proposed for Excavation in 1984

Property	Volume†[1]		Radionuclide Inventory (Ci)		Radionuclide Concentration (pCi/g)	
	m^3	yd^3	Thorium-232	Radium-226	Thorium-232	Radium-226
Davison Street/Latham Street	1,000	1,300	0.28†[2]	0.064†[2]	190†[2]	43†[2]
Grove Street/Park Way	230	300	Negl.†[3]	Negl.†[3]	Negl.†[3]	Negl.†[3]
Ballod	8,700	11,400	0.9†[4]	0.23†[5]	90†[6]	22†[6]
Total	10,000	13,000	1.2	0.29	100†[7]	23†[7]

†[1] Preliminary estimates by Bechtel National, Inc. Estimates are being revised as detailed engineering progresses. As of March 11, 1984, the volumes at Grove Street/Park Way and Ballod properties have been revised downward to 80 m^3 (100 yd^3) and 8,000 m^3 (10,000 yd^3), respectively.

†[2] Data from Table 2.3.

†[3] Negligible (Beck 1984).

†[4] Data from Robertson (1984).

†[5] No radium-226 data available. It is assumed that the ratio of thorium-232 to radium-226 is the same as at the Davison Street/Latham Street properties.

†[6] Assuming a dry weight density of 1200 kg/m^3.

†[7] Weighted average.

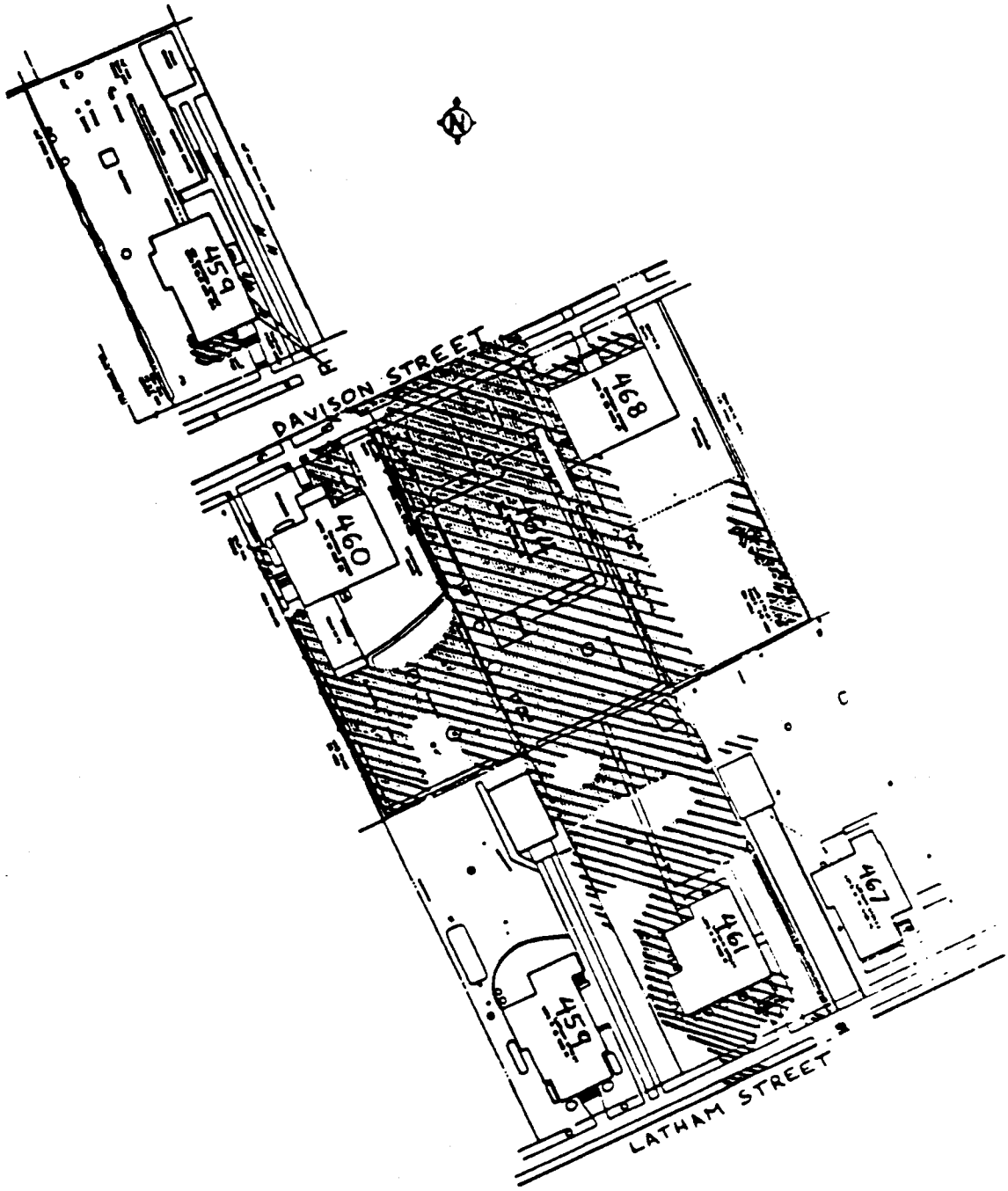

Figure 2.4. Proposed Excavation at the Davison Street and Latham Street Properties. Adapted from preliminary drawing by Bechtel National, Inc.

Table 2.3. Contamination of Davison Street/Latham Street Properties Proposed for Cleanup in 1984†[1]

Property	Location of Contamination	Estimated Volume of Soil Contaminated Above Guideline Levels (m^3)	Level of Soil Contamination: Average Contamination (pCi/g)		Level of Soil Contamination: Total Radionuclide Inventory†[1]	
			Thorium-232	Radium-226	Thorium-232	Radium-226
461 Latham	In extensive flower and shrubbery gardens around house, the vegetable garden, and rear of property	160	47	13	0.009	0.0025
464 Davison	Entire area of lot to depth of 0.9 m (3 ft)	720	255	58	0.22	0.050
468 Davison	Backyard along east border, along all west boundary, and in two shrubbery areas adjacent to house on north side	175	71	23	0.015	0.0048
460 Davison	East half of front yard and most of backyard	195	137	30	0.032	0.0069
467 Latham	Two small areas on property	1	18	3	I†[2]	I
459 Latham	In strip along border of 459 and 461 Latham and spotty amounts along northeast corner	1	5.6	2.3	I	I
459 Davison	Isolated locations in front yard and along east side	5	9.1	3.2	I	I
Total		1260†[3]	190	43†[4]	0.28†[4]	0.064

†[1] Assuming a dry weight density of 1200 kg/m^3.

†[2] I = Insignificant amount compared to other levels.

†[3] This volume is slightly higher than that estimated by Bechtel National as being in need of excavation. However, this volume is used to obtain the estimated radionuclide inventory of the materials to be excavated for the Davison Street and Latham Street properties.

†[4] Weighted average.

Source. Based on data from Oak Ridge National Laboratory (1981a-g).

3. THE EXISTING ENVIRONMENT

3.1 GEOLOGY AND HYDROLOGY

The Maywood Storage Site and vicinity properties are located within the glaciated section of the Piedmont Plateau of north-central New Jersey. The terrain is generally level, with shallow ditches and slight mounds (Cole 1981). The Maywood Storage Site slopes gently toward the Saddle River. It is underlain by the sedimentary mudstone and siltstone of the Brunswick Formation (Morton 1981). The bedrock lies close to the surface and is overlain by 0.9 to 4.6 m (3 to 15 ft) of weathered bedrock and unconsolidated glacial deposits of clay, silt, sand, and gravel. The depth of the glacial deposits varies considerably in the site area. In addition, fill materials have been placed on the site during its many years of industrial use (Morton 1981).

The Maywood Storage Site is located within the Saddle River drainage basin (Figure 3.1) about 0.8 km (0.5 mi) east of the Saddle River (a tributary of the Passaic River) and about 1.6 km (1 mi) west of the drainage divide of the Hackensack River basin (Morton 1981). At the Lodi gauging station, located approximately 1.3 km (0.8 mi) southwest of the site (Figure 3.1), the Saddle River has a drainage area of about 140 km^2 (55 mi^2). Based on 59 years of flow data (1923-1982) at the Lodi station, the minimum daily flow is 0.17 m^3/s (6.0 cfs), the maximum flow is 130 m^3/s (4,500 cfs), and the mean flow is 2.8 m^3/s (100 cfs) (U.S. Geol. Surv. 1983). Local surface drainage at the Maywood Storage Site is into Westerley Brook (Figure 3.1). This brook flows southwestward and enters the Maywood Storage Site near the Maywood-Rochelle Park boundary. It is channelized and encased in concrete, and it is covered with 0.6 to 1.5 m (2 to 5 ft) of fill material within the Maywood Storage Site and the Ballod property. The brook flows west through the underground channel and opens again at the surface about 200 m (655 ft) west of the Ballod property (Cole 1981). It eventually flows into the Saddle River. The Maywood Storage Site is not located in the 100-year floodplain of the Saddle River (Hanabergh 1984). Neither the Saddle River nor Westerley Brook are used for drinking water purposes (Jacobson 1982).

Groundwater in the Maywood area is available primarily from a bedrock aquifer and from unconsolidated surficial deposits. The Brunswick Formation is generally considered to be the more productive and major groundwater resource. Industrial and municipal wells with depths of 92 m (300 ft) or more can produce flows as high as 32 L/s (500 gpm) from the Brunswick aquifer (Morton 1981). Groundwater quality is generally good except that softening is required. Wells drawing from the unconsolidated surficial deposits usually have low yields and are used for domestic purposes. However, some high-yielding wells used for industrial and public supplies have been developed in the thicker surficial deposits of stratified glacial drift.

The groundwater gradient is low at the site and the water table is generally shallow--within about 2.1 to 3.0 m (7 to 10 ft) of the surface

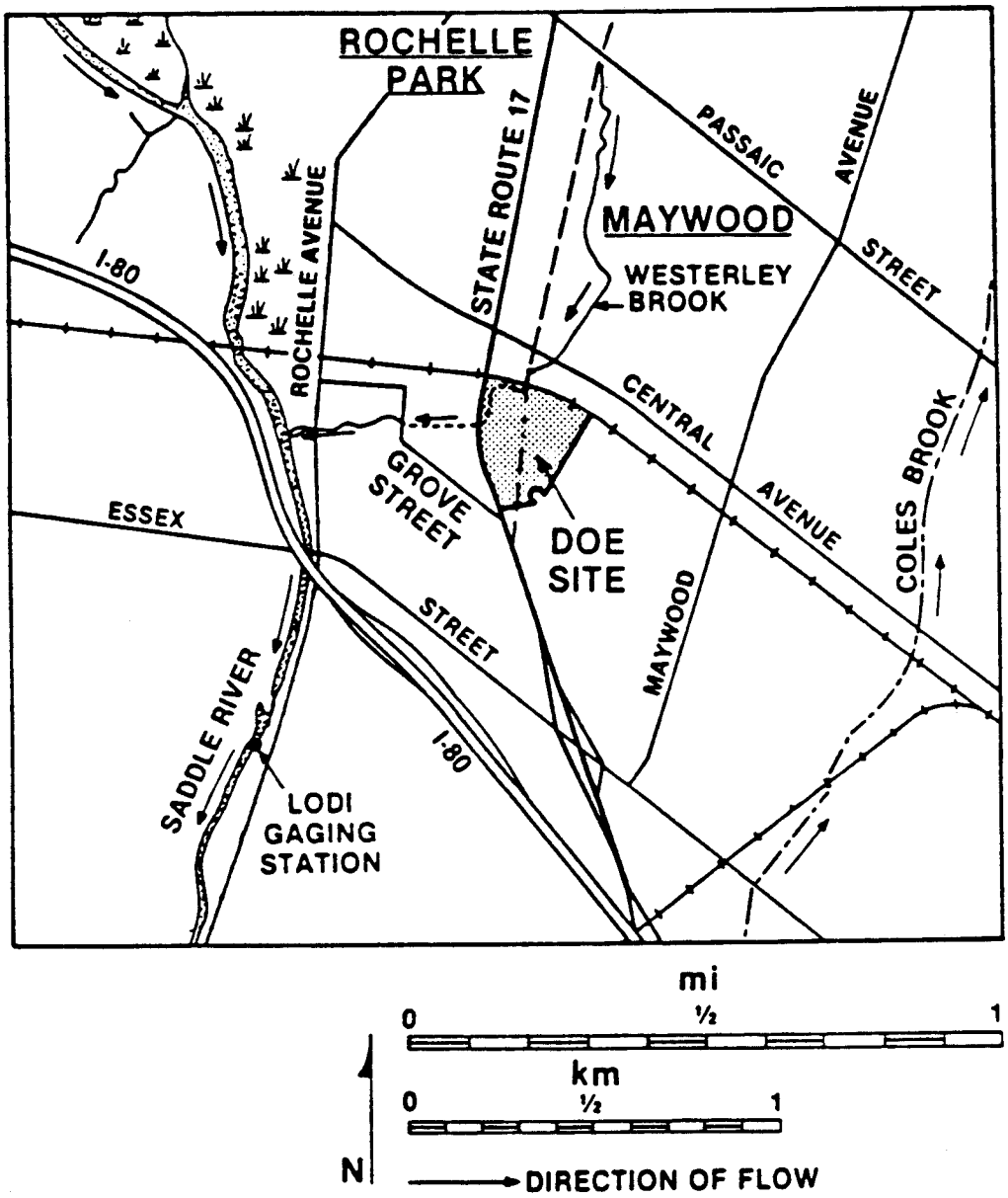

Figure 3.1. Surface Drainage in the Vicinity of the Maywood Storage Site. Adapted from U.S. Geological Survey map (Hackensack Quadrangle, New Jersey, 7.5 minute series).

(Morton 1981). The near-surface aquifer in the unconsolidated glacial materials is interconnected with the lower Brunswick aquifer. The groundwater flows southwest through the bedrock along fractures that tend to be most developed along the northeast-southwest strike of the Brunswick Formation (Spayd 1984). Several Lodi municipal wells are located downgradient southwest of the Maywood Storage Site and the burial grounds on the Stepan property. One of these wells, the "Home Place" well (about 3.2 km [2 mi] southwest of the site), has had elevated levels of radioactivity. Water from this well had a gross alpha concentration of 58.7 and 130.9 pCi/L in September and December 1983, respectively; five other Lodi wells had gross alpha concentrations ranging from 4.76 to 12.4 pCi/L (Spayd 1984). Background gross alpha concentrations in water from the Brunswick Formation in Bergen County range from <1 to 5.86 pCi/L, with a mean value of 1.09 pCi/L. It is not yet known whether the elevated levels of radioactivity in the Lodi wells result from leaching of radioactive contaminants from the buried wastes on the Stepan property or from leaching of existing contaminated soils on the Maywood Storage Site and Ballod property. The New Jersey Department of Environmental Protection is studying this situation.

3.2 METEOROLOGY

New Jersey averages about 120 days of precipitation per year, and the mean annual precipitation is about 120 cm (48 in.). August is the wettest month, with an average of 12 cm (4.8 in.) of precipitation measured at Little Falls, New Jersey, about 14 km [8.4 mi] southwest of Maywood (Gale Res. Co. 1980). The highest amount of precipitation recorded for a single day is 25 cm (9.8 in.), and the highest monthly total is 40 cm (15 in.). Floods frequently accompany heavy rains that are sometimes associated with storms of tropical origin. Short droughts occur during the growing season, but prolonged droughts are rare--generally occurring only once every 15 years (Gale Res. Co. 1980). The prevailing winds are from the northwest from October through April and from the southwest during the summer months.

3.3 ECOLOGY

Maywood is located within the glaciated area of the Appalachian oak forest section of the eastern deciduous forest (Bailey 1978). This forest section is characterized by oak, hickory, maple, basswood, elm, and ash--with alder, willow, ash, elm, and hygrophytic shrubs common in moist (poorly drained) habitats. However, because the sites are located within an urban setting and are developed as industrial and residential properties, little or no forest habitat is present.

The flora of the industrial sites (i.e., the Maywood Storage Site and the Stepan and Ballod properties) is dominated by early successional species (e.g., grasses, aster, goldenrod, clover, dandelion, smartweed, yarrow, thistle, and wild carrot) and shrubs and small trees (e.g., maple, aspen, willow, elm, and oak) (Vinikour 1984). Both the Maywood Storage Site and the Ballod property contain abundant stands of reed (*Phragmites communis*). *Phragmites* is an indicator of poorly drained, moist soils (Galvin 1979). The introduced (non-native) tree-of-heaven (*Ailanthus altissima*) is also common on the Maywood Storage Site, especially near the railroad spur. This species can thrive on poor soils in smoky environments (Schopmeyer 1974). The residential sites contain plant species common to landscaped yards such as grasses (fescue and blue grass), garden vegetables and/or flowers, evergreen shrubs, and trees.

The fauna is limited due to a lack of suitable habitat. Commonly encountered species are those that have adapted to suburban/urban encroachment. Birds found in the vicinity include house sparrow, cardinal, red-winged blackbird, common crow, robin, red-eyed vireo, mourning dove, and wood thrush. In Westerley Brook and the Saddle River, common surface-feeding ducks occur, such as mallards and black ducks. Mammal species occurring in the site vicinity probably include the Norway rat, racoon, opossum, muskrat, house mouse, meadow vole, white-footed mouse, deer mouse, eastern mole, eastern cottontail rabbit, striped skunk, eastern gray squirrel, and shorttail shrew. There are several woodchuck burrows on the Maywood Storage Site (Vinikour 1984). Generally, reptiles and amphibians are adversely affected by urbanization due to factors such as falling prey to humans and/or vehicles, habitat loss, and chemical wastes (Stearns and Ross 1978). However, a few species such as the eastern garter snake and American toad have partially adapted to urban habitats and can be expected to occur in the area.

Aquatic habitat is limited to drainageways, temporary ponds and other bodies of standing water, and Westerley Brook. Plant communities of Westerley Brook and permanently moist areas are dominated by cattails and marsh grasses. Mosquito and midge larvae, aquatic beetles and bugs, and other aquatic invertebrates capable of rapid colonization and/or short life cycles are typical inhabitants of temporary water bodies found in the vicinity. Species typical of small, generally degraded streams are found in Westerley Brook (e.g., aquatic worms, midges, snails, blackflies, beetles, bugs, minnows, and suckers).

No threatened or endangered species occur in the site vicinity (Fairbrothers and Hough 1973; N.J. Dep. Environ. Prot. 1975).

3.4 LAND USE

The Maywood Storage Site is a fenced vacant lot to be acquired by DOE from the Stepan Company for use as an interim-storage site for the radioactively contaminated materials to be excavated from nearby contaminated properties. The rest of the Stepan property is also enclosed by a fence and is currently used for chemical processing activities. Local residents use the Ballod property for unauthorized trash disposal, and local youths also play on the property (Cole 1981). SWS Industries had considered constructing an office/warehouse facility on the Ballod property (Mueller and Gunn 1981) but has located elsewhere (Dertsh 1984). This property has also been considered for residential development (Dertsh 1984). The Ballod property is zoned commercial and the Maywood Storage Site is zoned commercial and industrial.

A combination of industrial and residential land use exists within the immediate vicinity. With the exception of one house located along the east border of the Stepan property, the area to the east and south of the Maywood Storage Site is used for industrial and commercial purposes. Several residences are located along the south and west borders of the Ballod property. The New York, Susquehanna and Western Railroad property is located along the northern border of the Maywood Storage Site. Route 17 divides the Ballod property and the storage site.

Much of the land within several miles of the Maywood Storage Site is zoned for residential housing (one-family) and limited light industrial use. A few nearby lots are zoned for restricted commercial business. Zoning districts

for garden apartments and residential two-family housing are also found within several miles of the site. Similar commercial and residential zoning districts are found in the vicinity of the contaminated residences located on Latham and Davison streets.

3.5 SOCIOECONOMICS

The Maywood Storage Site and the Stepan and Ballod properties were part of a site that was initially developed in the late 19th Century as a chemical plant (Mueller and Gunn 1981). The Latham Street residences were all built in the mid-1920s, and the Davison Street homes were built in the 1950s and 1960s (Oak Ridge Natl. Lab. 1981a-g).

The contaminated sites are interconnected by a number of primary and secondary highways and are accessible to railroad and interstate transportation systems. New Jersey Route 17 divides the Ballod property from the Maywood Storage Site; the New York, Susquehanna and Western Railroad borders the north side of the site, and a railroad spur crosses the corner of the Ballod property and continues across the storage site into the Stepan plant. Reconstruction work on Route 17, including the railroad overpass, is scheduled for the spring of 1984 (Campbell 1984). Although the noise level within the residential areas tends to be low, highway and rail traffic cause higher noise levels.

The 1980 housing characteristics in the communities of Maywood and Rochelle Park were similar. Median home values were $67,200 for Maywood and $68,900 for Rochelle Park (U.S. Bur. Census 1982a). Vacancy rates for home owner and rental properties were very low compared to the patterns in many other New Jersey communities (Table 3.1).

Table 3.1. Housing Characteristics of Selected Areas in New Jersey†[1]

Select Locations	Vacancy Rate	
	Home Owner	Rental
Trenton SMSA	1.4	6.1
Newark City	1.6	6.5
Atlantic City	9.3	9.1
Maywood	0.3	1.0
Rochelle Park	0.1	0.7

†[1] Data from U.S. Bureau of the Census (1982a).

There are no churches, schools, hospitals, municipal buildings, or other institutional facilities immediately adjacent to the contaminated properties. However, these types of facilities are found within 1.6 km (1 mi) of the contaminated areas (U.S. Nucl. Reg. Comm. 1981) and along the routes that might be used for transport of contaminated materials to the Maywood Storage Site from vicinity properties (see Section 4.1.1).

The 1980 populations for Maywood and Rochelle Park were about 9,900 and 5,600 respectively, a decline from the 1970 populations of 11,000 and 6,400. Within Bergen County, the 1970 and 1980 populations were about 898,000 and 845,000 (U.S. Bur. Census 1973, 1982b). The population in this county is expected to increase over the next 20 years (Ryle 1980).

The socioeconomic makeup of Maywood and Rochelle Park is similar (U.S. Bur. Census 1982b). Both communities are comprised predominately of white, married-couple families who were born in New Jersey. In these communities, the median family income in 1979 was about $23,000 to $24,000. The main occupations in Maywood for employed persons 16 years and over include managerial and professional specialty occupations and technical, sales, and administrative support occupations, followed by service occupations. The occupational pattern in Rochelle Park is slightly different. The main occupations are technical sales and administrative support occupations, followed by managerial and specialty occupations and a variety of production-related occupations. Commuting by private vehicle appears to be the preferred mode of transportation to work in both communities, and the mean community travel times range from 19.7 to 21.4 minutes.

There is strong community concern that cleanup of the vicinity properties, particularly the residential properties, should proceed as quickly as possible (Feinstein 1982a, 1982b; Lang 1983; Stepan Chem. Co. 1983). Local residents and owners of contaminated residential properties have expressed concern about potential adverse health effects associated with radiation exposures (Mitchell 1984) and about reduced property values and difficulties in financing and selling properties (Anon. 1982). Officials from both Maywood and Rochelle Park have expressed three major concerns: (1) whether contaminated materials originating from only the Stepan site will be relocated on the Maywood Storage Site, (2) whether the site will become a "permanent" or "long-term" storage site, and (3) whether the consolidation of contaminated materials into one large pile will cause increased harmful effects from radiation (Curtis 1984; Rupp 1984).

4. PROPOSED REMEDIAL ACTIONS AND ALTERNATIVES

4.1 PROPOSED 1984 ACTIONS

4.1.1 Property Cleanup

The proposed actions for 1984 involve cleanup of three groups of properties: the Davison Street/Latham Street properties, the Grove Street/Park Way properties, and portions of the Ballod property. All contaminated materials will be removed from the two residential areas and placed in a temporary storage pile on the Maywood Storage Site.* The material from the Ballod property will be excavated beginning at the boundary with the Grove Street properties and working back north. The estimated volumes of material to be removed in 1984 are given in Table 2.2.

Except for the property at 464 Davison, removal of contaminated soil from the yards of the Davison Street/Latham Street properties (Figure 2.4) will be accomplished using a backhoe. A 0.5-yd^3 backhoe can load 150 m^3 (200 yd^3) of material onto trucks in one day (Means Co. 1981). Assuming that the close quarters of these residential lots will make excavation and loading slightly more difficult, it is estimated that most of the contaminated soil can be removed in about nine working days. Removal of the contaminated soils underneath the basement of the residence at 464 Davison will take longer (about three weeks). The slab will be removed and the basement will be excavated with shovels in 1.2-m (4-ft) sections as deeply as necessary. Each section will be backfilled when completed, and a new basement floor will be poured when all sections have been excavated/backfilled.

There are no weight restrictions on the public roads, but the trucks will be limited to a size of 10 yd^3. Using 10-yd^3 capacity trucks, approximately 15 truckloads per day will be required to move the contaminated soils about 2.4 to 3.8 km (1.5 to 2 mi) from the Davison Street/Latham Street properties to the interim-storage pile on the Maywood Storage Site. The contaminated materials in the trucks will be covered with tarps.

Two options are being considered for routing of the trucks. In Option 1, the trucks will travel east to Maywood Avenue, south to Central Avenue, west under Route 17 (Figure 4.1), south on a new gravel access road to the railroad, east on the south side of the railroad back under Route 17, and then south onto the storage site (Figures 4.1 and 4.2). In Option 2, the trucks will continue south on Maywood Avenue to either (a) the entrance to the Sears property (Figure 4.3) and then across the Sears property to a new access road to be constructed from the south end of the Maywood Storage Site (Figure 4.4),

*Negotiations for transfer of the proposed storage site from Stepan Company to DOE are nearing completion. The proposed actions are planned to commence after transfer of ownership has been completed.

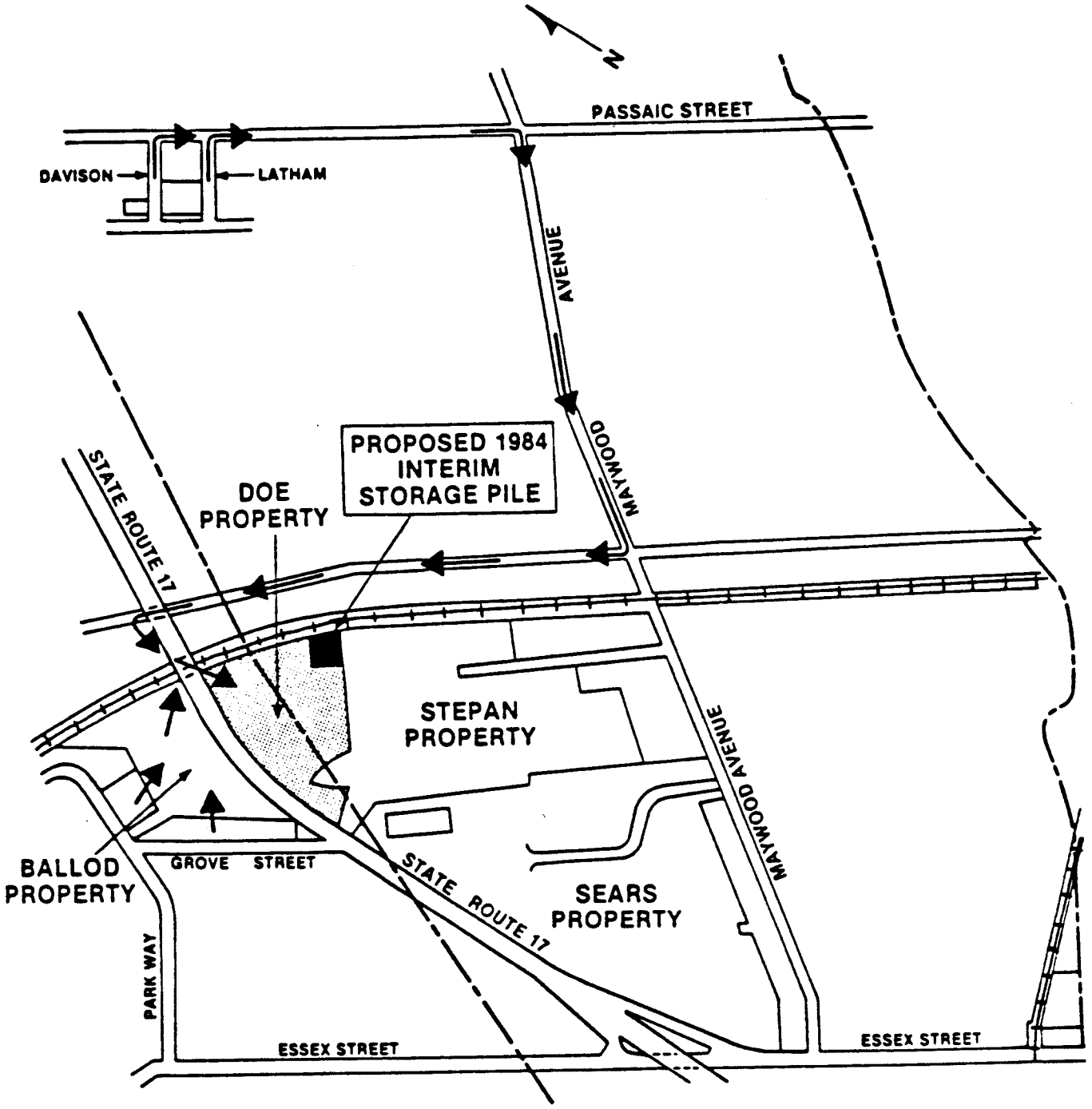

Figure 4.1. Option 1: Proposed Routing for Trucks Transporting Contaminated Soils. Adapted from preliminary drawing by Bechtel National, Inc.

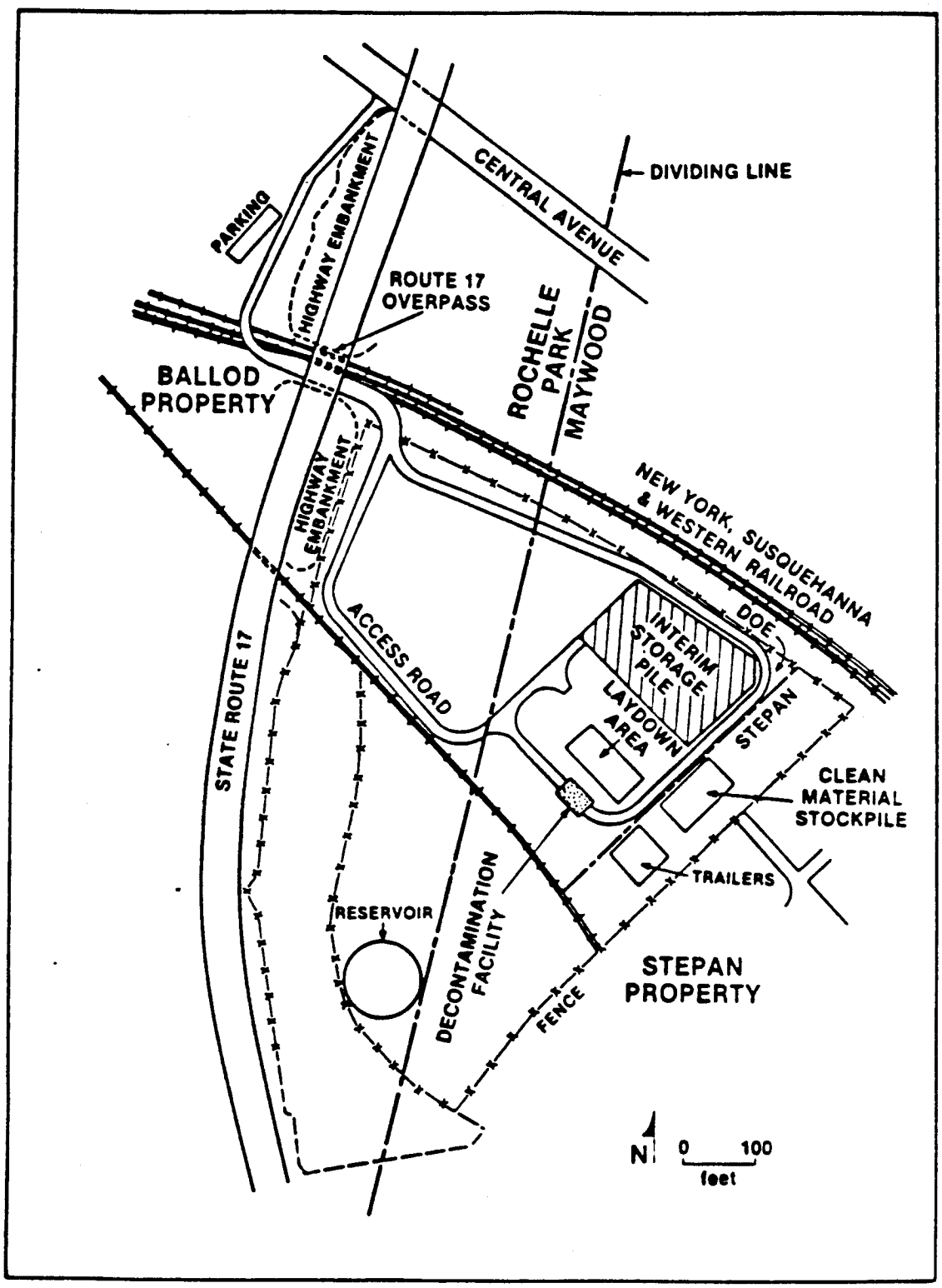

Figure 4.2. Option 1: Proposed 1984 Storage Pile, Access Road, and Support Facilities. Adapted from preliminary drawing by Bechtel National, Inc.

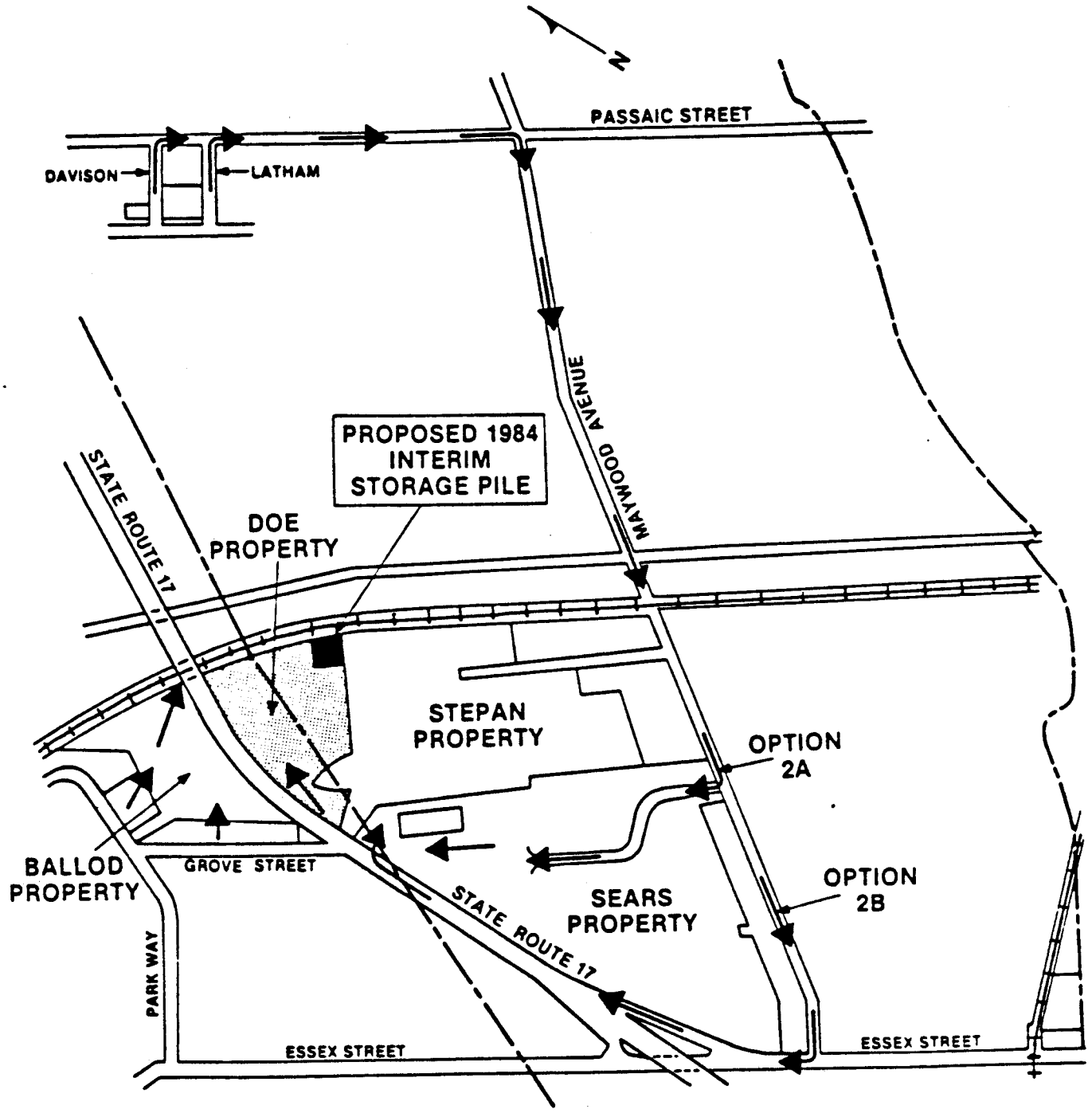

Figure 4.3. Option 2: Proposed Routing for Trucks Transporting Contaminated Soils. Adapted from preliminary drawing by Bechtel National, Inc.

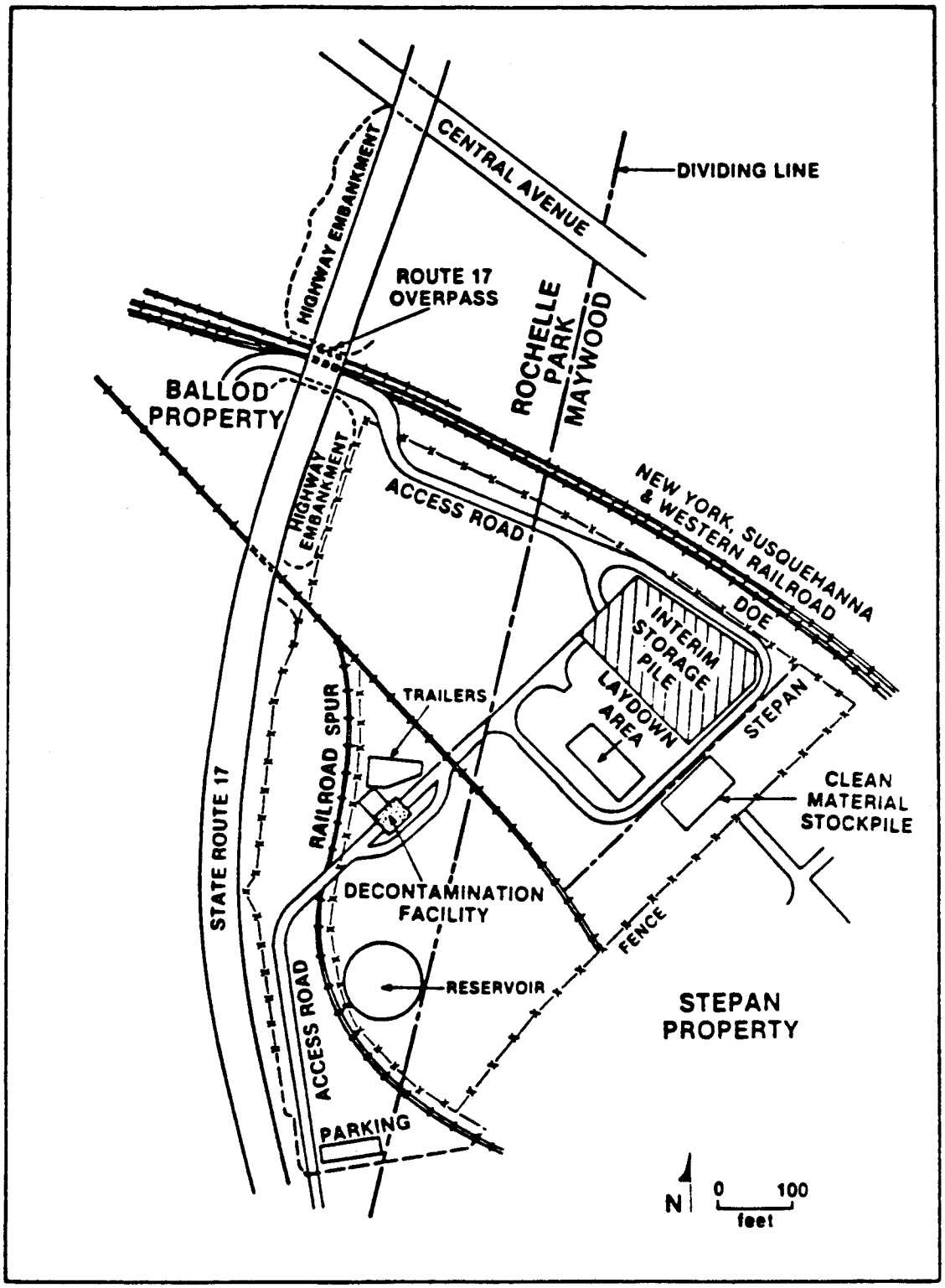

Figure 4.4. Option 2: Proposed 1984 Storage Pile, Access Road, and Support Facilities. Adapted from preliminary drawing by Bechtel National, Inc.

or (b) Essex Street, west to Route 17, north on Route 17 to an existing entrance to the Sears property, and then onto a new access road on the storage site (Figures 4.3 and 4.4). Negotiations are under way to determine which of these options can be implemented.

Removal of the small amount of contaminated soils on the Grove Street/Park Way properties and the Ballod property will be accomplished with standard earth-moving equipment and procedures because no buildings are involved. Public streets will not be traversed (Figure 4.1 and 4.3).

It is expected that the backfill requirements will be about equal to the amount excavated. After backfilling is complete, the area will be landscaped and reseeded. It is estimated that the total time from site preparation to backfill and landscaping at the Davison Street/Latham Street properties will be about two months and the total time at the Grove Street/Park Way properties will be about one month. The properties will be restored to an equal or better condition than existed before the remedial actions.

4.1.2 Interim Storage

For the proposed 1984 actions, a small storage pile containing 10,000 m^3 (13,000 yd^3)* of contaminated soils will be constructed on the northeast corner of the DOE Maywood Storage Site (Figure 4.2). The contaminated soils will be placed directly on the ground to form a pile covering 3,300 m^2 (35,000 ft^2) with a height of 4.6 m (15 ft).** The pile will have 2:1 side slopes and will be compacted by a bulldozer. Part of the area to be covered by the pile is already contaminated (Morton 1981). It will take 3-4 months to complete the pile, at which point it will be covered with a synthetic cover (Hypalon).

After depositing each load at the storage pile, the trucks used to haul the excavated material from the Davison Street/Latham Street properties will be surveyed for radioactivity and decontaminated as necessary. A decontamination facility, consisting of a gravel-filled pit with a wooden ramp over the pit, will be constructed on the storage site (Figures 4.2 and 4.4). Steam and high-pressure water will be used to clean the trucks. After collecting in the pit, the water will flow to a standpipe and will be recirculated through a sand filter to remove particulates. It is expected that the sand filters will have to be replaced about every two days; used filters will be disposed on the interim-storage pile. When the water becomes too contaminated and can no longer be recirculated, it will be transferred to a 19-m^3 (5000-gal) stationary bladder tank and will be used for dust control at the storage pile.

A summary of the measures to mitigate and monitor potential impacts that will be a part of the proposed action is given in Table 4.1.

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*As noted previously, the estimated volumes of materials to be excavated in 1984 are being revised as detailed engineering progresses. As of March 11, 1984, the estimated total volume has been reduced fo 9,000 m^3 (12,000 yd^3).

**Although not currently proposed, it is estimated that there will be room for two large storage piles on the Maywood Storage Site, having a total volume of about 84,000 m^3 (110,000 yd^3).

Table 4.1. Summary of Measures to Mitigate and Monitor Potential Adverse Impacts of the Proposed 1984 Actions

- Controls over possible spread of contamination, including: worker and environmental monitoring; decontamination of vehicles; and erosion- and dust-control measures.
- Erosion and dust controls, including: staged, prompt restoration/revegetation of disturbed areas and completion of work before end of growing season; temporary cover over storage pile, as necessary; watering of disturbed areas and unpaved truck routes; covering truckloads of contaminated material with tarps.
- Water quality monitoring, including: installation of monitoring wells around the storage area.
- Air monitoring for radioactive gases and contaminated dust.
- Noise mitigation, including: periodic checks of mufflers, compressors, etc.; work between 8:00 a.m. and 8:00 p.m. to minimize nuisance to nearby residents.
- Use of temporary snow fences around excavation areas; prompt restoration of fences, driveways, landscaping, etc.
- Scheduling of truck movements and provision of traffic directors, as necessary, to minimize traffic congestion.
- Consultation, cooperation, and coordination with local authorities and concerned citizens throughout the entire period of the action, including: regular information/coordination/planning meetings during both the cleanup and storage phases and designation of an onsite public liaison person for the cleanup phase.
- Periodic monitoring and surveillance of the interim-storage pile, with maintenance of the Hypalon cover and a pest (rodent and plant) control program, as necessary, to ensure the integrity of the pile and minimize potential offsite movement of contaminants.

A major advantage of the proposed action is the consolidation of the contaminated material into a single controlled area, thus reducing the potential risks of prolonged exposure of people to radiation as a result of either uncontrolled changes in land use or further dispersion by human activities or natural processes. Another advantage is the alleviation of public concerns about the contaminated properties.

4.2 ALTERNATIVES TO THE PROPOSED ACTIONS

One alternative to the proposed action is to take no action. This would result in continued exposure of people living on the contaminated properties to elevated levels of radioactivity and continued adverse social impacts such as concerns about health effects and property values (Section 3.5).

Another alternative to the proposed actions involves the method used to decontaminate the property at 464 Davison Street where it is necessary to remove and excavate under the basement slab. Because of the close quarters in the building, use of large mechanical equipment will be limited. In addition, it will be necessary to minimize the spread of dust and radioactivity throughout the house. An alternative might be to demolish this building and remove both the contaminated soils and any contaminated rubble to the interim-storage pile. Without the inhibitions imposed by retaining the house, larger equipment could be used and the cleanup completed more expeditiously. After removal of all the contaminated material, clean fill could be placed on the site. The current occupants could either be relocated in an equivalent home in the area or a new home could be built on the site, depending on negotiations with the home owner. Although this alternative may be technically feasible, it may be more costly and there may be legal impediments to its implementation.

Another alternative might be to move the contaminated soils from all properties directly to another site for permanent disposal. This alternative offers the advantage of having to move the contaminated materials only once. However, a permanent disposal site has not yet been identified and Congress has directed DOE to give priority to cleaning up the residential properties and has made funds available for this purpose. Any delay in cleaning up properties until a permanent disposal site is available would result in continued adverse social impacts associated with concerns about health effects and property values.

One additional alternative might be to remove the contaminated soils to permanent disposal on the Maywood Storage Site. Additional site characterization would be required and some additional land might have to be acquired for a buffer zone. Funds are currently not available for consideration of a permanent site. In addition, local authorities have taken the position that they do not want the Maywood Storage Site to be used for permanent disposal of radioactive materials.

5. ENVIRONMENTAL CONSEQUENCES AND MITIGATION

5.1 RADIOLOGICAL

A major potential issue is the radiological impacts associated with the proposed remedial actions. The predominant pathways by which radionuclides could reach nearby workers and members of the general public during the proposed actions are: (1) internal dose from inhalation of radioactive products such as those from decay of thoron gas (radon-220) and radon gas (radon-222)--radionuclides in the decay chains of thorium-232 and uranium-238, which are found at the Maywood site (Figures 5.1 and 5.2), (2) internal dose from inhalation of contaminated dust particles, (3) external dose from submersion in a cloud of contaminated dust, and (4) external dose from radioactive particles deposited on the ground. Based on analysis of similar activities (Argonne Natl. Lab. 1982), it is expected that the internal dose from ingesting contaminated food or water will be relatively insignificant.

The analysis of potential doses to nearby individuals and to the general public within an 80-km (50-mi) radius of Maywood is based on the following:

- Radionuclides in each of the two separate decay chains (Figures 5.1 and 5.2) are assumed to be present in equilibrium with the parents thorium-232 and uranium-238.

- The average concentrations of nuclides in the contaminated materials to be excavated and stored are 100 pCi/g for the thorium-232 decay chain and 23 pCi/g for the uranium-238 decay chain (Table 2.2).

- The duration of the activities involving cleanup and construction of the storage pile will be 4 months.

- There will be both gaseous and particulate releases while the material is being excavated and placed on the storage pile, but only gaseous releases will occur thereafter because the storage pile will be covered and maintained.

- Particulate releases from excavation activities are assumed to be 0.001% of the material to be moved (U.S. Environ. Prot. Agency 1977), and particulate releases from the exposed storage pile during the 4 months of pile construction are assumed to be 0.27 $kg/m^2/mo$ (1.2 tons/acre/mo) (U.S. Environ. Prot. Agency 1977; Argonne Natl. Lab. 1982). Estimated particulate releases are therefore 0.00037 Ci of thorium-232 and 0.000086 Ci of uranium-238.

- Thoron and radon gas releases will include both "puff" releases when the contaminated soils are disturbed during excavation and "steady" releases from the storage pile. Puff releases are assumed to be 20% of the radon and thoron gas inventories (the other 80% remains trapped within the

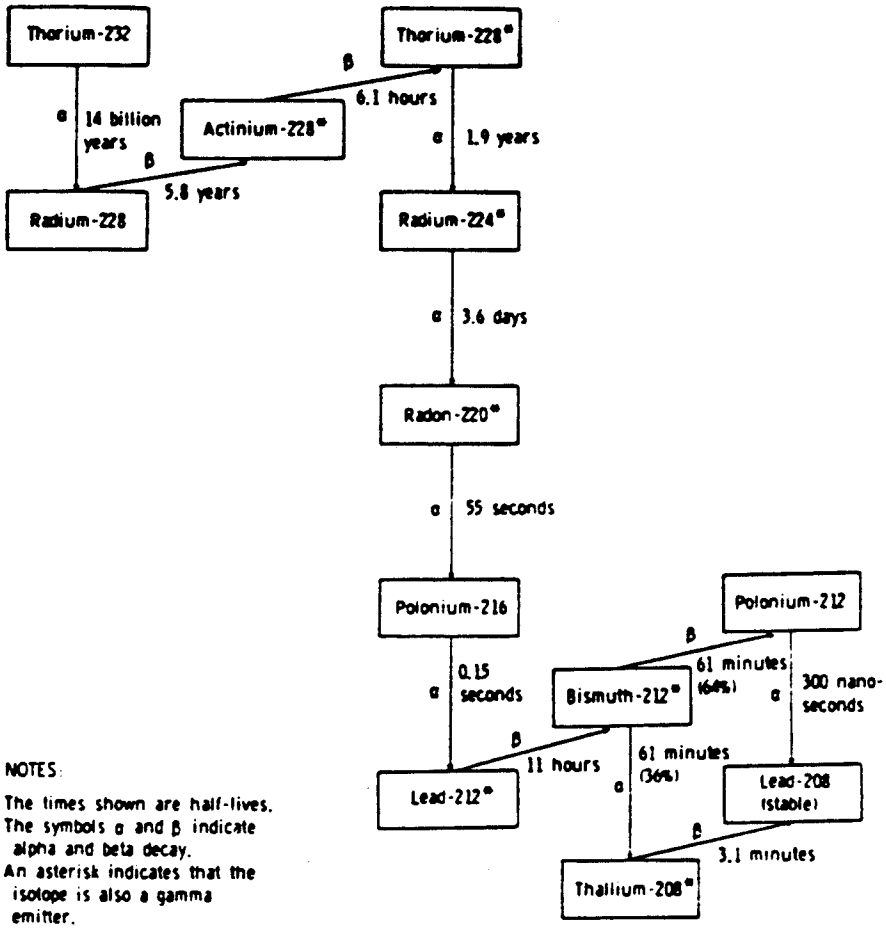
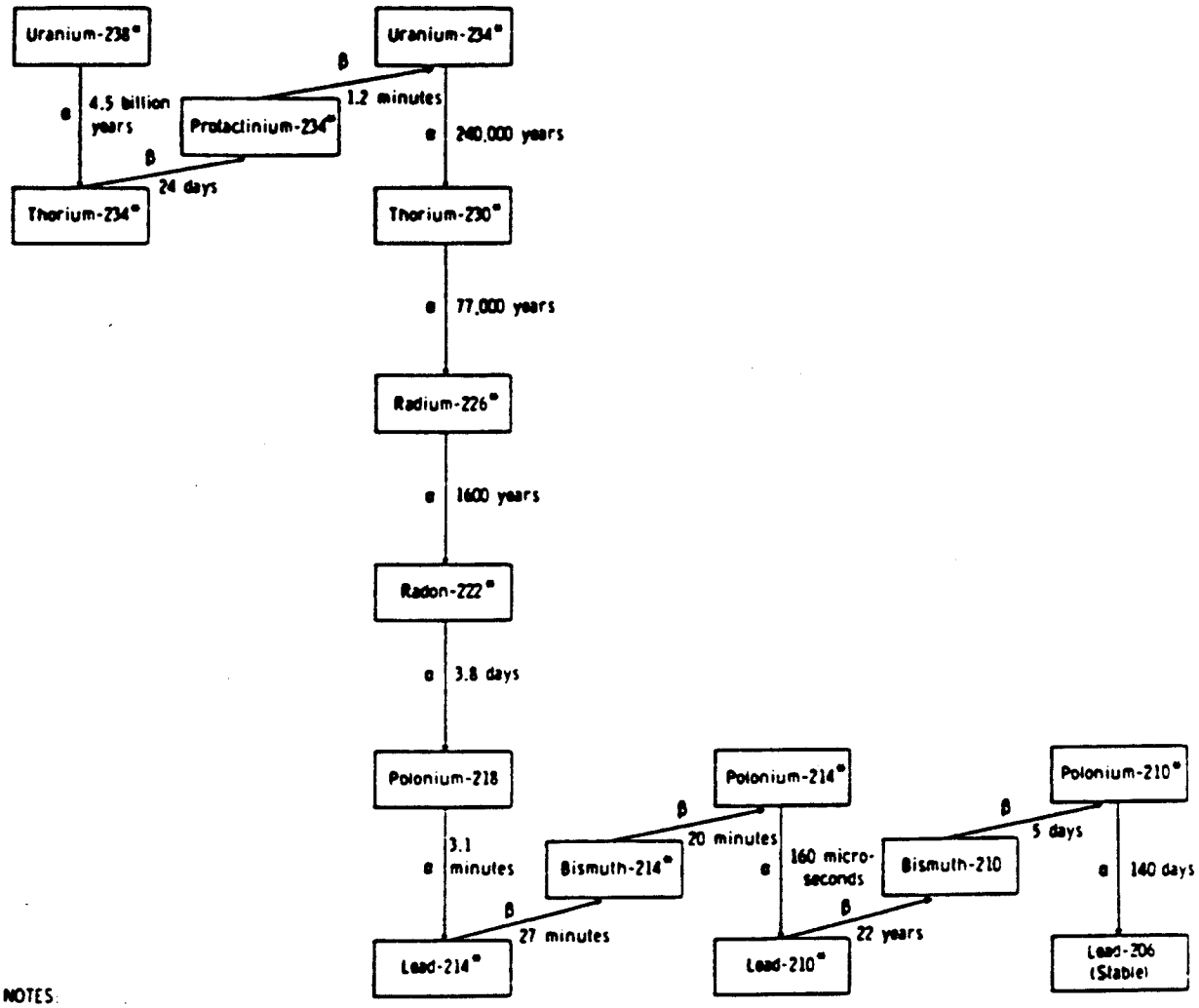


Figure 5.1. Thorium-232 Radioactive Decay Chain.



NOTES:

Only the dominant decay mode is shown.
The times shown are half-lives.
The symbols α and β indicate alpha and beta decay.
An asterisk indicates that the isotope is also a gamma emitter.

Figure 5.2. Uranium-238 Radioactive Decay Chain.

contaminated particles). Steady releases account for most of the releases and are calculated based on the following assumptions: (a) the stored material will be 4.5-m (15-ft) deep, (b) it will cover 3300 m^2 (35,000 ft^2), (c) it will have about a 13% moisture content, and (d) it will have a gaseous diffusion coefficient of 0.0036 cm^2/s. For continued releases during interim storage, no credit is taken for retardation of radioactive gases by the cover. Thoron fluxes are estimated to be 920 $pCi/m^2/s$, and radon fluxes are estimated to be 6.4 $pCi/m^2/s$. These fluxes are calculated according to the method of analysis given in a report of the U.S. Nuclear Regulatory Commission (1983). The thoron fluxes are higher because thoron has a shorter half-life and the activity is consequently higher. It is estimated that 33 Ci of thoron will be released during the actions and 95 Ci/yr thereafter from the storage pile. Radon releases are estimated to be 0.28 Ci during the action and 0.67 Ci/yr thereafter.

- The population distribution for the 15 million people within 80 km (50 mi) of the Maywood Storage Site is estimated based on 1980 county census data.

- Meteorological conditions at Maywood are assumed to be similar to those at Newark, New Jersey, for which meteorological data are available.

- Doses are evaluated in terms of the 100-year environmental dose commitment (EDC). The 100-year EDC is the integrated dose over 100 years resulting from continued exposure to the radionuclides released either during the 4 months of remedial actions or during each subsequent year from the storage pile.

Assuming that the mitigative measures discussed in Table 4.1 are implemented, potential doses to nearby individuals are predicted to be small (Table 5.1). The predicted whole-body doses are similar in magnitude to doses received while spending one hour on a jet plane at high altitudes or spending

Table 5.1. Estimated Radiological Doses to Nearby Individuals As a Result of Releases During the Proposed 1984 Remedial Actions†[1]

Individual/ Location	Distance and Direction from Center of Storage Pile	Dose (mrem)			
		Whole Body	Bone	Average Lung	Bronchial Epithelium
Resident on Central Avenue	0.15 km NE	0.37	9.3	9.0	0.016
Worker at Stepan Company	0.1 km SE	0.33	6.9	8.0	0.0089
Resident on Grove Street	0.3 km W	0.30	7.4	0.89	0.0025

†[1] Bases for radiological analysis are given in the text.

4 months (the time required to complete the remedial actions) at an altitude that is 60 m (200 ft) higher (Table 5.2). Specific organ doses (e.g., bone and lung) are lower than doses received from natural sources (Table 5.2).

The estimated doses to several organs and the whole body for the general public are presented in Table 5.3. The general public is considered to be the population of about 15 million people (1980 census) residing within 80 km (50 mi) of the site. The general public will receive doses resulting from releases during the remedial actions. After the remedial actions have been completed, the population near Maywood will continue to be exposed to radioactive releases from the storage pile (e.g., radon and thoron gas). These doses will all be negligible compared to doses the same population will receive from natural background sources of radiation (Table 5.3).

Doses to workers will be controlled and limited to less than those specified by DOE regulations for occupational doses (e.g., whole-body doses of 3000 mrem/quarter or 5000 mrem/year). Workers will be trained with regard to radiation risks and proper health-physics procedures.

Another radiological issue may be whether the decontamination criteria for the contaminated areas will be considered sufficient (see Appendix A). The criteria to be used are based on recent detailed studies (U.S. Dep. Energy 1983; Gilbert et al. 1983). DOE believes that these criteria are conservatively low for considering potential adverse health effects that might occur in the future from any residual contamination. Following removal of contaminated materials, DOE will certify the properties for future use, as appropriate.

5.2 PHYSICAL AND BIOLOGICAL

The proposed action will result in some short-term impacts on surface water and groundwater. Disturbed areas will be subject to wind and water erosion, with subsequent increases in turbidity, sedimentation, and dissolved solids of nearby receiving rivers (e.g., Westerley Brook and Saddle River). The greatest potential for such impact will be in August during the thunderstorm season, and the magnitude of this impact will depend primarily on the timing of construction and the amount of material exposed. However, because Westerley Brook and the Saddle River are located in an urbanized area and are thus recipients for a number of point and nonpoint discharges, no noticeable change in the quality or biota of these water bodies is expected. Mitigative measures--such as placement of a temporary cover over the storage pile, minimizing the time that the contaminated areas are exposed, and use of straw bales downslope from the excavation areas and storage pile--should minimize this impact.

Contaminated runoff from the storage pile and continued runoff from the existing contaminated areas on the Maywood Storage Site may be an issue. For the 1984 remedial actions, the existing drainage patterns will not be changed. The addition of access roads and the small storage pile is not expected to markedly affect the overall infiltration and runoff patterns. If large additional amounts of contaminated materials are to be brought to the storage site in future years, a site runoff control system will be provided. Such future actions will be subject to separate environmental analysis at the time a decision is to be made regarding future remedial actions (see Section 1).

Table 5.2. Comparison of Doses to Maximally Exposed Individual to Doses from Natural Background Sources

Dose from Remedial Action (values from Table 5.1)	Comparable Dose
0.37 mrem (whole body)†[1]	Equal to dose from riding about 1 hour in a jet plane at 10,000 m (33,000 ft) because of increase in cosmic radiation with altitude, or Equal to dose from staying for the same amount of time as the remedial action (4 months) at 60-m (200-ft) higher altitude
9.3 mrem (bone)†[1]	40 mrem received from natural radiation sources (background) over the same period of time
9.0 mrem (average lung)†[1]	60 mrem received from natural background radiation over the same period of time
0.016 mrem (bronchial epithelium)†[2]	110 to 200 mrem received from radon from natural background radiation over the same period of time

†[1] Conversion factors are given in reports of Argonne National Laboratory (1982) and National Council on Radiation Protection and Measurements (1975).

†[2] Based on 320 to 600 mrem/yr, assuming an outdoor radon-222 concentration of 0.3 pCi/L (Moses et al. 1963), an indoor concentration of 1 pCi/L (U.N. Sci. Comm. At. Radiat. 1977), and dose conversion factors for radon-222 of 1000 mrem/yr per pCi/L for outdoor background conditions (infinite source) and 625 mrem/yr per pCi/L for indoor conditions (50% equilibrium of radon daughters) (U.S. Nucl. Reg. Comm. 1980).

Contamination of groundwater may also be an issue. Elevated radiation levels have recently been discovered in water from Lodi municipal wells located downgradient from the Maywood Storage Site. It is not known whether the cause of the well contamination is leachate from materials in the Stepan burial grounds or the Maywood Storage site. The consolidation of contaminated materials from the vicinity properties onto the Maywood Storage Site could potentially increase groundwater contamination. However, it is planned that the 1984 storage pile will be very small and will be only temporary until a permanent disposal site can be found. The storage pile will be compacted and covered with a synthetic membrane (Hypalon) that is widely used in the construction industry. Infiltration of precipitation into the pile, and consequent leaching out of the pile, will be minimal if the cover and the pile remain intact.

Table 5.3. Estimated Doses to the General Public As a Result of the Proposed 1984 Remedial Actions

Tissue or Organ	Dose†[1] (person- or organ-rem) From Releases During the 4 Months of Remedial Actions	Dose†[1] (person- or organ-rem) From Natural Background Radiation During the 4 Months of Remedial Actions
Whole body	0.60	500,000
Bone	24	600,000
Average lung	38	900,000
Bronchial epithelium	4.2	530,000-3,000,000

Tissue or Organ	Dose†[1] (person- or organ-rem/yr) From Continuing Gaseous Releases from the Storage Pile	Dose†[1] (person- or organ-rem/yr) From Continuing Natural Background Radiation
Whole body	0.067	1,500,000
Bone	0.16	1,800,000
Average lung	2.7	2,700,000
Bronchial epithelium	2.7	4,800,000-9,000,000

†[1] Reported as the 100-year environmental dose commitment to the population within 80 km (50 mi) of the Maywood Storage Site.

Another issue may be the durability of the interim-storage pile. Frost penetrates to a depth of about 38 to 50 cm (15 to 20 in.) in the Maywood area. Frost heave could cause the Hypalon cover to rupture--resulting in infiltration of snowmelt and rainwater, saturation of the pile, and leaching to groundwater. This may be exacerbated by the relatively steep side slopes (2:1) that may lead to slumping of the stored material. However, measures will be taken to minimize this potential impact, including: use of a cover material that has a 20-year guaranteed life, compaction of the stored materials, periodic surveillance to check on the integrity of the pile and its cover, repairs (as necessary), and routine monitoring of groundwater in new wells to be drilled around the storage area.

Water from the Stepan plant will be used for equipment decontamination. A steam/high-pressure water system will be used to minimize water use, and water will be recirculated through filters as much as possible. The amount of water to be used is small relative to the available resources and local demands in Maywood. Contaminated water will be stored in a bladder tank and used for dust control on the storage pile.

Construction of the access roads will require consumption of timber, sand, and gravel resources. These resources are generally available locally, and supplies will not be unduly strained by the demands of the proposed project.

Implementation of the proposed action will have only a minimal effect on the terrestrial biota in the project area. Mammals and birds currently inhabiting the properties will be dispossessed (larger and/or mobile species) or destroyed (smaller, less mobile species). The vegetation on the sites will be destroyed temporarily on the Ballod property and for the period of interim storage on the Maywood Storage Site. The adverse effects of dust, noise, and traffic during the period of excavation and storage will be minimal due to (1) the paucity of wildlife, (2) the fact that the sites are located in an urban area where such impacts currently exist, and (3) implementation of mitigative measures (i.e., dust suppression). Vegetation destroyed on the residential properties due to excavation will be replaced through landscaping agreements. No impacts to endangered or threatened biota are anticipated from the proposed actions because their habitats do not correspond to those found on the affected sites.

Animals and plants could adversely affect the durability of the interim-storage pile. Burrowing animals that are on the site, such as the woodchucks (Section 3.3), may invade the pile--resulting in excavation of the contaminated soils, increased water infiltration, and decreased stability of the pile (Arthur and Markham 1983). Plant roots may also intrude into the storage pile (Cline and Uresk 1979; Yamamoto 1982)--especially species that produce suckers, such as the tree-of-heaven (Section 3.3). However, during the interim-storage period, the cover will be maintained and a pest-control program will be implemented, if necessary (Table 4.1).

5.3 SOCIOECONOMIC

The following assessment is based on the census information presented in Section 3.5 and a review of available secondary information about the local communities and the project plan presented in the report of Bechtel National (1983). Additional information was obtained during a visit to the area and meetings with local officials on February 22-23, 1984.

At the county and community levels, the settlement pattern should not be permanently impacted by the proposed action. Following cleanup of contaminated soils, current residential and industrial land uses could continue (subject to local zoning ordinances). Cleanup may affect the future use of the currently contaminated properties. For example, the Ballod property is the only undeveloped property in Rochelle Park and has been considered for residential and commercial development in recent years (Dertsh 1984). Excavations or building on the site will not be appropriate until the thorium contamination has been cleaned up, the residual contamination characterized, and a decision made regarding future use of the site. Use of the Maywood Storage Site will be restricted for as long as contaminated materials are stored there.

Cleanup activities involving movement and storage of the contaminated material could cause some localized impacts. Depending on which main access option is negotiated (Section 4.1.1), increased truck and commuter traffic will occur on the following streets: Davison Street, Latham Street, Grove

Street, Park Way, Passaic Street, Central Avenue, Maywood Avenue, Essex Street, and N.J. Route 17 (Figures 4.1 and 4.3). Also, if construction work on Route 17 is not completed by the time remedial actions commence, traffic conjestion could increase. Truck movements will be scheduled and traffic directors will be provided, as necessary, to minimize traffic congestion. Trucks hauling contaminated materials from the Grove Street/Park Way properties and the Ballod property will not traverse public streets (Figures 4.1 and 4.3).

Excavation and construction activities, as well as increased traffic, are expected to increase local noise levels, and some residents in the immediate vicinity of the proposed actions may be annoyed. In order to minimize this nuisance, there will be periodic checks of mufflers, compressors, etc., and work will be carried out only between 8:00 a.m. and 8:00 p.m.

Activities on and near the New York, Susquehanna and Western Railroad could disrupt train service. Earth-moving activities, truck traffic, and surveying will be coordinated with train schedules in order to minimize conflicts.

Demographic changes from the influx of workers or outmigration of local residents is expected to be insignificant. Local subcontractors will be hired, and the personnel associated with the small, short-term work force are expected to follow the commuting trends that are well established for this area (see Section 3.5). Impacts, such as demands on local goods and services or effects on the local economy, are expected to be minimal for a project of this size (Argonne Natl. Lab. 1982).

A positive socioeconomic impact that is expected to occur is the alleviation of problems that have occurred since the contamination was discovered a few years ago (e.g., concerns about health effects, negative publicity about the area, and difficulties with property sales--see Section 3.5). After cleanup of the residential properties, concerns of the owners and their neighbors should be reduced. However, some degree of public concern may continue until decisions are made regarding permanent disposition of the contaminated materials to be stored on the Maywood Storage Site, and future use of the Maywood Storage Site and vicinity properties.

Some short-term socioeconomic impacts may occur for those residents who are experiencing cleanup activities in their yards and, in one case, under their house. Yards, fences, and the basement floor of the house at 464 Davison Street are expected to be temporarily disturbed by excavation and restoration activities. While these actions are taking place, the lifestyle of the residents will be temporarily interrupted. The property access agreements will contain provisions for the residents to vacate the property, if they so desire, during the remedial actions. Security will be provided for all properties during the proposed actions. Properties will be restored to an equal or better condition than before the remedial actions.

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APPENDIX A. U.S. DEPARTMENT OF ENERGY INTERIM RESIDUAL CONTAMINATION AND WASTE-CONTROL GUIDELINES FOR FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP) AND REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM (SFMP) SITES

(April 1984)

Presented here are the residual contamination cleanup and waste-control guidelines of general applicability to the FUSRAP project and remote SFMP sites.* A site-specific analysis will be prepared for each FUSRAP and remote SFMP site prior to determining residual contamination guidelines for a specific site. In addition, it is policy of the DOE to decontaminate sites in a manner consistent with DOE's as-low-as-reasonably-achievable (ALARA) policy. ALARA will be considered in reducing levels of residual contamination below applicable dose limits. ALARA will be implemented using cost/benefit considerations, and applied on a site-specific basis.

The soil residual contamination guidelines were developed on the basis of limiting maximum individual radiation exposure to DOE limits specified in DOE Order 5480.1A, exclusive of exposure from natural background radiation or medical procedures. The radium-226 and thorium-230 guidelines include an additional limitation for builup of radon-222 decay products in buildings. The aggregate of the contribution from all major pathways was assumed, based on scenarios for permanent intrusion--e.g., establishing residences on the site. In most circumstances, the probability is low that such an intrusion will occur. Also, conservative assumptions were used in deriving these criteria to ensure that a particular dose limit would not be exceeded. Use of these guidelines is additionally conservative because the pathways considered in the derivation of the guidelines assume all water intake and most food intake is from the site. Also, the FUSRAP and remote SFMP sites often have limited agricultural capability and the contamination is generally not homogeneous. The combined effect of these factors is such that the probable radiation exposure to the average population on, or in the vicinity of, FUSRAP or remote SFMP sites decontaminated to these guidelines will not be appreciably different from that normally received from natural background radiation.

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*A remote SFMP site is one that is excess to DOE programmatic needs and is located outside a major operating DOE Research and Development (R&D) or production area. Remote sites are more likely to be released to the public or excessed to other government agencies after decontamination than are sites located with major R&D or production areas.

The residual contamination guidelines for surface contamination of structures were adapted from guidelines developed by the U.S. Nuclear Regulatory Commission (1982) for decontamination of facilities and equipment prior to release for unrestricted use or termination of licenses for byproduct, source, or special nuclear material. The waste-control guidelines are consistent with DOE Orders and EPA regulations for inactive uranium milling sites, 40 CFR Part 192.

A. RESIDUAL CONTAMINATION GUIDELINES FOR FORMERLY UTILIZED SITES AND REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

The following guidelines represent the maximum residual contamination limits for unrestricted use of land and structures contaminated with radionuclides related to the nuclear fuel cycle at FUSRAP and remote SFMP sites. A site-specific analysis will be prepared for each site prior to determining residual contamination guidelines for a specific site. It is the policy of DOE to decontaminate sites to contamination levels at or below the limits and in a manner consistent with DOE's as-low-as-is-reasonably-achievable (ALARA) policy on a site-specific basis. Site-specific guidelines and ALARA policy will be determined by DOE on a site-specific basis and an ALARA report filed on completion of remedial action at a site. Existing state and federal standards will be applied for water protection. Residual contamination limits for other nuclides will be developed when required using the same methodology as was used for those represented here [described in ORO-831 (U.S. Dep. Energy 1983) and ORO-832 (Gilbert et al. 1983)].

1. Soil (Land) Guidelines (Maximum Limits for Unrestricted Use)

Radionuclide	Soil Criteria†[1],†[2],†[3] (pCi/g above background)
U-Natural†[4]	75
U-238†[5]	150
U-234†[5]	150
Th-230†[6]	15
Ra-226	5 pCi/g, averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over 15-cm-thick soil layers more than 15 cm below the surface and less than 1.5 m below the surface.
U-235†[5]	140
Pa-231	40
Ac-227	190
Th-232	15

Am-241	60
Pu-241†[7]	2400
Pu-238, -239, -240	300
Cs-137	80
Sr-90	300
H-3 (pCi/mL soil moisture)	5,200

†[1] In the event of occurrence of mixtures of radionuclides, the fraction contributed by each radionuclide to its guideline shall be determined, and the sum of these fractions shall not exceed 1. There are two special cases for which this rule must be modified:

(a) If Ra-226 is present, then the fraction for Ra-226 should not be included in the sum if the Ra-226 concentration is less than or equal to the Th-230 concentration. If the Ra-226 concentration exceeds the Th-230 concentration, then the sum shall be evaluated by replacing the Ra-226 concentration by the difference between the Ra-226 and Th-230 concentrations.

(b) If Ac-227 is present, then the same rule given in (a) for Ra-226 relative to Th-230 applies for Ac-227 relative to Pa-231.

†[2] Except for Ra-226, 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. The same conditions prevail for Ra-226 except for soil layers beneath 1.5 m; beneath 1.5 m, the allowable Ra-226 concentration may be affected by site-specific conditions and must be evaluated accordingly.

†[3] Localized concentrations in excess of these guidelines are allowable provided that the average over 100 m^2 is not exceeded. However, DOE ALARA policy will be considered on a site-specific basis when dealing with elevated localized concentrations.

†[4] One curie of natural uranium means the sum of 3.7×10^{10} disintegrations per second (dis/s) over any 15-cm-thick layers from U-238 plus 3.7×10^{10} dis/s from U-234 plus 1.7×10^{9} dis/s from U-235. One curie of natural uranium is equivalent to 3,000 kilograms or 6,600 pounds of natural uranium.

†[5] Assumes no other uranium isotopes are present.

†[6] The Th-230 guideline is 15 pCi/g to account for ingrowth of Ra-226 as Th-230 decays. Ra-226 is a limiting radionuclide because its decay product is Rn-222 gas.

†[7] The Pu-241 guideline was derived from the Am-241 concentration.

2. <u>Structure Guidelines (Maximum Limits for Unrestricted Use</u>

a. <u>Indoor Radon Decay Products</u>

A structure located on private property and intended for unrestricted use shall be subject to remedial action as necessary to ensure the annual average concentration of radon decay products is less than 0.03 WL within the structure.

b. Indoor Gamma Radiation

The indoor gamma radiation after decontamination shall not exceed 20 microroentgen per hour (20 μR/h) above background in any occupied or habitable building.

c. Indoor/Outdoor Structure Surface Contamination

Radionuclides†[2]	Allowable Surface Residual Contamination (dpm/100 cm^2)†[1]		
	Average†[3],†[4]	Maximum†[4],†[5]	Removable†[4],†[6]
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
U-Natural, U-235, U-238, and associated decay products	5,000α	15,000α	1,000α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000β-γ	15,000β-γ	1,000β-γ

†[1] 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.

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

†[3] Measurements of average contaminant 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.

†[4] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h at 1 cm and 1.0 mrad/h at 1 cm, respectively, measured through not more than 7 mg/cm^2 of total absorber.

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

†[6] 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 assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels shall be reduced proportionately and the entire surface shall be wiped.

B. CONTROL OF RADIOACTIVE WASTES AND RESIDUES FROM FUSRAP AND REMOTE SFMP SITES

Specified here are the control requirements for radioactive wastes and residues related to the nuclear fuel cycle at FUSRAP and remote SFMP sites. It is the policy of DOE to store radioactive wastes in a manner representing sound engineering practices consistent with DOE's ALARA policy.

1. Interim Storage

All operational and control requirements specified in the following DOE Orders and other items shall apply:

a. 5480.1A, Environmental Protection, Safety, and Health Protection Program for DOE Operations.

b. 5480.2, Hazardous and Radioactive Mixed Waste Management.

c. 5483.1, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities.

d. 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements.

e. 5484.2, Unusual Occurrence Reporting System.

f. 5820, Radioactive Waste Management.

g. Control and stabilization features will be designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years.

h. Rn-222 concentrations in the atmosphere above facility surfaces or openings shall not (1) exceed 100 pCi/L at any given point, or an average concentration of 30 pCi/L for the facility site, or (2) exceed an average Rn-222 concentration at or above any location outside the facility site of 3.0 pCi/L (above background).

i. For water protection, use existing state and federal standards; apply site-specific measures where needed.

2. Long-Term Management

a. All operational requirements specified for Interim Storage Facilities (B.1) will apply.

b. Control and stabilization features will be designed to ensure, to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years. Other disposal site design features shall conform with 40 CFR Part 192 performance guidelines/ requirements.

c. Rn-222 emanation to the atmosphere from facility surfaces or openings shall not (1) exceed an average release rate of 20 $pCi/m^2/s$, or (2) increase the annual average Rn-222 concentration at or above any location outside the facility site by more than 0.5 pCi/L.

d. For water protection, use existing state and federal standards; apply site-specific measures where needed.

e. Prior to placement of any potentially biodegradable contaminated wastes in a Long-Term Management Facility, such wastes will be properly conditioned to (1) ensure that the generation and escape of biogenic gases will not cause the requirement in paragraph 2.c. to be exceeded, and (2) ensure that biodegradation within the facility will not result in premature structural failure not in accordance with the requirements in paragraph 2.b. If biodegradable wastes are conditioned by incineration, incineration operations will be carried out in compliance with all applicable federal, state, and local air emission standards and requirements, including any standards for radionuclides established pursuant to 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAPS).

C. Exceptions

Exceptions may be made to the guidelines presented herein following analysis of the site-specific aspects of a candidate site. Specific situations that warrant consideration for modifying these guidelines are:

1. Where remedial actions would pose a clear and present risk of injury to workers or members of the public, notwithstanding reasonable measures to avoid or reduce risk.

2. Where remedial actions would produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near affected sites, now or in the future, notwithstanding reasonable measures to limit damage to the environment. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

3. Where the cost of remedial actions for contaminated soil is unreasonably high relative to long-term benefits and the residual radioactive materials do not pose a clear present or future hazard. The likelihood that buildings will be erected or that people will spend long periods

of time at such a site should be considered in evaluating this hazard. Remedial actions will generally not be necessary where residual radioactive materials have been placed semipermanently in a location where site-specific factors limit their hazard and from which they are costly or difficult to remove, or where only minor quantities of residual radioactive materials are involved. Examples are residual radioactive materials under hard-surface public roads and sidewalks, around public sewer lines, or in fence-post foundations. Supplemental standards shall not be applied at such sites, however, if individuals are likely to be exposed for long periods of time to radiation from such materials at levels above those that would prevail in Subpart A.

4. Where the cost of cleanup of a contaminated building is clearly unreasonably high relative to the benefits. Factors that shall be included in this judgment are the anticipated period of occupancy, the incremental radiation level that would be affected by remedial actions, the residual useful lifetime of the building, the potential for future construction at the site, and the applicability of less costly remedial methods than removal of residual radioactive materials.

5. Where there is no known remedial action.

D. Guideline Sources

Guideline	Source
Residual Contamination Guidelines†[1]	
Soil Guideline	DOE Order 5480.1A, 40 CFR Part 192†[2]
Structure Guideline	40 CFR Part 192, U.S. Nuclear Regulatory Commission (1982)
Control of Radioactive Wastes and Residues	
Interim Storage	DOE Order 5480.1A
Long-Term Management	40 CFR Part 192

†[1] The bases of the residual contamination guidelines are developed in ORO-831 (U.S. Dep. Energy 1983) and ORO-832 (Gilbert et al. 1983).

†[2] Based on limiting the concentration of Rn-222 decay products to 0.03 WL within structures.

REFERENCES (Appendix A)

Gilbert, T.L., P.C. Chee, M.J. Knight, J.M. Peterson, C.J. Roberts, J.E. Robinson, S.Y.H. Tsai, and Y.C. Yuan. 1983. Pathways Analysis and Radiation Dose Estimates for Radioactive Residues at Formerly Utilized MED/AEC Sites. ORO-832. Prepared for the Formerly Utilized Sites Remedial Action Program, U.S. Department of Energy, Oak Ridge, TN, by the Division of Environmental Impact Studies, Argonne National Laboratory, Argonne, IL. March 1983.

U.S. Department of Energy. 1983. Radiological Guidelines for Application to DOE's Formerly Utilized Sites Remedial Action Program. ORO-831. Oak Ridge Operations, Oak Ridge, TN. March 1983.

U.S. Nuclear Regulatory Commission. 1982. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material. Division of Fuel Cycle and Material Safety, Washington, DC. July 1982.

LIST OF CONTRIBUTORS

This Action Description Memorandum has been prepared by the U.S. Department of Energy (DOE) with contractual assistance from Argonne National Laboratory (ANL). Staff members of the DOE Oak Ridge Operations Office, DOE Remedial Actions Program Office, and Bechtel National, Inc. (Oak Ridge, Tennessee) have reviewed the document. The following staff members of the ANL Environmental Research Division contributed to the preparation of this report.

Name	Education/Expertise	ADM Contribution
Pamela Merry-Libby	B.S. Biology 12 yr experience in environmental assessment of energy-related projects	Project Leader
Sue Ann Curtis	Ph.D. Anthropology 9 yr experience in socioeconomic and cultural resources assessment; 15 yr experience in archaeology	Description of existing socio-economic environment and impacts
John M. Peterson	M.S., P.E. Nuclear Engineering 9 yr experience in nuclear programs, including 5 yr in environmental assessment	Review of engineering and radiological analyses
William S. Vinikour	M.S. Biology (environmental emphasis) 10 yr experience in environmental impact assessment and aquatic research	Description of existing ecological environment and impacts
Robert W. Vocke	Ph.D. Water Resources/Botany 6 yr experience in environmental impact assessment	FUSRAP Program Manager, review
Seymour Vogler	B.S. Chemistry 37 yr experience in nuclear fuel reprocessing and waste management	Description of engineering and existing radiological environment
Dimis J. Wyman	M.S. Botany, M.A. Library Science 9 yr experience in technical editing	Technical editing
Jing-Yea Yang	Ph.D. Environmental Engineering 11 yr experience in hydrology and water resources analysis	Description of hydrological and geological existing environment and impacts
Yu-Chien Yuan	Ph.D. Nuclear Engineering 8 yr experience in radiological impact assessment of nuclear facilities	Description of radiological impacts

Exhibit II (5) - Access Agreements

Access agreements were obtained from each property owner before remedial action activities began. There is also an access agreement between the Borough of Maywood and DOE. The agreement was necessary because the Borough of Maywood owns the property between the sidewalk and the street of each property; however, remedial action on that section of the Maywood properties is included with the listed properties. The following list includes properties for which access agreements exist and are included here by reference.

10 Grove Avenue	454 Davison Street	58 Trudy Drive
26 Grove Avenue	459 Davison Street	59 Trudy Drive
22 Grove Avenue	460 Davison Street	61 Trudy Drive
30 Grove Avenue	464 Davison Street	64 Trudy Drive
34 Grove Avenue	468 Davison Street	
38 Grove Avenue		86 Park Way
42 Grove Avenue	59 Avenue C	90 Park Way
459 Latham Street	121 Avenue F	3 Hancock Street
461 Latham Street	123 Avenue F	
467 Latham Street		Ballod Associates
Borough of Maywood		

Exhibit II (6) - Post-Remedial Action Reports

The following reports document the remedial action activities and the post-remedial action radiological status for each of the subject properties. These post-remedial action reports are included in this docket by reference.

Bechtel National, Inc. Post-Remedial Action Report for the Ballod Associates Property, DOE/OR/20722-82, Revision 1, Oak Ridge, TN, November 1986.

Bechtel National, Inc. Post-Remedial Action Report for the Residential Properties on Davison and Latham Streets, DOE/OR/20722-77, Oak Ridge, TN, February 1986.

Bechtel National, Inc. Post-Remedial Action Report for the Residential Properties on Grove Avenue and Parkway, DOE/OR/20722-83, Oak Ridge, TN, March 1986.

Bechtel National, Inc. Post-Remedial Action Report for the Lodi Residential Properties, DOE/OR/20722-89, Oak Ridge, TN, August 1986.

Exhibit II (7) - Interim Verification Letters to Property Owners and Verification Statements and Reports

The following interim verification statements were sent to each of the property owners; copies are attached.

Page

Letter, J.E. Baublitz, Director, Division of Remedial Action Projects, Office of Terminal Waste Disposal and Remedial Action, Office of Nuclear Energy, Department of Energy Headquarters, to Distribution (for Grove Avenue and Parkway, Interim Verification), November 13, 1984. II-131

Letter, E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy, to Ballod Associates, November 8, 1985. II-134

Letter, E.L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy, to Distribution (for Davison and Latham Streets, Interim Verification), February 27, 1986. II-135

Letter, S.W. Ahrends, Director, Technical Services Division, Oak Ridge Operations Office, Department of Energy, to Distribution (for the Lodi Properties, Interim Verification), September 2, 1986. II-136

The following verification statements and reports were issued by Oak Ridge National Laboratory for the subject properties. Copies of the statements are attached; the reports are included by reference.

Letter, B.A. Berven, RASA Program Manager, Oak Ridge National Laboratory, to A.J. Whitman, Office of Nuclear Energy, Department of Energy. "Verification Statement for

Exhibit II (7) - Interim Verification Letters to Property Owners and Verification Statements and Reports (continued)

Page

Parcels Block 18, Lot 1 and Block 19A, Lot 1 at the Ballod Property in Rochelle Park, New Jersey," November 6, 1985. II-145

Letter, M.G. Yalcintas, Radiological Survey Activities, Oak Ridge National Laboratory, to A.J. Whitman, Division of Remedial Action Projects, Office of Nuclear Energy, Department of Energy Headquarters. "Statement on Verification to be Added to the Post-Remedial Action Report," December 16, 1985. II-148

Letter, M.G. Yalcintas, Oak Ridge National Laboratory, Radiological Survey Activities, to E.G. DeLaney, Division of Facility and Site Decommissioning Projects, Office of Nuclear Energy, Department of Energy Headquarters. "Verification Statement for Maywood Properties," February 18, 1986. II-162

Letter, M.G. Yalcintas, Radiological Survey Activities, Oak Ridge National Laboratory, to E.G. DeLaney, Director, Division of Facility and Site Decommissioning, Office of Nuclear Energy, Department of Energy. "Verification Statement for Lodi Properties," February 18, 1986. II-167

Letter, M.G. Yalcintas, Radiological Survey Activities, Oak Ridge National Laboratory, to E.G. DeLaney, Division of Facility and Site Decommissioning, Office of Nuclear Energy, Department of Energy. "Verification Statement for Lodi Properties," February 28, 1986. II-175

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 459 Davison Street, Maywood, New Jersey (MJ14L), ORNL/RASA-86/60, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 460 Davison Street, Maywood, New Jersey (MJ15L), ORNL/RASA-86/61, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 464 Davison Street, Maywood, New Jersey (MJ16L), ORNL/RASA-86/62, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 468 Davison Street, Maywood, New Jersey (MJ17L), ORNL/RASA-86/63, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 461 Latham Street, Maywood, New Jersey (MJ11L), ORNL/RASA-86/58, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 467 Latham Street, Maywood, New Jersey (MJ12L), ORNL/RASA-86/59, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 10 Grove Avenue, Rochelle Park, New Jersey (MJ03L), ORNL/RASA-86/42, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 22 Grove Avenue, Rochelle Park, New Jersey (MJ04L), ORNL/RASA-86/43, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 26 Grove Avenue, Rochelle Park, New Jersey (MJ05L), ORNL/RASA-86/44, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 30 Grove Avenue, Rochelle Park, New Jersey (MJ06L), ORNL/RASA-86/45, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 34 Grove Avenue, Rochelle Park, New Jersey (MJ07L), ORNL/RASA-86/46, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 38 Grove Avenue, Rochelle Park, New Jersey (MJ08L), ORNL/RASA-86/47, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 42 Grove Avenue, Rochelle Park, New Jersey (MJ09L), ORNL/RASA-86/48, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 86 Park Way, Rochelle Park, New Jersey (MJ02L), ORNL/RASA-86/41, Oak Ridge, TN, August 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 90 Park Way, Rochelle Park, New Jersey (MJ01L), ORNL/RASA-86/18, Oak Ridge, TN, July 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 454 Davison Street, Maywood, New Jersey (MJ13L), ORNL/RASA-86/75, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 459 Latham Street Maywood, New Jersey (MJ10L), ORNL/RASA-86/74, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 59 Avenue C, Lodi, New Jersey (LN008V), ORNL/RASA-86/72, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 121 Avenue F, Lodi, New Jersey (LN006V), ORNL/RASA-86/70, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 123 Avenue F, Lodi, New Jersey (LN007V), ORNL/RASA-86/71, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 3 Hancock Street, Lodi, New Jersey (LN005V), ORNL/RASA-86/69, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at the Ballod Associates Property, Rochelle Park, New Jersey (MJ18V), ORNL/RASA-86/64, Oak Ridge, TN, November 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 58 Trudy Drive, Lodi, New Jersey (LN001V), ORNL/RASA-86/65, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 59 Trudy Drive, Lodi, New Jersey (LN002V), ORNL/RASA-86/66, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 61 Trudy Drive, Lodi, New Jersey (LN003V), ORNL/RASA-86/67, Oak Ridge, TN, December 1986.

Oak Ridge National Laboratory. Results of the Independent Radiological Verification Survey at 64 Trudy Drive, Lodi, New Jersey (LN004V), ORNL/RASA-86/68, Oak Ridge, TN, December 1986.

NE-24
for DeLaney
11/9/84

NE-24
Baublitz
11/13/84

NOV 13 1984

Dear _____:

I am enclosing for your information the report of a radiological survey conducted of your property. The results of the survey indicated minor levels of residual radioactive material on your property which have since been cleaned up. It appears from the initial results of the remedial action measurements that the cleanup was successful. When the final data is reported and verified, you will be notified and the property will be formally certified as appropriate.

Thank you for your cooperation, and if there are any questions, please contact Mr. E. L. Keller, Director, Technical Services Division, Oak Ridge Operations Office, U.S. Department of Energy, Oak Ridge, Tennessee 37830 (615-576-0948).

Sincerely,

/S/

John E. Baublitz, Director
Division of Remedial Action Projects
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy

Enclosure

cc:
J. Eng, NJDEP, w/encl.

bcc: w/o encl.
E. Keller, OR
J. Eastman, OR
B. Berven, ORNL
J. Beck, BNI
A. Whitman, NE-24
Aerospace

NE-73 (4)
NE-24 RF
Whitman RF

NE-24 Whitman:ph:353-5439:11/8/84:IBM:307/9:3.30.6
IBM:307/10 (List of Addressees)

LIST OF ADDRESSEES

Mrs. Sadie Calabrese
10 Grove Avenue
Rochelle Park, NJ 07662

Mr. and Mrs. R. Waleck
22 Grove Avenue
Rochelle Park, NJ 07662

Mrs. E. Grammatico & Mrs. L. Lewis
26 Grove Avenue
Rochelle Park, NJ 07662

Mrs. Teresa Kohlus
30 Grove Avenue
Rochelle Park, NJ 07662

Mr. E. Eickhorst
34 Grove Avenue
Rochelle Park, NJ 07662

Mr. and Mrs. J. Hrablook
42 Grove Avenue
Rochelle Park, NJ 07662

Mr. and Mrs. H. Pfeiffer
90 Park Way
Rochelle Park, NJ 07662

Mr. and Mrs. F. Herkert
86 Park Way
Rochelle Park, NJ 07662

ATKIN

MAR 17 1986

Mr. and Mrs. Walter Kirchheimer
38 Grove Avenue
Rochelle Park, NJ 07662

Dear Mr. and Mrs. Kirchheimer:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property at 38 Grove Avenue has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

/s/

E. L. Keller, Director
Technical Services Division

CE-53:Atkin

Enclosure:
As Stated

cc w/encl.:
Honorable James Pallouras
Mayor of Rochelle Park

David Paley, NJDEP
Jeanette Eng, NJDEP

Frank Dahlinger, Secretary
of Planning Board
Rochelle Park

bcc w/encl.:
E. G. DeLaney, NE-23, GTN (2 encls.)
P. Merry-Libby, ANL
P. Owen, ORNL (2 encls.)
A. Wallo, Aerospace

bcc w/o encl.:
J. Nemec, BNI
B. Berven, ORNL
J. Berger, ORAU
W. Range, M-4
C. Seehorn, CC-10
J. Milloway, CE-50
J. Feldman, EPA-II

CONCURRENCES

RTG SYMBOL	INITIALS/SIG.	DATE
CE-53	Atkin RA	3/14/86
CE-53	Campbell CFC	3/14/86
CE-53	Wing AW	3/14
CE-53	Keller	3/14

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79)

OFFICIAL FILE COPY

CE-53:RCAtkin

Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

November 8, 1985

Jordan Industries Corp.
2110 Northern Boulevard
Manhasset, New York 11030

Gentlemen:

I am pleased to inform you that the remedial action on the property at Block 18, Lot 1 and Block 19A, Lot 1 in Rochelle Park, New Jersey has been satisfactorily completed. The property is now in compliance with applicable standards and guidelines. The data supporting this determination are in the enclosed post-remedial action report.

Thank you for your cooperation and if there are any questions, please feel free to call me on 615-576-0948.

Sincerely,

E. L. Keller

E. L. Keller, Director
Technical Services Division

CH-53:Atkin

Enclosures:
As stated

cc w/encl.:
Honorable James Panco
Mayor of Maywood
Honorable James Pallouras
Mayor of Rochelle Park
J. Bag, NJDEP
D. Paley, NJDEP

35103

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

February 27, 1986

Mrs. Frances Cielo
464 Davison Street
Maywood, NJ 07607

Dear Mrs. Cielo:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property at 464 Davison Street has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

E. L. Keller

E. L. Keller, Director
Technical Services Division

CE-53:Atkin

Enclosure:
As Stated

cc w/encl.:
Honorable James Panos
Mayor of Maywood

Patricia Allison
Borough Clerk

David Paley, NJDEP
Jeanette Eng, NJDEP

-ived by
FEB 28 1986
PDCC

LIST OF ADDRESSEES

Mrs. Frances Cielo
464 Davison Street
Maywood, New Jersey 07607

Mrs. Evelyn Dunphy
468 Davison Street
Maywood, New Jersey 07607

Mr. David Babcock
459 Davison Street
Maywood, New Jersey 07607

Mrs. Florence DiChiara
460 Davison Street
Maywood, New Jersey 07607

Mr. and Mrs. Louis A. Caccioppoli
454 Davison Street
Maywood, New Jersey 07607

Mr. and Mrs. David Mitchell
461 Latham Street
Maywood, New Jersey 07607

Mr. and Mrs. Joseph Hughes
467 Latham Street
Maywood, New Jersey 07607

Mr. John Schafer
459 Latham Street
Maywood, New Jersey 07607

[redacted] Nemec

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. Edward Woolsey
121 Avenue F
Lodi, New Jersey 07644

Dear Mr. and Mrs. Woolsey:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 121 Avenue F has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-070

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

SEP 4

[redacted] Hillcmrc

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. Richard Miller
123 Avenue F
Lodi, New Jersey 07644

Dear Mr. and Mrs. Miller:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 123 Avenue F has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-069

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

[redacted] Memo

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. Robert Kelly
59 Avenue C
Lodi, New Jersey 07644

Dear Mr. and Mrs. Kelly:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 59 Avenue C has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-067

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

[redacted])emec

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. Harold Lindner
3 Hancock Street
Lodi, New Jersey 07644

Dear Mr. and Mrs. Lindner:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 3 Hancock Street has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-068

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. Guy Capizzi
58 Trudy Drive
Lodi, New Jersey 07644

Dear Mr. and Mrs. Capizzi:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 58 Trudy Drive has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-063

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. William Gulino
59 Trudy Drive
Lodi, New Jersey 07644

Dear Mr. and Mrs. Gulino:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 59 Trudy Drive has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-065

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

[redacted] 1 ycmcc

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. Salvatore Composto
61 Trudy Drive
Lodi, New Jersey 07644

Dear Mr. and Mrs. Composto:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 61 Trudy Drive has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-064

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

[redacted] Remec

Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

September 2, 1986

Mr. and Mrs. Austin Hawxhurst
64 Trudy Drive
Lodi, New Jersey 07644

Dear Mr. and Mrs. Kelly:

I am pleased to inform you that the results of the post-remedial action radiological survey have been verified and that remedial action on the property of 64 Trudy Drive has been satisfactorily completed. The property is now in compliance with the standards and guidelines applicable to the remedial action activities at the Maywood site. The data supporting this determination are in the enclosed post-remedial action report. This report also describes the radiological surveys and remedial actions conducted on your property and other properties in your area on which appropriate remedial action activities were conducted.

A formal certification statement on your property will be forwarded to you in the near future.

Thank you for your cooperation and if there are any questions, call me on 615-576-0948.

Sincerely,

S. Ahrends

S. W. Ahrends, Director
Technical Services Division

CE-53:Atkin 86-066

Enclosure:
As stated

cc w/encl.:
Honorable Anthony Luna
Mayor of Lodi

David Paley, NJDEP
Jeanette Eng, NJDEP

John Curran
Borough Administrator
Lodi

32504

OAK RIDGE NATIONAL LABORATORY
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS INC

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37831

November 6, 1985

Mr. A. J. Whitman, NE-23
Division of Facility & Site
Decommissioning Projects
U. S. Department of Energy
Germantown, Maryland 20545

Dear Mr. Whitman:

Verification Statement for Parcels Block 18, Lot 1 and Block 19A, Lot 1 at the Ballod Property in Rochelle Park, New Jersey

Attached is a verification statement to be used in the post-remedial action report for Parcels Block 18, Lot 1 and Block 19A, Lot 1 at the Ballod property in Rochelle Park, New Jersey. Based on review of all radiological data about the present condition of this site and numerous onsite inspections, as Independent Verification Contractor (IVC), we believe that this site has been sucessfully remediated to the degree that it meets all applicable remedial action criteria established for this site.

Additionally, we would like to make several suggestions to improve the overall remedial action process. First, we believe that the health physics personnel responsible for excavation control should conduct a rapid gamma scan of the entire restored surface in the remediated area. This could avoid problems of accidential recontamination of a decontaminated area during restoration activities by use of potentially contaminated material from a radiologically-uncharacterized area. Also, this would provide a check for these individuals to preview the site prior to inspection by state health officials or auditing organizations (if any).

Close communication needs to be maintained between the IVC and the remedial action contractor. Specifically, site visits conducted by the IVC need to be arranged such that confirmatory measurements over the excavated area are completed by the remedial action contractor prior to inviting the IVC for the verification survey.

Finally, we would like to again reiterate the need for ALARA decisions to be made by responsible health physicists during excavation control. If localized areas of elevated radioactivity are discovered during remedial action, the ALARA philosophy dictates their cleanup unless unreasonable costs are incurred. Specifically, if these areas could be remediated by use of laborers with hand tools, volume would be small and work could be rapidly completed. Clearly, the benefit of performing this action is the assurance that only minimal radioactivity remains in the soil, and increased assurance of compliance with remedial action criteria.

Our full report on our verification activities on this site is under preparation, and will be available in January 1986. If you have any questions or comments about this matter, please don't hesitate to contact me.

Sincerely yours,

Barry A. Berven

Barry A. Berven, Ph.D.
RASA Program Manager, ORNL

BAB:sh

cc: R. G. Atkin, DOE/OR
J. D. Berger, ORAU
R. O. Chester
W. D. Cottrell
P. Crotwell, BNI
S. V. Kaye
E. L. Keller, DOE/OR
L. J. Mezga
J. F. Nemec, BNI
T. H. Row
L. E. Velazquez, DOE/OR
M. G. Yalcintas

VERIFICATION STATEMENT TO BE ADDED TO THE POST-REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities on Parcels Block 18, Lot 1 and Block 19A, Lot 1 at the Ballod property, Rochelle Park, New Jersey, has been accomplished by the Oak Ridge National Laboratory (ORNL), Radiological Survey Activities (RASA) group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria.

Based on all data collected, these Parcels on the Ballod property in Rochelle Park, New Jersey, conform to all applicable DOE radiological guidelines established for release of this site for unrestricted use.

OAK RIDGE NATIONAL LABORATORY
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

December 16, 1985

Mr. Arthur J. Whitman
Division of Remedial Action Projects
Office of Nuclear Energy
U.S. Department of Energy
MS - NE24
Washington, D.C. 20545

Dear Mr. Whitman:

Statement on Verification to be Added to the Post-Remedial Action Report

Enclosed please find the statements for the properties in Maywood and Rochelle Park, New Jersey, which were mentioned in my December 5, 1985 letter to you. The changes were made as you suggested, and they are now ready to be added to the post remedial action report.

If you have any questions, please call me at FTS 626-2078.

Sincerely yours,

M. G. Yalcintas, Ph.D.
Radiological Survey Activities

MGY:sh

cc: B. A. Berven
W. D. Cottrell

VERIFICATION STATEMENT FOR 10 GROVE AVENUE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 10 Grove Avenue, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 10 Grove Avenue, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 30 GROVE AVENUE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 30 Grove Avenue, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 30 Grove Avenue, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 34 GROVE AVENUE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 34 Grove Avenue, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 34 Grove Avenue, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 38 GROVE AVENUE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 38 Grove Avenue, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 38 Grove Avenue, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 42 GROVE AVENUE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 42 Grove Avenue, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 42 Grove Avenue, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 454 DAVIDSON STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 454 Davidson Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 454 Davidson Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 459 DAVIDSON STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 459 Davidson Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 459 Davidson Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 460 DAVIDSON STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 460 Davidson Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 460 Davidson Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 464 DAVIDSON STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 464 Davidson Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 464 Davidson Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 468 DAVIDSON STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 468 Davidson Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 468 Davidson Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 461 LATHAM STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 461 Latham Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 461 Davidson Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 467 LATHAM STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 467 Latham Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 467 Latham Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

VERIFICATION STATEMENT FOR 86 PARKWAY TO BE
ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 86 Parkway, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques suggests that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 86 Parkway, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria for the MISS, and the vicinity properties.

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

February 18, 1986

Mr. Edward DeLaney
Division of Facility y Site
Decommissioning Projects
U. S. Department of Energy
Germantown, Maryland 20545

Dear Mr. DeLaney:

Verification Statement for Maywood Properties

Enclosed please find revised verification statements to be included in the post remedial action reports for the following properties in Rochelle Park and Maywood, New Jersey.

Rochelle Park	Maywood
22 Grove Avenue	459 Latham Street
26 Grove Avenue	454 Davidson Street

Sincerely yours,

M. Guven Yalcintas, Ph.D.
Radiological Survey Activities

MGY:sh

cc: R. G. Atkin, DOE/OR
B. A. Berven
R. O. Chester
W. D. Cottrell
A. G. Croff
P. Crotwell, BNI
S. V. Kaye
E. L. Keller, DOE/OR
C. Leichtweis, BNI
J. F. Nemec, BNI
T. H. Row

VERIFICATION STATEMENT FOR 22 GROVE AVENUE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 22 Grove Avenue, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as verification analyses of archived post-remedial action soil samples.

A review of procedures, techniques, and analysis of archived samples indicate that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 22 Grove Avenue, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Maywood Site," April 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 26 GROVE AVENUE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 26 Grove Avenue, Rochelle Park, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as verification analyses of archived post-remedial action soil samples.

A review of procedures, techniques, and analysis of archived samples indicate that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 26 Grove Avenue, Rochelle Park, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Maywood Site," April 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 459 LATHAM STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 459 Latham Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as verification analyses of archived post-remedial action soil samples.

A review of procedures, techniques, and analysis of archived samples indicate that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 459 Latham Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Maywood Site," April 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 454 DAVIDSON STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 454 Davidson Street, Maywood, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 454 Davidson Street, Maywood, New Jersey, and that based on the data in the post-remedial action reports, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Maywood Site," April 1985 (Rev. 1).

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

February 18, 1986

Mr. Edward DeLaney
Division of Facility y Site
Decommissioning Projects
U. S. Department of Energy
Germantown, Maryland 20545

Dear Mr. DeLaney:

Verification Statement for Lodi Properties

Enclosed please find verification statements to be included in the post remedial action reports for the following properties in Lodi, New Jersey.

58 Trudy Drive
59 Trudy Drive
61 Trudy Drive
64 Trudy Drive
3 Hancock Street
123 Avenue F
59 Avenue C

Sincerely yours,

M. Guven Yalcintas, Ph.D.
Radiological Survey Activities

MGY:sh

cc: R. G. Atkin, DOE/OR
B. A. Berven
R. O. Chester
W. D. Cottrell
A. G. Croff
P. Crotwell, BNI
S. V. Kaye
E. L. Keller, DOE/OR
C. Leichtweis, BNI
J. F. Nemec, BNI
T. H. Row

VERIFICATION STATEMENT FOR 59 AVENUE C TO BE
ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 59 Avenue C, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 59 Avenue C, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 123 AVENUE F TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 123 Avenue F, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 123 Avenue F, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 3 HANCOCK STREET TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 3 Hancock Street, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 3 Hancock Street, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 64 TRUDY DRIVE TO BE
ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 64 Trudy Drive, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 64 Trudy Drive, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 61 TRUDY DRIVE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 61 Trudy Drive, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 61 Trudy Drive, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 59 TRUDY DRIVE TO BE
ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 59 Trudy Drive, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 59 Trudy Drive, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev. 1).

VERIFICATION STATEMENT FOR 58 TRUDY DRIVE TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 58 Trudy Drive, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 58 Trudy Drive, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Maywood vicinity properties as referenced in the post-remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev. 1).

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

February 28, 1986

Mr. Edward DeLaney
Division of Facility & Site
Decommissioning Projects
U. S. Department of Energy
Germantown, Maryland 20545

Dear Mr. DeLaney:

Verification Statement for Lodi Properties

Enclosed please find verification statements to be included in the post remedial action reports for the property at 121 Avenue F, Lodi, New Jersey.

Sincerely yours,

M. Guven Yalcintas, Ph.D.
Radiological Survey Activities

MGY:sh

cc: R. G. Atkin, DOE/OR
B. A. Berven
R. O. Chester
W. D. Cottrell
A. G. Croff
P. Crotwell, BNI
S. V. Kaye
E. L. Keller, DOE/OR
C. Leichtweis, BNI
J. F. Nemec, BNI
T. H. Row

VERIFICATION STATEMENT FOR 121 AVENUE F TO BE ADDED TO THE POST REMEDIAL ACTION REPORT

An independent assessment of remedial action related activities at 121 Avenue F, Lodi, New Jersey, has been accomplished by the ORNL/RASA group. The purpose of the assessment is to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria. The assessment included reviews of data included in the post-remedial action report, measurement and analysis procedures, sampling techniques, and remedial action plans and activities as well as the verification survey of the property.

A review of procedures and techniques indicates that the procedures used to develop the data presented in the post-remedial action report are adequate to characterize the final radiological condition of 121 Avenue F, Lodi, New Jersey, and that based on the data in the post-remedial action reports and verification survey results, the site conforms to the remedial action criteria established for the Lodi vicinity properties as referenced in the post remedial action report and stated in the "Remedial Action Work Plan for the Lodi Site," January 1985 (Rev.1).

Exhibit II (8) - State, County, and Local Comments on Remedial Action

The State of New Jersey was kept fully informed of all DOE activities. Copies of many reports, including the post-remedial action reports, were transmitted to the New Jersey Department of Environmental Protection for its review.

During the course of remedial action, a Memorandum of Understanding between the Borough of Maywood and DOE was agreed to and signed. It is included in this section of the docket.

MEMORANDUM OF UNDERSTANDING

WHEREAS, this Memorandum of Understanding (MOU) is entered into by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), represented by the UNITED STATES DEPARTMENT OF ENERGY (hereinafter referred to as "DOE") and the BOROUGH OF MAYWOOD, (hereinafter referred to as the "Borough"), and sets forth the understanding of the parties with respect to the decontamination research and development project to be undertaken by the DOE.

WHEREAS, the Energy and Water Development Appropriations Act for Fiscal Year 1984, Pub. L. 98-50 (hereinafter referred to as "the Act") authorizes the DOE to undertake a decontamination research and development project in the Borough of Maywood at a parcel of land at 100 West Hunter Avenue, Maywood, New Jersey, owned by the Stepan Company (hereinafter referred to as the "Maywood site"), and at other properties in the vicinity of the Maywood site (hereinafter referred to as the "vicinity properties") which contain radioactively contaminated soils originating from the Maywood site, under previous owners, and appropriates two (2) million dollars to initiate the project during Fiscal Year 1984.

NOW THEREFORE, the parties set forth their understanding as follows:

1. The DOE will not deposit any radioactively contaminated soil anywhere within the Borough other than that originating within the Borough or the Township of Rochelle Park, nor deposit any such soil at any location within the Borough other than upon an interim storage area (hereinafter, "Storage site") which will be constructed on the west portion of the Maywood site, on land to be acquired by DOE, as described more fully in Appendix A.

2. Subject to the direction of Congress and all applicable laws, and the availability of sufficient appropriated funds, the DOE will remove any and all radioactively contaminated soil stored on the Maywood and Storage sites, as well as the radioactively contaminated waste now buried on said site, to a suitable disposal site outside of the Borough within the State of New Jersey, to be selected by the State of New Jersey. In the event that Congress does not direct the removal of all radioactively contaminated soil and other radioactively contaminated waste stored on the Maywood and Storage sites, or if sufficient appropriated funds are not available, the DOE will take whatever steps it deems necessary to stabilize such soil and waste in place, in accordance with all applicable laws.

3. Pending the permanent disposal of radioactively contaminated soil and radioactively contaminated waste stored on the Maywood and Storage sites, the DOE will

take such steps as it deems necessary, including the covering of the contaminated soil with a waterproof fabric, designed to prevent the migration or discharge of contaminated waste, water, dust or other airborne contamination from the Maywood and Storage sites onto other surrounding properties within the Borough of Maywood. The DOE will take those steps it considers appropriate to insure that the radioactively contaminated soil at the Storage site is stored in a secure manner and shall install and maintain fencing around this site to discourage unauthorized entry and shall provide other security measures as appropriate, for so long as this site is used for the storage of radioactively contaminated soil.

4. Pending the permanent disposal of radioactively contaminated soil stored on the Maywood and Storage sites, the DOE will periodically monitor the Storage site. The DOE will provide the Borough with the monitoring results. Furthermore, the DOE will monitor the interior of any homes located on vicinity properties at the request of the property owners and, in the event such monitoring results in a finding of radioactive contamination, originating from the Maywood site, in excess of applicable standards, the DOE will remove such contamination and will clean all such affected areas in accordance with such standards.

BOROUGH OF MAYWOOD, NEW JERSEY

By: _____
James J. Panos, Mayor

_____
Patricia Allison, Clerk

Date: July 24, 1984

UNITED STATES DEPARTMENT OF ENERGY

By: _____
John E. Baublitz, Director
Division of Remedial Action
Projects, Office of Nuclear
Energy

Date: August 10, 1984

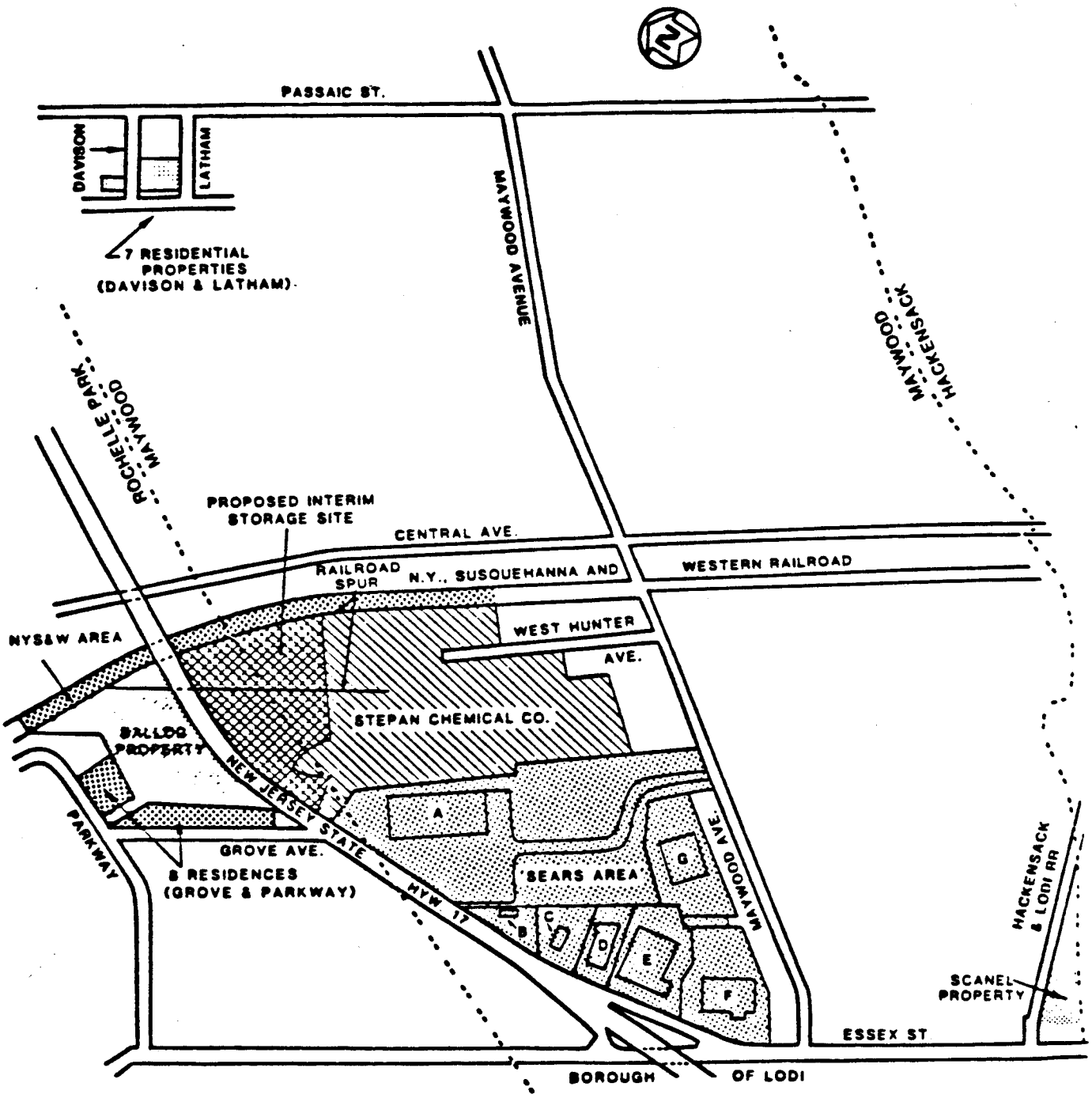
Subscribed and sworn to before me,
a Notary Public In and For the State
of Maryland, County of Frederick,
this 10th day of
August, 1984.

_____
Marilyn L. White
Notary Public

My Commission Expires: July 1, 1986

MAYWOOD

Remedial Action Site



'SEARS' AREA BUILDING LEGEND

A. SEARS WAREHOUSE
B. GULF STATION
C. SUNOCO STATION
D. FEDERAL EXPRESS
E. HUNTER DOUGLAS
F. AMF/VOIT
G. DESAUSSURE

(SHADED AREAS INDICATE RADIOLOGICAL CHARACTERIZATION HAS BEEN PERFORMED)

Exhibit II (9) - Restrictions

Parcel 9 (identified as Block 18, Lot 1 and Block 19A, Lot 1 and referred to as the Ballod property) has been decontaminated up to the toe of the Route 17 embankment as shown in Figure 9 in Exhibit III. This figure was taken from the **Post-Remedial Action Report for the Ballod Associates Property,** and illustrates the excavation limits at the property. Although the Route 17 embankment is within the Ballod property line, it has been considered separately because of the complexity of any potential remedial action for Route 17.

Exhibit II (10) - Federal Register Notice

This section contains the text of the Federal Register notice that was approved by DOE for publication in the Federal Register. It documents the certification that the subject properties have no radiological restrictions on their use.

6450-01
DEPARTMENT OF ENERGY

OFFICE OF NUCLEAR ENERGY

Certification of the Radiological Condition of Twenty-Six Private Properties Located in Maywood, Rochelle Park, and Lodi, New Jersey

AGENCY: Office of Remedial Action and Waste Technology, Department of Energy

ACTION: Notice of Certification

SUMMARY: The Department of Energy has completed radiological surveys and taken remedial action to decontaminate 10 properties in Rochelle Park, New Jersey; 8 properties in Lodi, New Jersey; and 8 properties in Maywood, New Jersey. The properties were found to contain quantities of radioactive material from thorium processing activities conducted at the former Maywood Chemical Works.

FOR FURTHER INFORMATION CONTACT:

J.J. Fiore, Director
Division of Facility and Site Decommissioning Projects
Office of Remedial Action and Waste Technology
U.S. Department of Energy
Washington, D.C. 20545
(301) 353-5272

SUPPLEMENTARY INFORMATION:

The Department of Energy (DOE), Office of Nuclear Energy, Office of Remedial Action and Waste Technology, Division of Facility and Site Decommissioning Projects, has implemented a remedial action project in the Maywood, New Jersey, area as part of a specially authorized research and development project (The Energy and Water Appropriations Act for FY 1984). The ultimate objective of the program is to ensure that any properties contaminated as a result of activities at the former Maywood Chemical Works can be certified to be within current radiological guidelines and applicable standards established to protect the general public.

The Maywood Chemical Works was founded in 1895. In 1916, the company began processing thorium from monazite sand for use in manufacturing gas mantles for various lighting devices. The company continued this work until 1956. Process wastes from manufacturing operations were pumped to an area west of the plant (now divided by Route 17). Subsequently, some of the contaminated wastes migrated onto adjacent properties on Grove Avenue and Parkway in Rochelle Park.

Over a period of time, some of the residues from the processing operations were moved from the company's property and used as landfill in nearby low-lying areas. The contamination at the Davison and Latham properties in Maywood resulted from the use of fill taken from the Maywood Chemical Works.

Unlike the Davison and Latham properties in Maywood, it is not known for certain how the properties in Lodi were contaminated. According to an area resident, fill from an unknown source was brought to Lodi and spread over large portions of the previously low-lying and swampy area. For several reasons, however, a more plausible explanation is that the contamination migrated along a drainage ditch originating on the Maywood Chemical Works property. It can be seen from old photographs and tax maps of the area that the course of a previously existing stream known as Lodi Brook, which originated at the former Maywood Chemical Works, generally coincides with the path of contamination in Lodi. The brook was subsequently replaced by a storm drain system as the area was developed. Secondly, samples taken from Lodi properties indicate elevated concentrations of a series of elements known as rare earths. Rare earth elements are typically found in monazite sands, which also include thorium. This type of sand was feedstock at the Maywood Chemical Works, and elevated levels are known to exist in the byproduct of the extraction process. Third, the ratio of thorium to other radionuclides found in Lodi is comparable to the ratio of those found in Maywood and Rochelle Park. And finally, long-time residents of Lodi recall chemical odors in and around the brook in Lodi, and have seen steam rising off the water. These observations suggest discharges of contaminants occurring upstream.

In 1954, the Atomic Energy Commission (AEC) issued a license to the Maywood Chemical Works to possess, process, manufacture, and

distribute radioactive materials. This license allowed manufacturing activities to continue under the Atomic Energy Act of 1954.

The Stepan Chemical Company [now called the Stepan Company (SC)] purchased Maywood Chemical Works in 1959. The Stepan Company itself has never been involved in the manufacture or processing of any radioactive materials.

In 1961, the SC was issued an AEC radioactive materials storage license. Based on AEC inspections of and information related to the property on the western side of Route 17, the SC agreed to take remedial action in that area and began in 1963 to clean up piles of thorium waste. As a result, residues and tailings on the property west of Route 17 (referred to as the Ballod property) were partially stabilized. From 1966 to 1968, the Stepan Company moved contaminated material from west of Route 17 to various places on the site.

At the request of the SC, a radiological survey of the company's property east of Route 17 was made by the AEC in 1968. Based on the findings of that survey, clearance was granted for unrestricted release of the property. At the time of the survey, however, the AEC was not aware of waste material still present west of Route 17. In late 1980, a resident's report that the area west of Route 17 was contaminated initiated a series of radiological characterizations that identified contaminated areas in Maywood, Lodi, and Rochelle Park, New Jersey.

The enactment of the 1984 Energy and Water Appropriations Act authorized DOE to conduct a decontamination research and development project at four sites throughout the nation, including the site of the former Maywood Chemical Works and its vicinity properties in the Boroughs of Maywood and Lodi and Township of Rochelle Park, New Jersey. Remedial action at these properties is being performed under the direction of the Formerly Utilized Sites Remedial Action Program (FUSRAP), a DOE effort to identify, decontaminate, or otherwise control sites where low-level 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.

On the basis of the 1984 Congressional authorization, DOE developed a remedial action plan to remove the contamination from 26 vicinity properties in Maywood, Lodi, and Rochelle Park, New Jersey. The first priority for the remedial action was to remove contaminated materials from residential properties, and then from commercial properties. These materials are stored at the Maywood Interim Storage Site. These 26 properties represent the first group of properties for which removal actions were taken under the Maywood project.

DOE coordinated its activities with the New Jersey Department of Environmental Protection, the Borough of Maywood, the Borough of Lodi, and the Township of Rochelle Park.

From May 1984 to November 1985, the 26 properties were decontaminated. Post-remedial action surveys have demonstrated and DOE has certified that radiological conditions on the affected properties are consistent with applicable criteria and that the use of the 26 properties presents no radiological hazard to the general public or to site occupants. These findings are supported by the DOE Certification Docket for the Remedial Action Performed at Properties in Maywood, Rochelle Park, and Lodi, New Jersey, in 1984 and 1985. Accordingly, these properties are released from the Formerly Utilized Sites Remedial Action Program.

The certification docket will be available for review between 9:00 a.m. and 4:00 p.m., Monday through Friday (except Federal holidays), in the Department of Energy Public Reading Room located in Room 1E-190 of the Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C. The certification docket will also be available at the Maywood Public Library, 459 Maywood Avenue, Maywood, New Jersey 07607.

The Department of Energy, through the Oak Ridge Operations Office, Technical Services Division, has issued the following statement:

STATEMENT OF CERTIFICATION: TWENTY-SIX PROPERTIES ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed the radiological data

obtained following remedial action at the 26 subject properties. Based on this review, DOE has certified that the properties listed below are in compliance with all applicable decontamination criteria and standards. This certification of compliance provides assurance that use of the properties will result in no radiological exposure above DOE criteria and standards to members of the general public or to site occupants. Accordingly, the following properties are released from the Formerly Utilized Sites Remedial Action Program:

Parcel 1 located on 454 Davison Street, Borough of Maywood identified as Block 124A, Lots 22, 23.

Parcel 2 located on 459 Davison Street, Borough of Maywood, identified as Block 123, Lots 18, 19, 20A.

Parcel 3 located on 460 Davison Street, Borough of Maywood, identified as Block 124, Lots 24, 25.

Parcel 4 located on 464 Davison Street, Borough of Maywood, identified as Block 124, Lots 26, 27.

Parcel 5 located on 468 Davison Street, Borough of Maywood, identified as Block 124, Lots 28, 29.

Parcel 6 located on 459 Latham Street, Borough of Maywood, identified as Block 124, Lots 18, 19.

Parcel 7 located on 461 Latham Street, Borough of Maywood, identified as Block 124, Lots 16, 17.

Parcel 8 located on 467 Latham Street, Borough of Maywood, identified as Block 124, Lots 14, 15.

Parcel 9 located on Ballod Associates property (up to the toe of the Route 17 embankment), Township of Rochelle Park, identified as Block 18, Lot 1 and Block 19A, Lot 1.

Parcel 10 located on 10 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 42, 43.

Parcel 11 located on 22 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 48, 49.

Parcel 12 located on 26 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 50, 51.

Parcel 13 located on 30 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 52, 53.

Parcel 14 located on 34 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 54, 55.

Parcel 15 located on 38 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 56, 57.

Parcel 16 located on 42 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 58, 59.

Parcel 17 located on 86 Park Way, Township of Rochelle Park, identified as Block 17, Lots 36, 37, 38, 39B.

Parcel 18 located on 90 Park Way, Township of Rochelle Park, identified as Block 17, Lots 39A, 40, 41.

Parcel 19 located on 58 Trudy Drive, Borough of Lodi, identified as Block 176G, Lot 15.

Parcel 20 located on 59 Trudy Drive, Borough of Lodi, identified as Block 176H, Lot 5.

Parcel 21 located on 61 Trudy Drive, Borough of Lodi, identified as Block 176I, Lot 6.

Parcel 22 located on 64 Trudy Drive, Borough of Lodi, identified as Block 176L, Lot 3.

Parcel 23 located on 3 Hancock Street, Borough of Lodi, identified as Block 176H, Lot 4.

Parcel 24 located on 121 Avenue F, Borough of Lodi, identified as Block 223A, Lots 60, 61.

Parcel 25 located on 123 Avenue F, Borough of Lodi, identified as Block 223A, Lots 62, 63.

Parcel 26 located on 59 Avenue C, Borough of Lodi, identified as Block 212, Lots 11, 12, 13.

J. E. Baublitz

Dated: 12/21/88

J.E. Baublitz, Acting Director
Office of Remedial Action
and Waste Technology
Office of Nuclear Energy
U.S. Department of Energy

Exhibit II (11) - Approved Certification Statements

The following statements document the certification of each of the 26 subject properties.

DOE F 1325.8
(12-84)

United States Government **Department of Energy**

memorandum

DATE: December 12, 1988

REPLY TO ATTN OF: NE-23: J.J. Fiore

SUBJECT: RECOMMENDATION FOR CERTIFICATION OF REMEDIAL ACTION FOR 26 PROPERTIES ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS, MAYWOOD, NEW JERSEY

TO: J.E. Baublitz, Acting Director
Office of Remedial Action and Waste Technology, NE-20

I am attaching for your signature the Federal Register Notice for 26 properties associated with the former Maywood Chemical Works in Maywood, New Jersey.

The Maywood Chemical Works produced rare earths and thorium compounds for the commercial and/or government sectors from about 1916 to 1956. The facility was first licensed by the Atomic Energy Commission (AEC) in 1954. In 1956, the Maywood Chemical Works ceased production, and in 1959, Stepan Chemical Company (now called the Stepan Company) purchased the facility. In 1961, Stepan Chemical was issued an AEC license for the storage of thorium and rare earths.

In 1963, Stepan began cleanup procedures and, from 1966 to 1968, consolidated waste materials into three burial areas located in the east and southeast portions of the facility. In 1968, after a closeout survey, the AEC authorized the unrestricted release of a vacant portion of the site to the west of Route 17 (referred to as the Ballod Associates property).

During the course of the plant's operation a number of adjacent and nearby properties were contaminated with ore or soil containing above-background concentrations of naturally occurring radionuclides. An inquiry from an area resident resulted in a survey by the Nuclear Regulatory Commission (NRC) in late 1980 and on January 26, 1981, an aerial radiological survey located thorium contamination near the plant site. Followup ground surveys conducted for the NRC and DOE further characterized the site and identified contamination at residential and commercial properties.

During 1984 and 1985, the Office of Nuclear Energy performed remedial actions at 26 properties associated with the former Maywood Chemical Works. These properties are:

Parcel 1 located on 454 Davison Street, Borough of Maywood identified as Block 124A, Lots 22, 23.

Parcel 2 located on 459 Davison Street, Borough of Maywood, identified as Block 123, Lots 18, 19, 20A.

Parcel 3 located on 460 Davison Street, Borough of Maywood, identified as Block 124, Lots 24, 25.

Parcel 4 located on 464 Davison Street, Borough of Maywood, identified as Block 124, Lots 26, 27.

Parcel 5 located on 468 Davison Street, Borough of Maywood, identified as Block 124, Lots 28, 29.

Parcel 6 located on 459 Latham Street, Borough of Maywood, identified as Block 124, Lots 18, 19.

Parcel 7 located on 461 Latham Street, Borough of Maywood, identified as Block 124, Lots 16, 17.

Parcel 8 located on 467 Latham Street, Borough of Maywood, identified as Block 124, Lots 14, 15.

Parcel 9 located on Ballod Associates property (up to the toe of the Route 17 embankment), Township of Rochelle Park, identified as Block 18, Lot 1 and Block 19A, Lot 1.

Parcel 10 located on 10 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 42, 43.

Parcel 11 located on 22 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 48,49.

Parcel 12 located on 26 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 50, 51.

Parcel 13 located on 30 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 52, 53.

Parcel 14 located on 34 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 54, 55.

Parcel 15 located on 38 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 56, 57.

Parcel 16 located on 42 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 58, 59.

Parcel 17 located on 86 Park Way, Township of Rochelle Park, identified as Block 17, Lots 36, 37, 38, 39B.

Parcel 18 located on 90 Park Way, Township of Rochelle Park, identified as Block 17, Lots 39A, 40, 41.

Parcel 19 located on 58 Trudy Drive, Borough of Lodi, identified as Block 176G, Lot 15.

Parcel 20 located on 59 Trudy Drive, Borough of Lodi, identified as Block 176H, Lot 5.

Parcel 21 located on 61 Trudy Drive, Borough of Lodi, identified as Block 176I, Lot 6.

Parcel 22 located on 64 Trudy Drive, Borough of Lodi, identified as Block 176L, Lot 3.

Parcel 23 located on 3 Hancock Street, Borough of Lodi, identified as Block 176H, Lot 4.

Parcel 24 located on 121 Avenue F, Borough of Lodi, identified as Block 223A, Lots 60, 61.

Parcel 25 located on 123 Avenue F, Borough of Lodi, identified as Block 223A, Lots 62, 63.

Parcel 26 located on 59 Avenue C, Borough of Lodi, identified as Block 212, Lots 11, 12, 13.

Based on a review of all documents related to these properties, we have concluded that they should be certified to be in compliance with criteria and standards established for the Maywood Remedial Action Project. These criteria were established in accordance with DOE Guidelines and Orders, consistent with other appropriate NRC and Environmental Protection Agency guidelines, and to protect the public health and environment.

The Division of Facility and Site Decommissioning Projects has provided the attached docket to effect the certification of the subject properties.

Following your concurrence of the certification, this office and/or Oak Ridge Operations Technical Services Division will notify interested state and local agencies, the public, local land offices, and the specific property owners of the certification actions by correspondence and local newspaper announcements, as appropriate. The documents transmitted with the Statement of Certification and the Federal Register notice will be compiled in final docket form by the Division of Facility and Site Decommissioning Projects for retention in accordance with DOE Order 1324.2 (Disposal Schedule 25).

J.J. Fiore, Director
Division of Facility and Site
Decommissioning Projects
Office of Nuclear Energy
U.S. Department of Energy

Attachments:
As Stated

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 1 located on 454 Davison Street, Borough of Maywood, identified as Block 124A, Lots 22, 23.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

Date: 11/18/88

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 2 located on 459 Davison Street, Borough of Maywood, identified as Block 123, Lots 18, 19, 20A.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 3 located on 460 Davison Street, Borough of Maywood, identified as Block 124, Lots 24, 25.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 4 located on 464 Davison Street, Borough of Maywood, identified as Block 124, Lots 26, 27.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 5 located on 468 Davison Street, Borough of Maywood, identified as Block 124, Lots 28, 29.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/15/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 6 located on 459 Latham Street, Borough of Maywood, identified as Block 124, Lots 18, 19.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 4/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 7 located on 461 Latham Street, Borough of Maywood, identified as Block 124, Lots 16, 17.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 8 located on 467 Latham Street, Borough of Maywood, identified as Block 124, Lots 14, 15.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 4/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property (up to the toe of the Route 17 embankment) is in compliance with all applicable decontamination criteria and standards:

Parcel 9 located on Ballod Associates Property, Township of Rochelle Park, identified as Block 18, Lot 1 and Block 19A, Lot 1.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 10 located on 10 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 42, 43.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/15/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 11 located on 22 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 48, 49.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

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ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 12 located on 26 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 50, 51.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 13 located on 30 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 52, 53.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 14 located on 34 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 54, 55.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

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ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 15 located on 38 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 56, 57.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/15/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 16 located on 42 Grove Avenue, Township of Rochelle Park, identified as Block 17, Lots 58, 59.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/15/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 17 located on 86 Park Way, Township of Rochelle Park, identified as Block 17, Lots 36, 37, 38, 39B.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/15/85

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 18 located on 90 Park Way, Township of Rochelle Park, identified as Block 17, Lots 39A, 40, 41.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/16/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 19 located on 58 Trudy Drive, Borough of Lodi, identified as Block 176G, Lot 15.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 20 located on 59 Trudy Drive, Borough of Lodi, identified as Block 176H, Lot 5.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/15/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 21 located on 61 Trudy Drive, Borough of Lodi, identified as Block 176I, Lot 6.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/15/85

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 22 located on 64 Trudy Drive, Borough of Lodi, identified as Block 176L, Lot 3.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 23 located on 3 Hancock Street, Borough of Lodi, identified as Block 176H, Lot 4.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: Peter J. Gross

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

Date: 11/15/88

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 24 located on 121 Avenue F, Borough of Lodi, identified as Block 223A, Lots 60, 61.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: Peter J. Gross

Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 25 located on 123 Avenue F, Borough of Lodi, identified as Block 123A, Lots 62, 63.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: _____ Date: 11/18/88

P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

STATEMENT OF CERTIFICATION: VICINITY PROPERTY
ASSOCIATED WITH THE FORMER MAYWOOD CHEMICAL WORKS

The U.S. Department of Energy, Oak Ridge Operations Office, Technical Services Division, has reviewed and analyzed the radiological data obtained following remedial action at 26 properties that were contaminated by material similar to that processed at the former Maywood Chemical Works in Maywood, New Jersey. Based on this analysis, the Department of Energy certifies that the following property is in compliance with all applicable decontamination criteria and standards:

Parcel 26 located on 59 Avenue C, Borough of Lodi, identified as Block 212, Lots 11, 12, 13.

This certification of compliance provides assurance that use of the property will result in no radiological exposure above DOE criteria and standards established to protect members of the general public or to site occupants.

By: P.J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy

Date: 11/18/88

Exhibit III Diagrams of the Remedial Action at the Properties in Maywood, Rochelle Park, and Lodi, New Jersey, in 1984 and 1985

EXHIBIT III

DIAGRAMS OF THE REMEDIAL ACTION AT THE

PROPERTIES IN MAYWOOD, ROCHELLE PARK, AND

LODI, NEW JERSEY, IN 1984 AND 1985

The figures provided on the following pages are taken from the post-remedial action reports and indicate the types of remedial action performed at the subject properties.

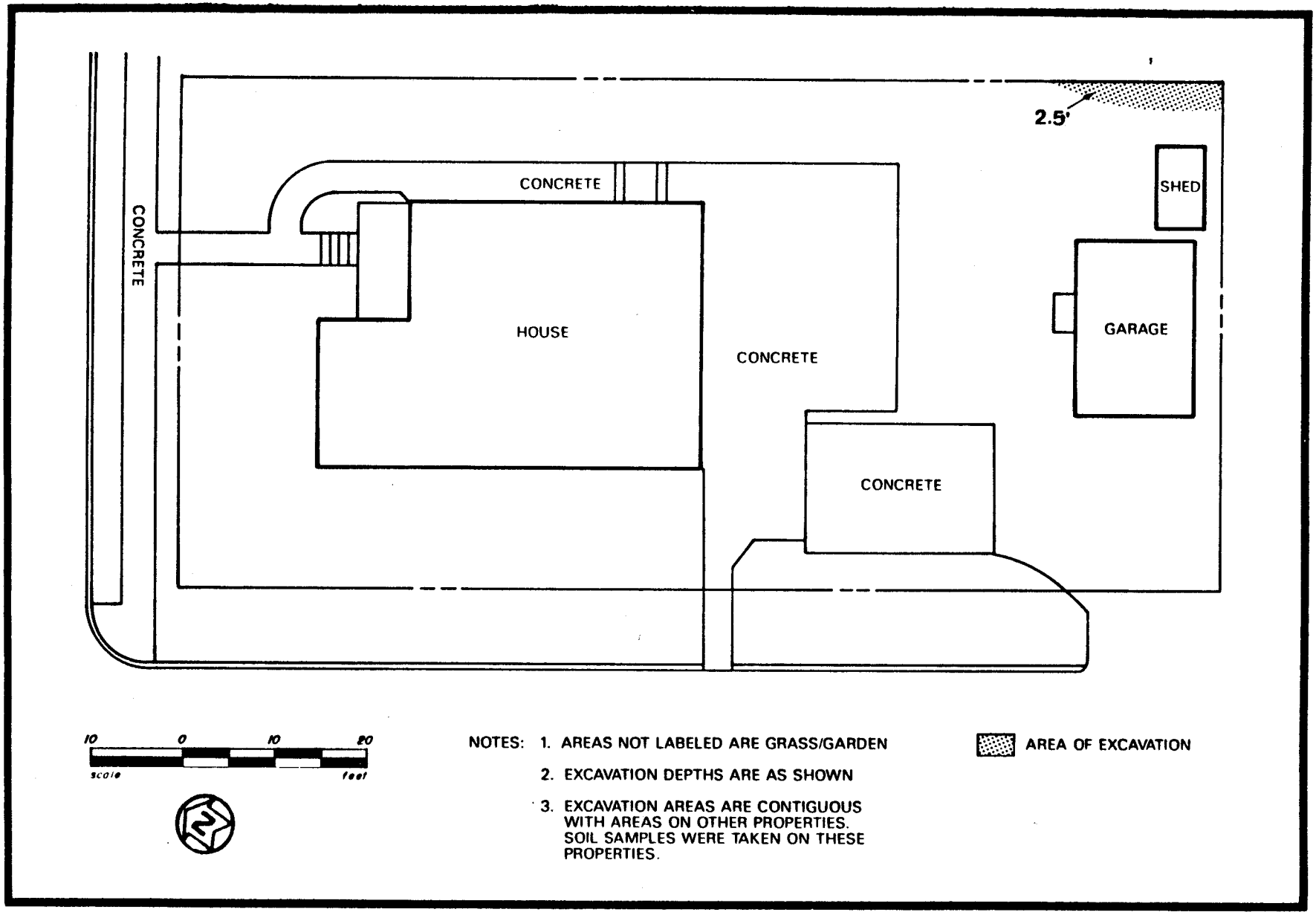


FIGURE 1 PARCEL 1, REMEDIAL ACTION AT 454 DAVISON STREET; BLOCK 124A, LOTS 22, 23

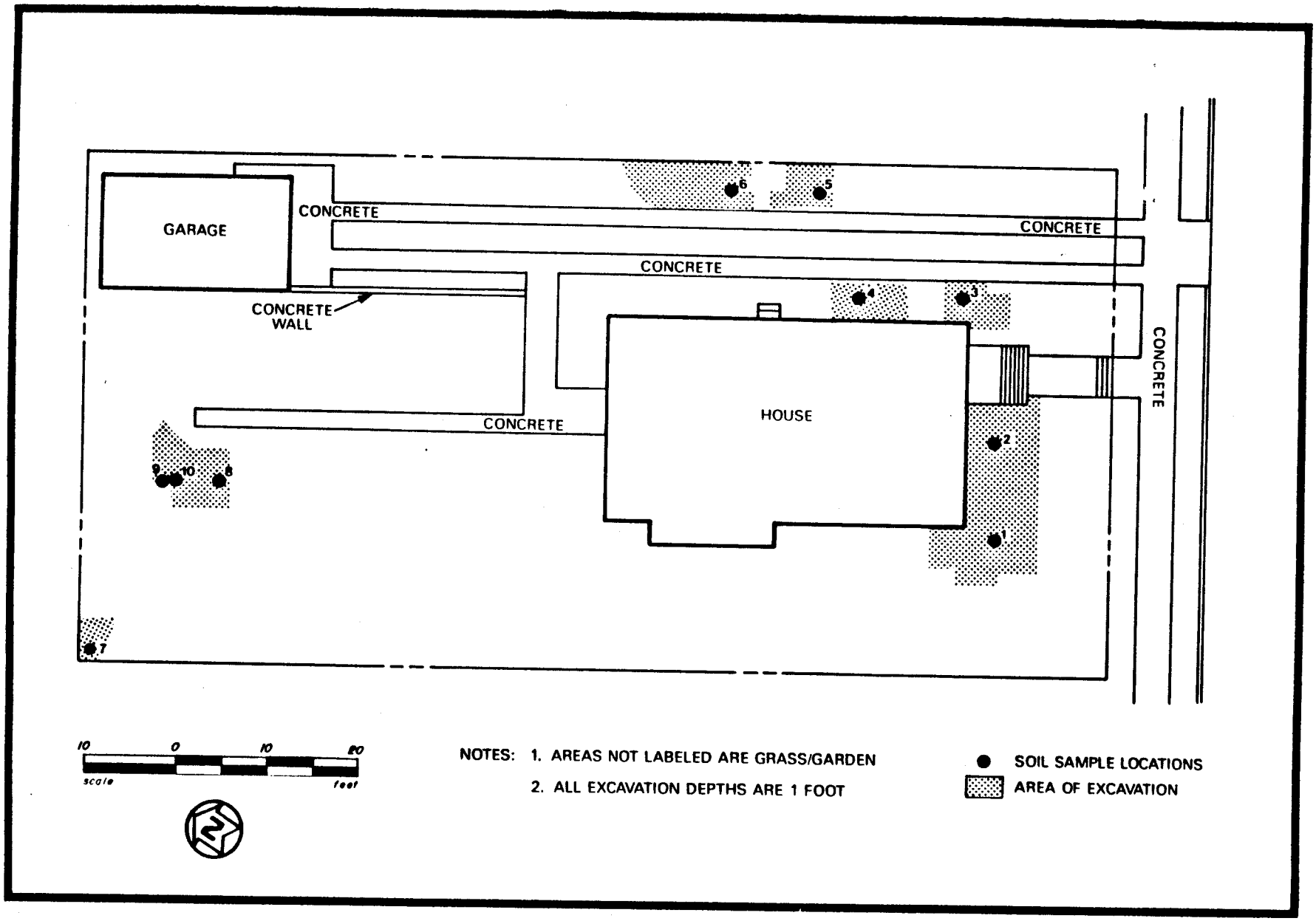


FIGURE 2 PARCEL 2, REMEDIAL ACTION AT 459 DAVISON STREET; BLOCK 123, LOTS 18, 19, 20A

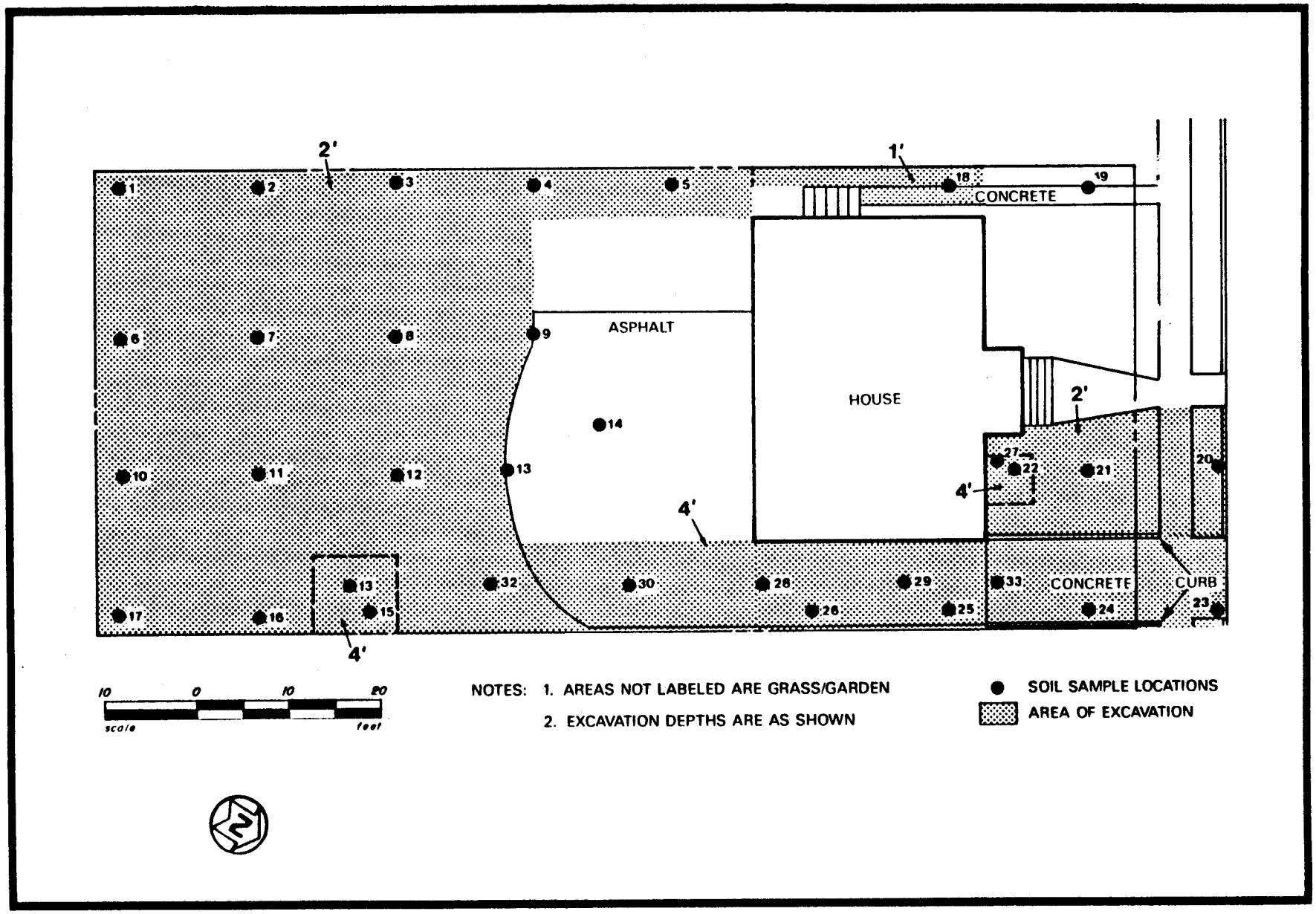


FIGURE 3 PARCEL 3, REMEDIAL ACTION AT 460 DAVISON STREET; BLOCK 124, LOTS 24, 25

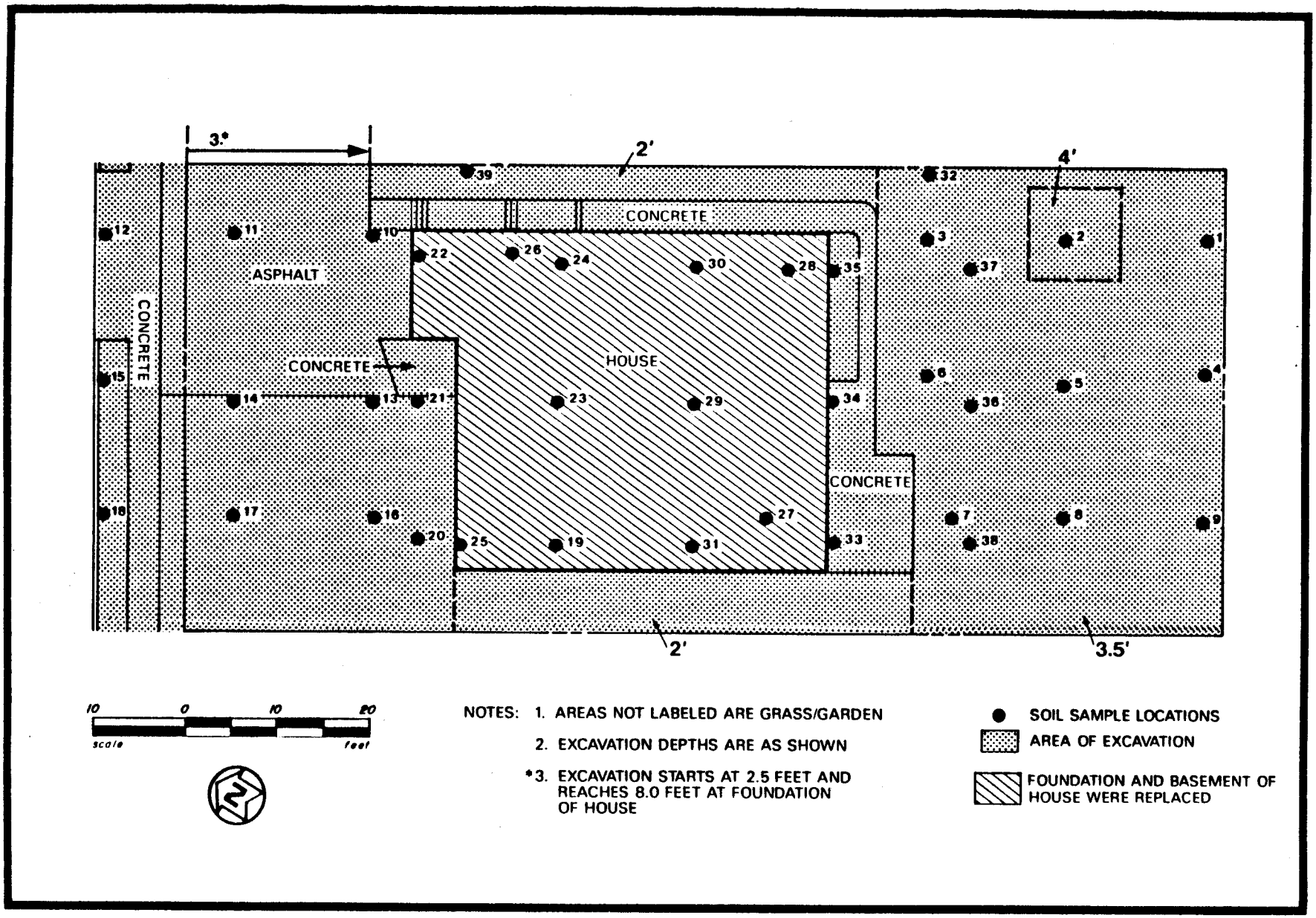


FIGURE 4 PARCEL 4, REMEDIAL ACTION AT 464 DAVISON STREET; BLOCK 124, LOTS 26, 27

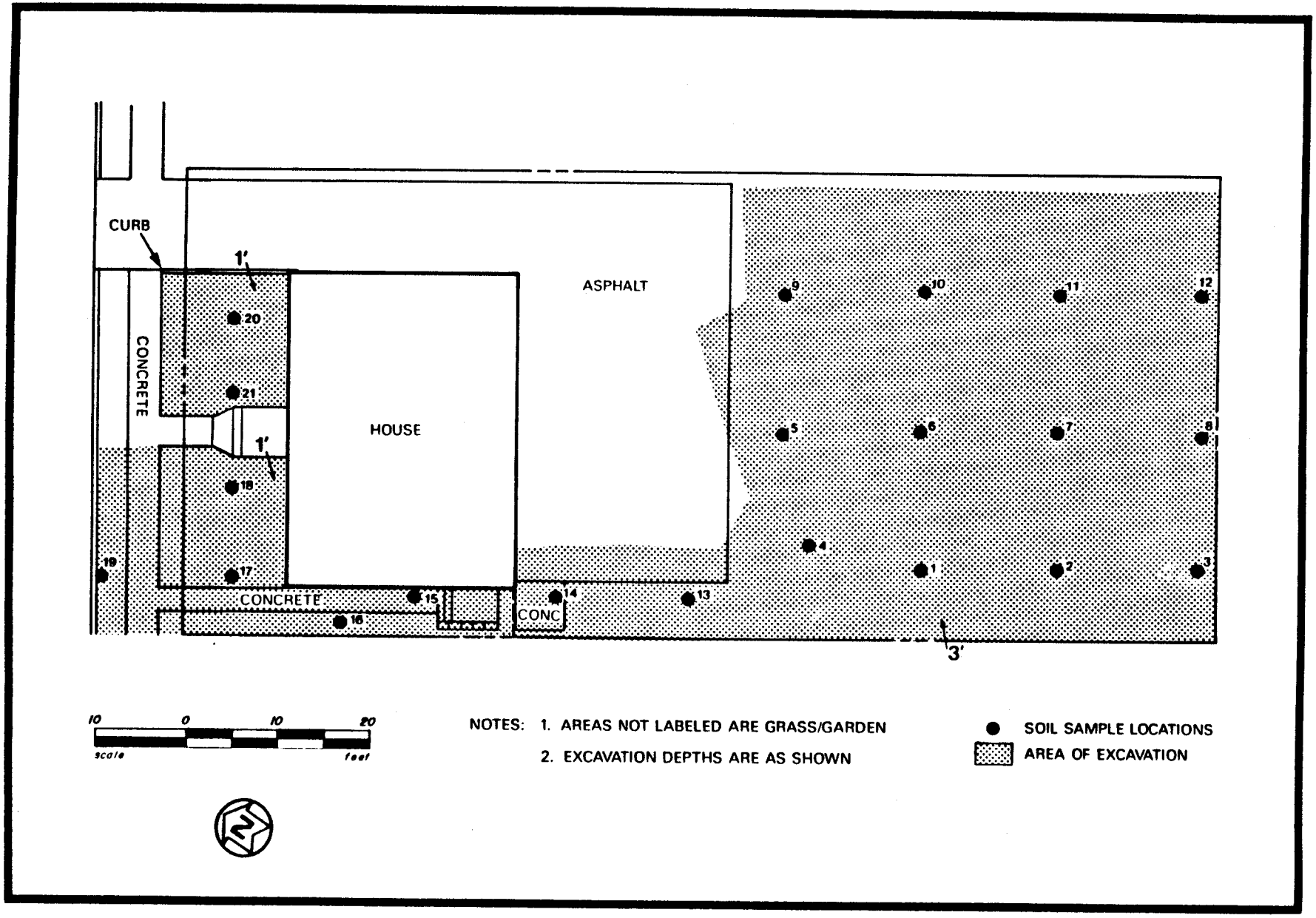


FIGURE 5 PARCEL 5, REMEDIAL ACTION AT 468 DAVISON STREET; BLOCK 124, LOTS 28, 29

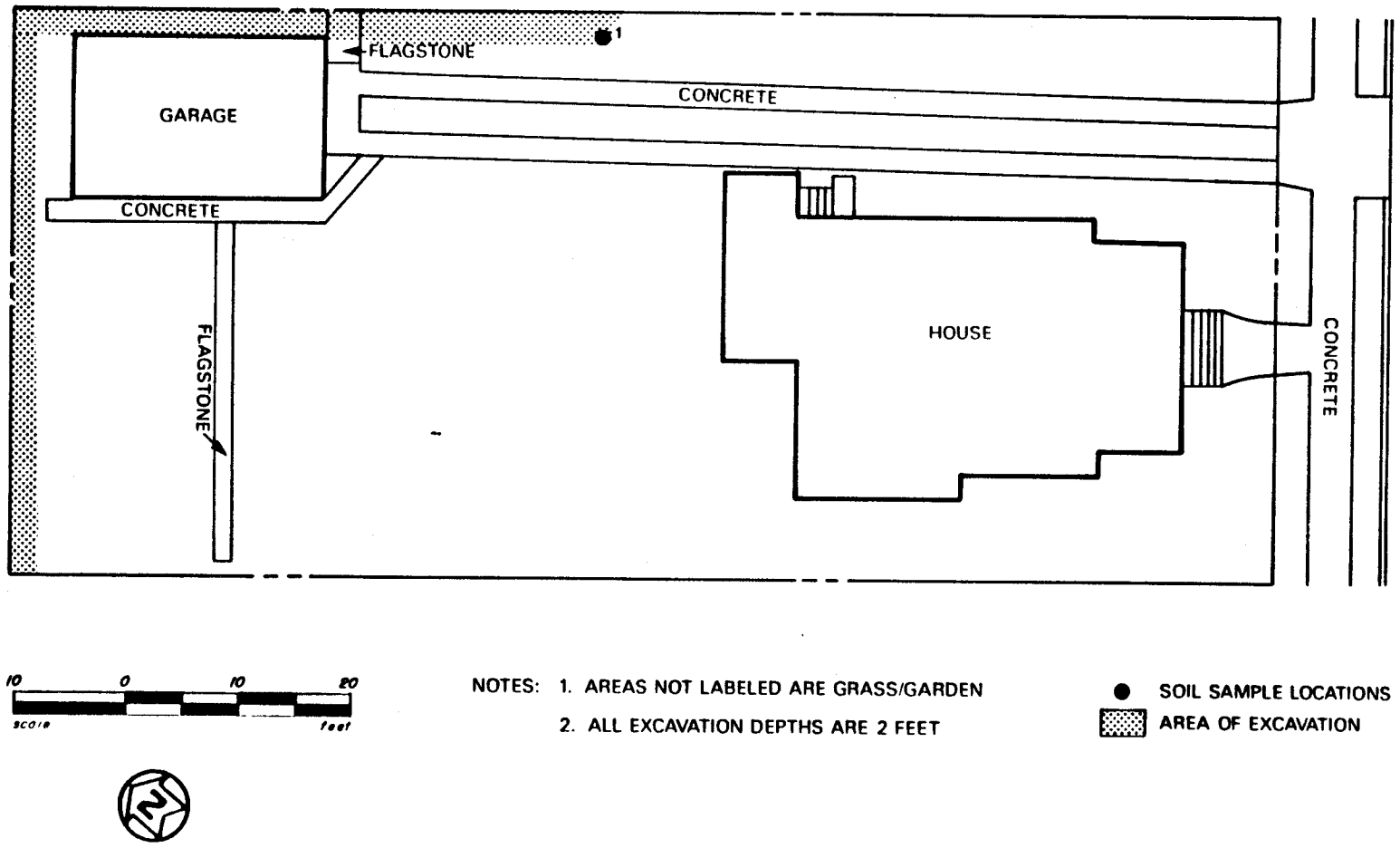


FIGURE 6 PARCEL 6, REMEDIAL ACTION AT 459 LATHAM STREET; BLOCK 124, LOTS 18, 19

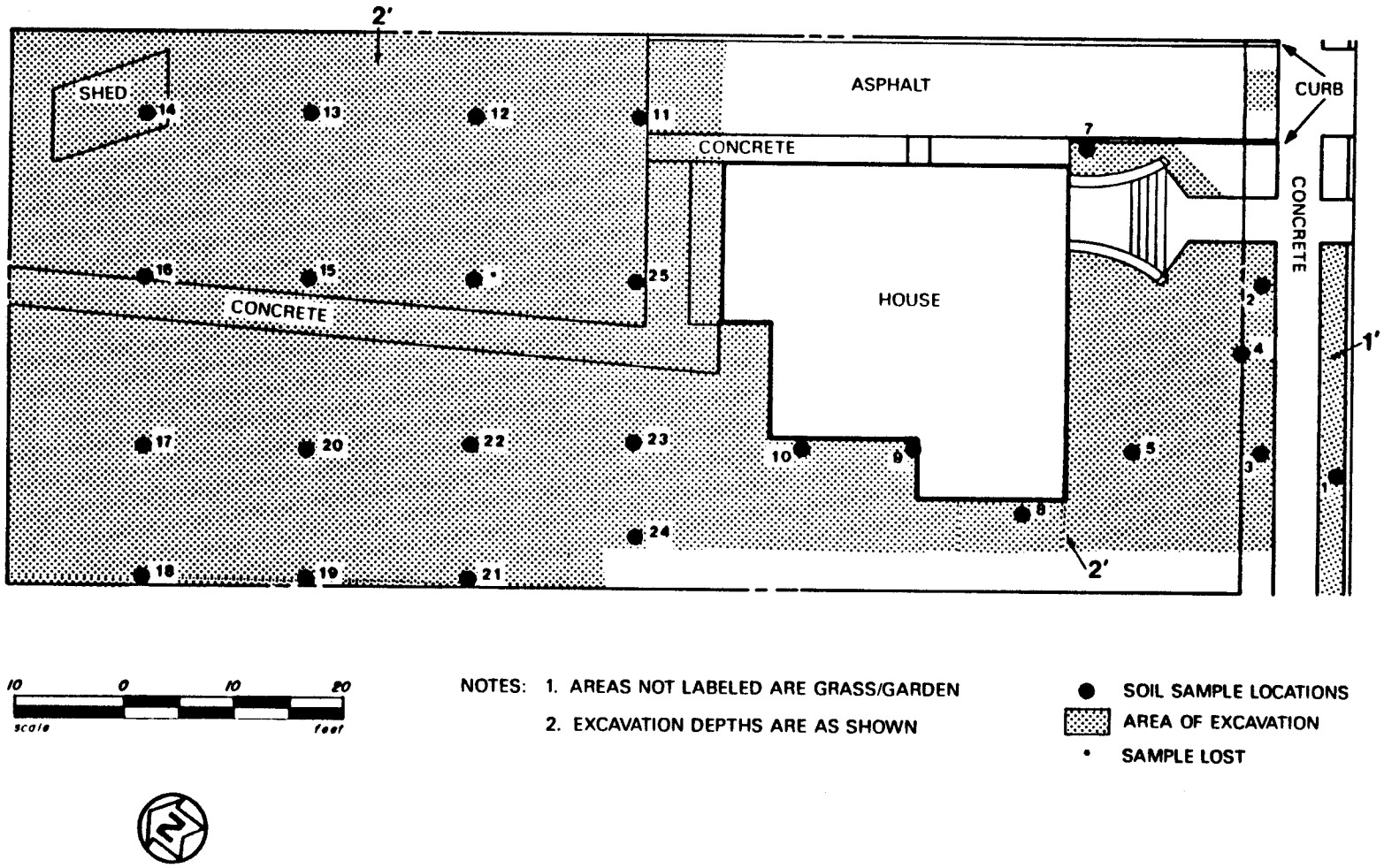


FIGURE 7 PARCEL 7, REMEDIAL ACTION AT 461 LATHAM STREET; BLOCK 124, LOTS 16, 17

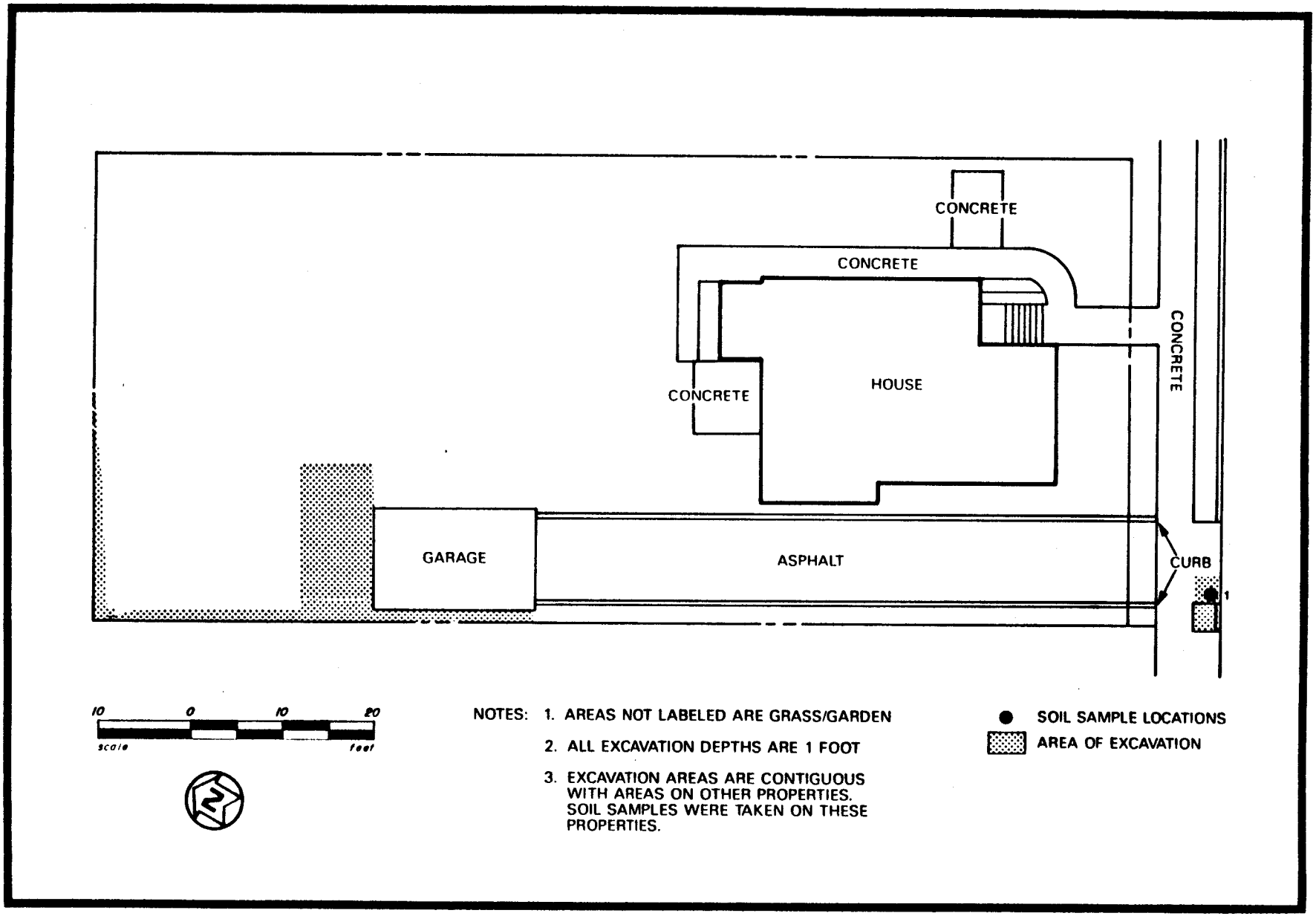


FIGURE 8 PARCEL 8, REMEDIAL ACTION AT 467 LATHAM STREET; BLOCK 124, LOTS 14, 15

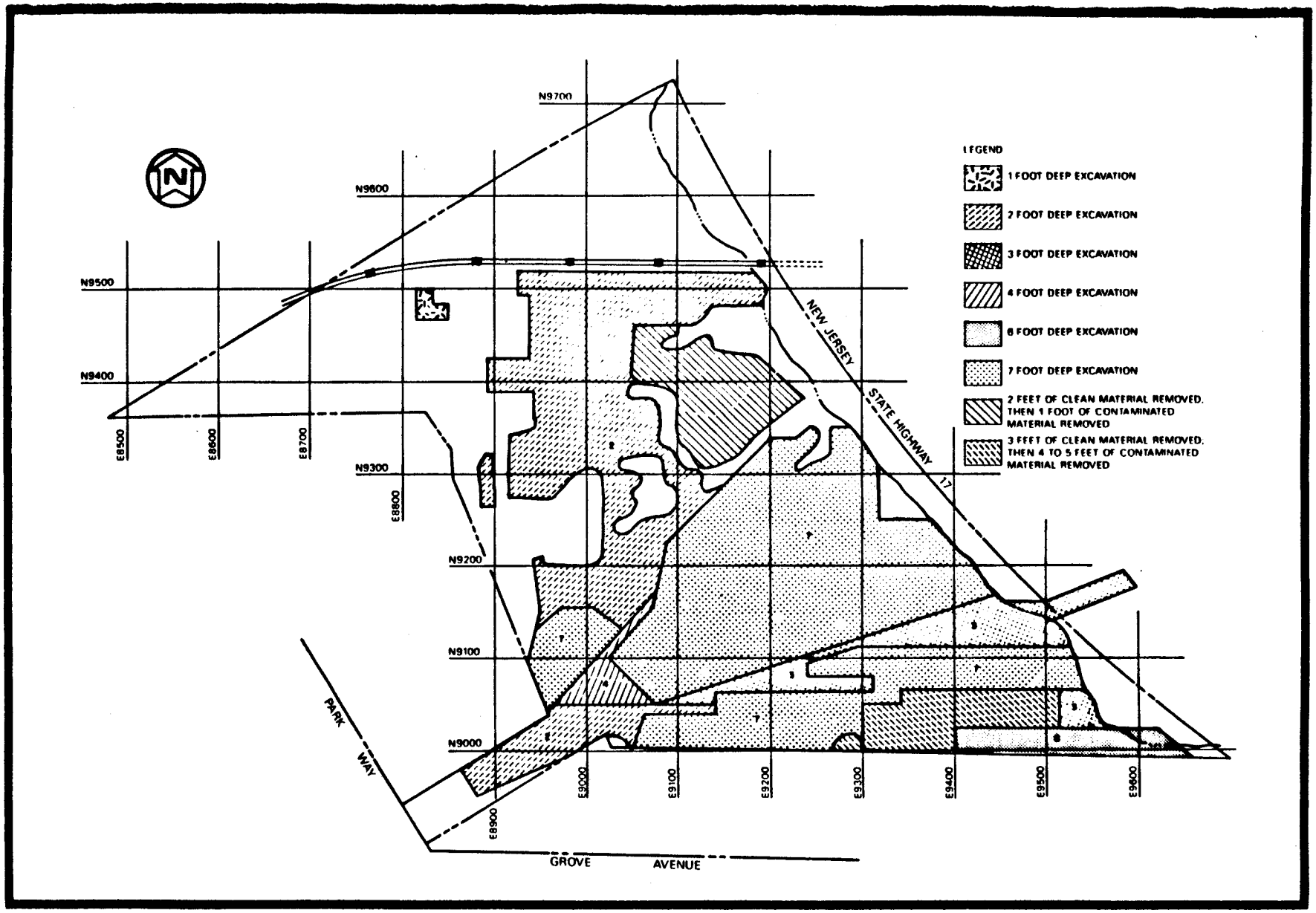


FIGURE 9 PARCEL 9, BALLOD PROPERTY; BLOCK 19A, LOT 1; BLOCK 18, LOTS 1, 2, 3;

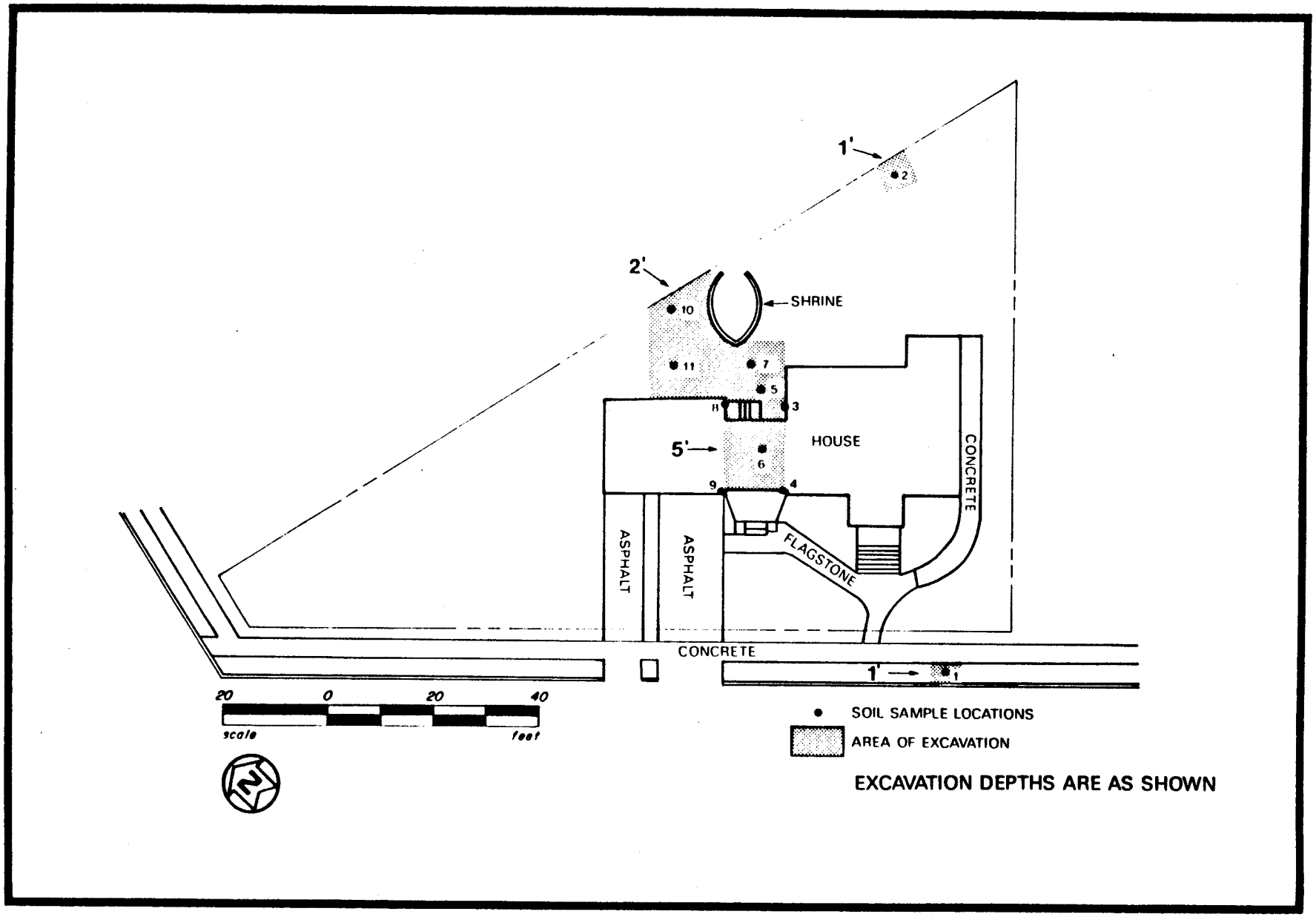


FIGURE 10 PARCEL 10, REMEDIAL ACTION AT 10 GROVE AVENUE; BLOCK 17, LOTS 42, 43

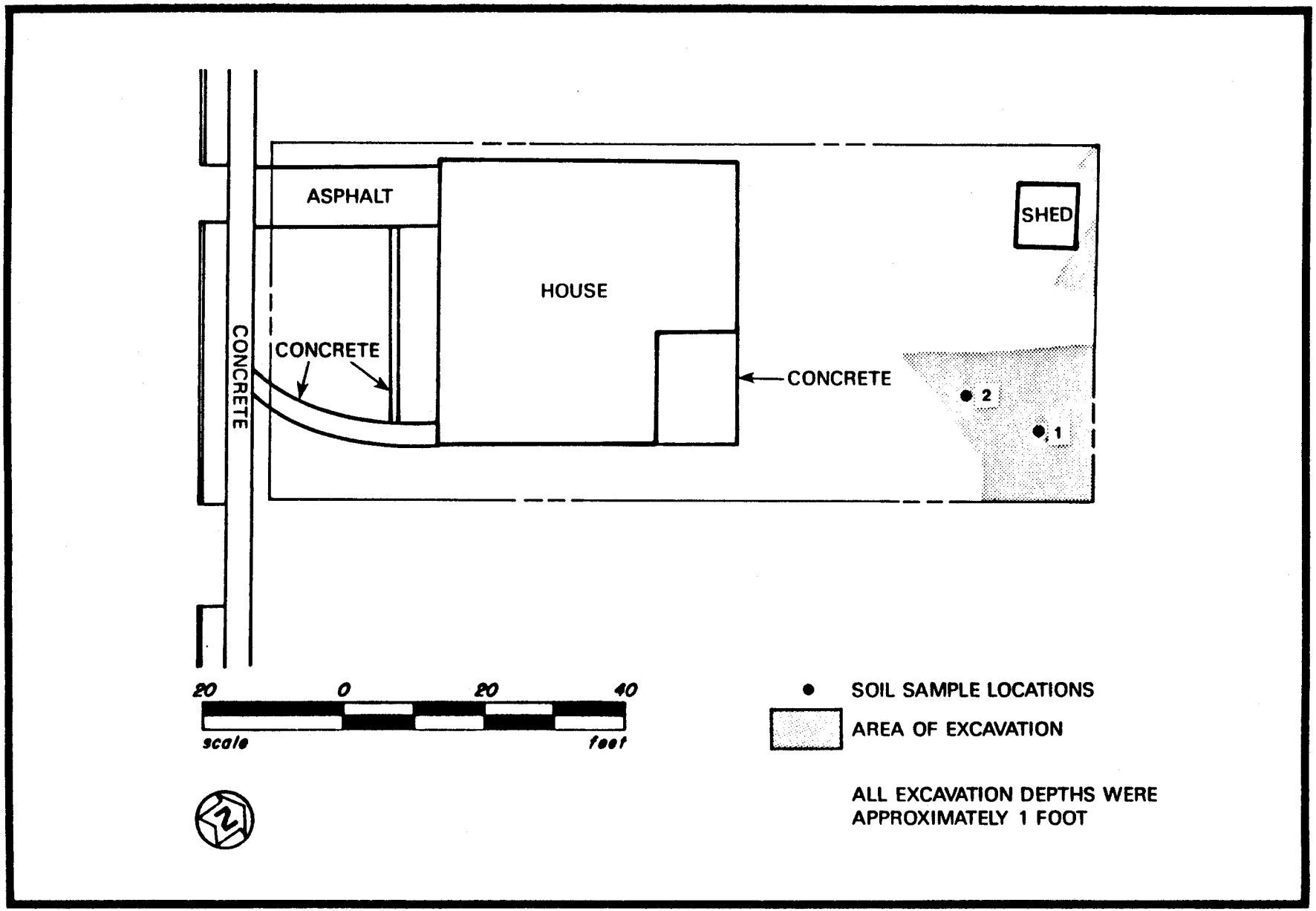


FIGURE 11 PARCEL 11, REMEDIAL ACTION AT 22 GROVE AVENUE; BLOCK 17, LOTS 48, 49

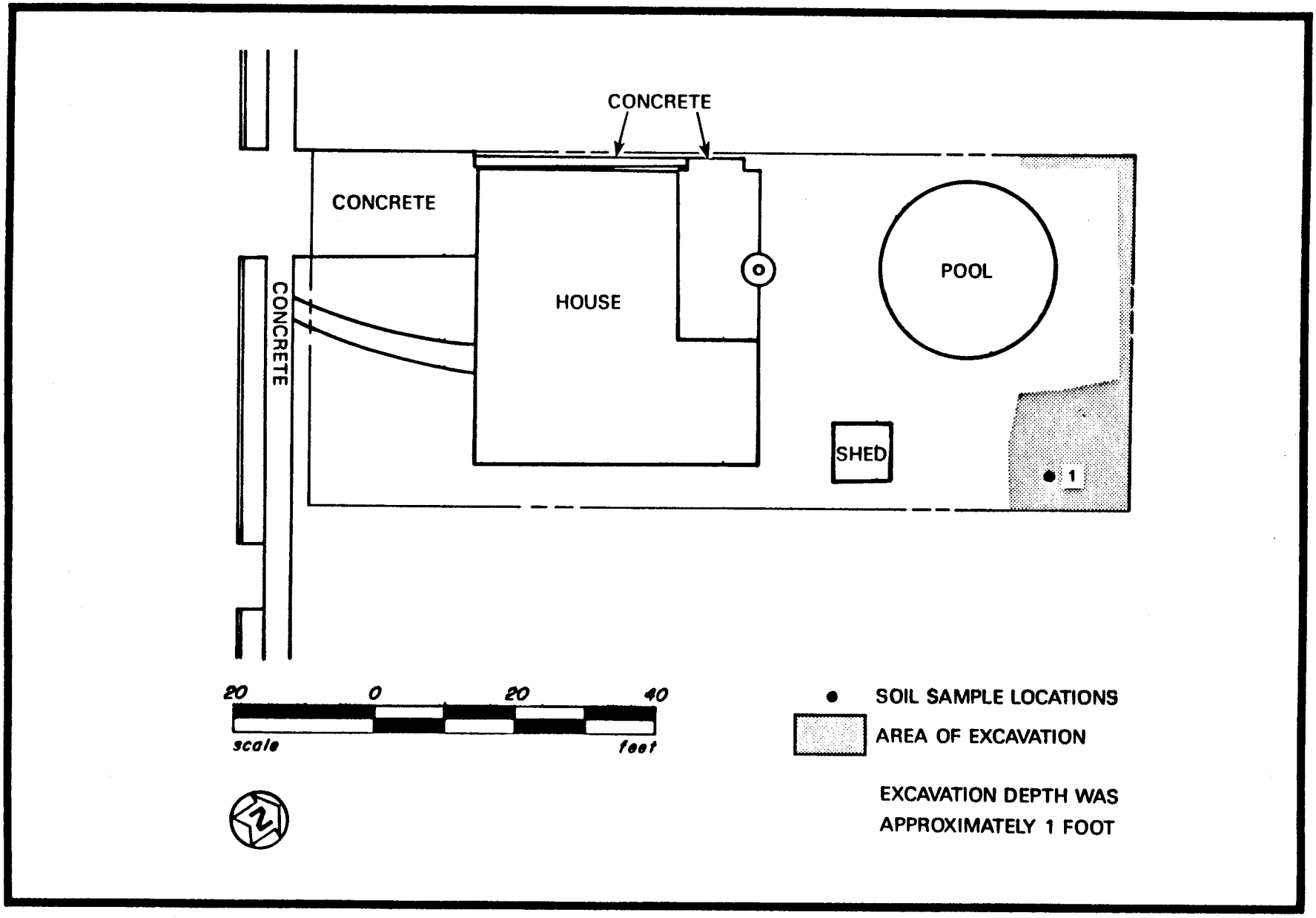


FIGURE 12 PARCEL 12, REMEDIAL ACTION AT 26 GROVE AVENUE; BLOCK 17, LOTS 50, 51

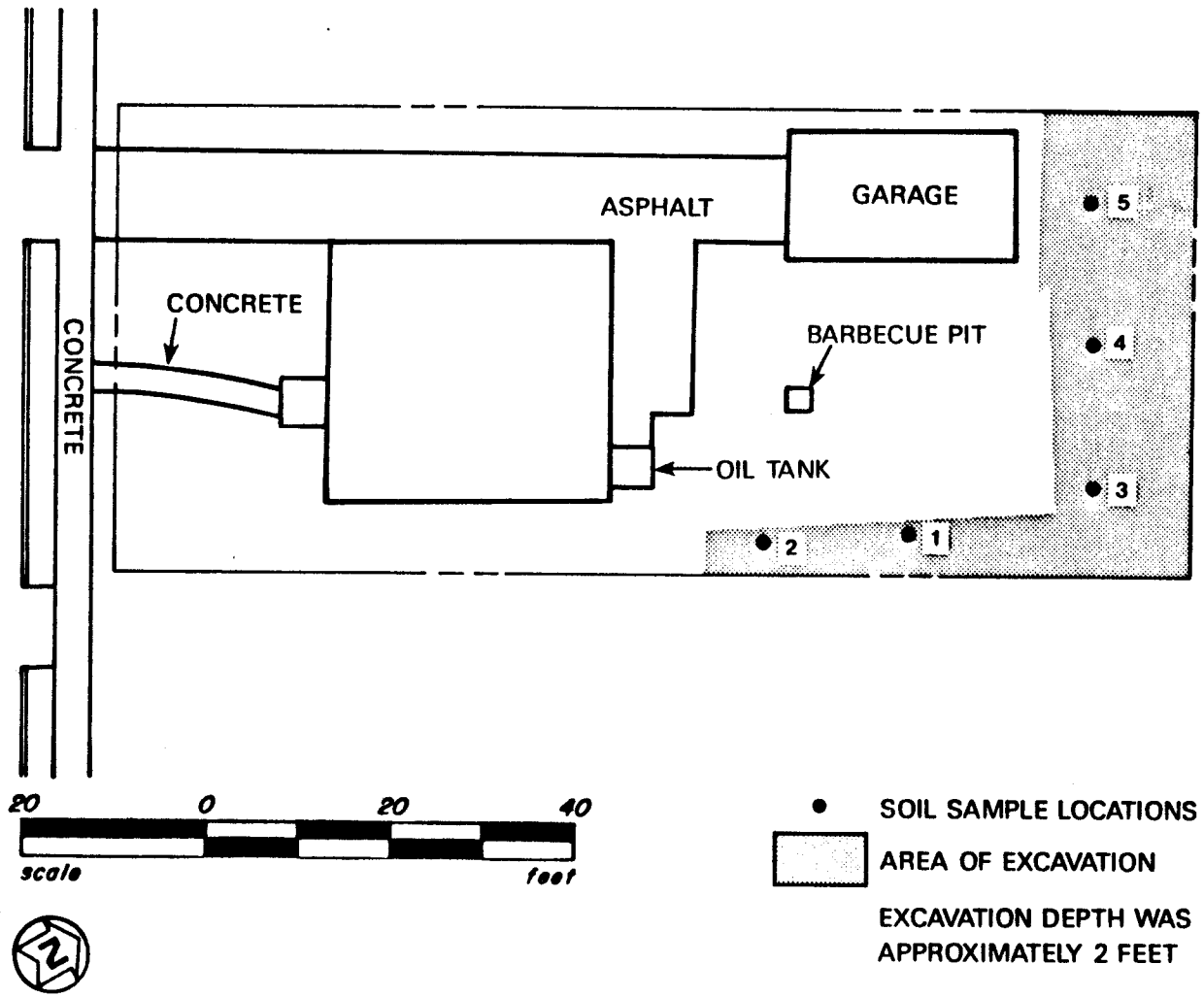


FIGURE 13 PARCEL 13, REMEDIAL ACTION AT 30 GROVE AVENUE; BLOCK 17, LOTS 52, 53

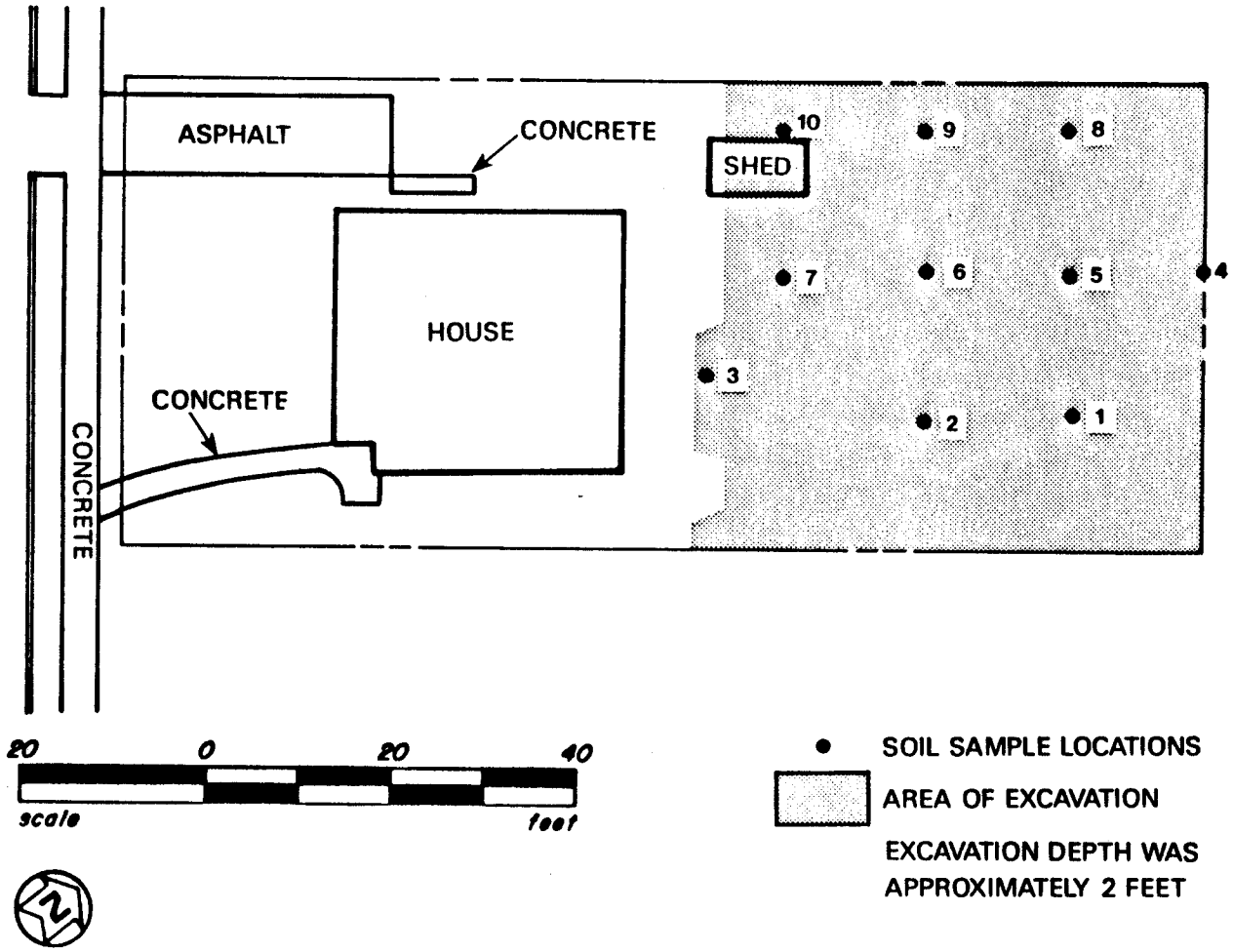


FIGURE 14 PARCEL 14, REMEDIAL ACTION AT 34 GROVE AVENUE; BLOCK 17, LOTS 54, 55

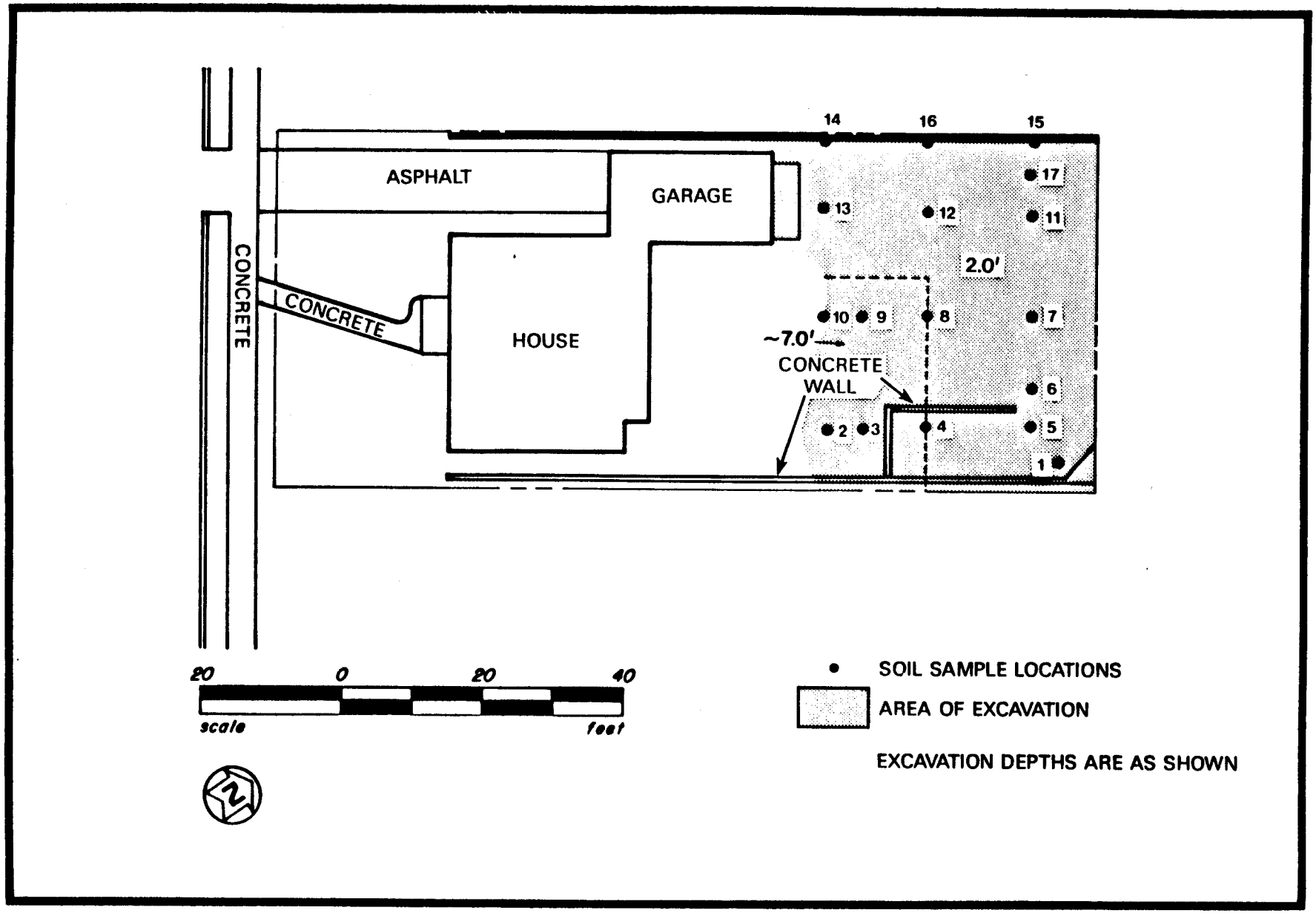


FIGURE 15 PARCEL 15, REMEDIAL ACTION AT 38 GROVE AVENUE; BLOCK 17, LOTS 56, 57

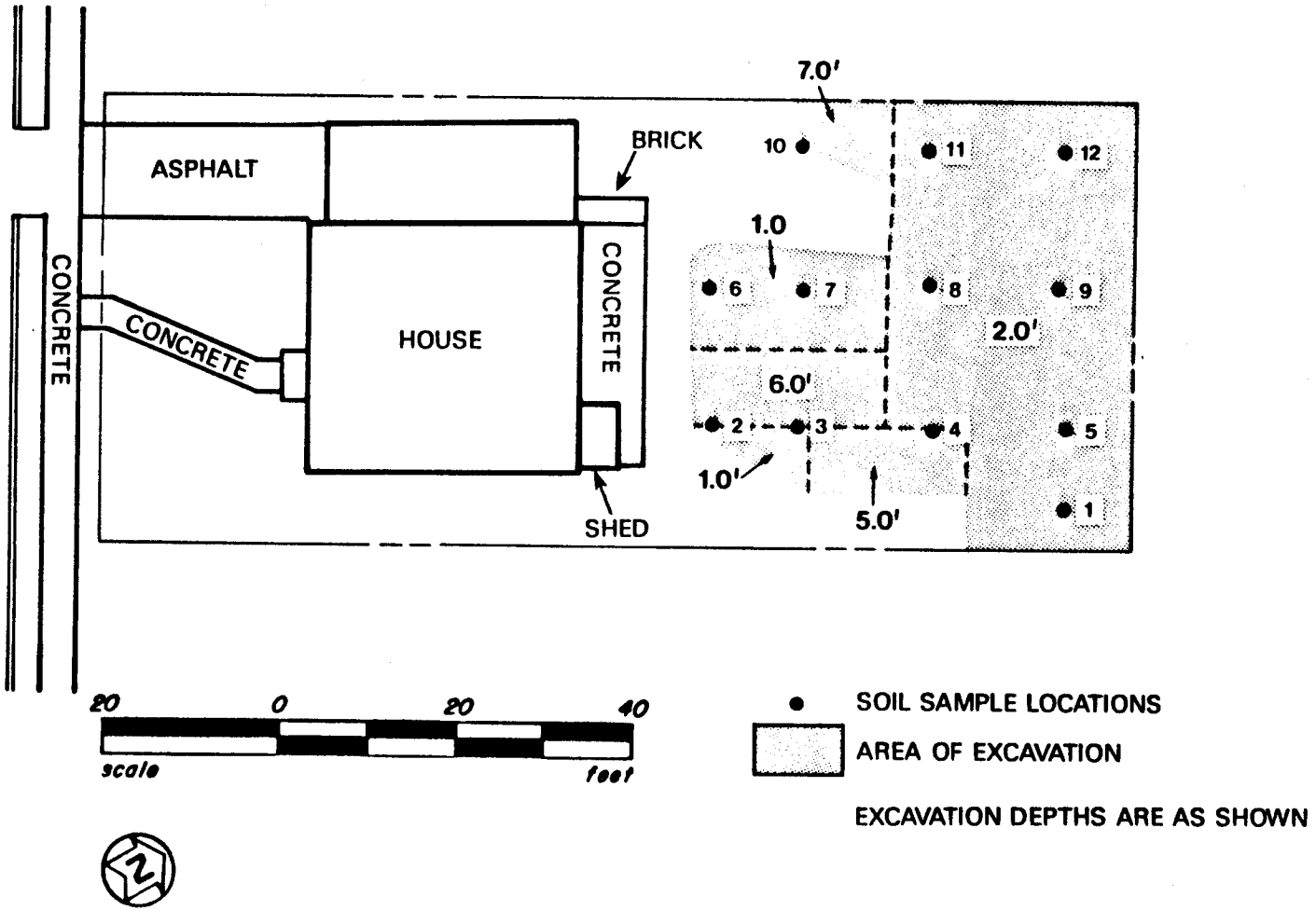


FIGURE 16 PARCEL 16, REMEDIAL ACTION AT 42 GROVE AVENUE; BLOCK 17, LOTS 58, 59

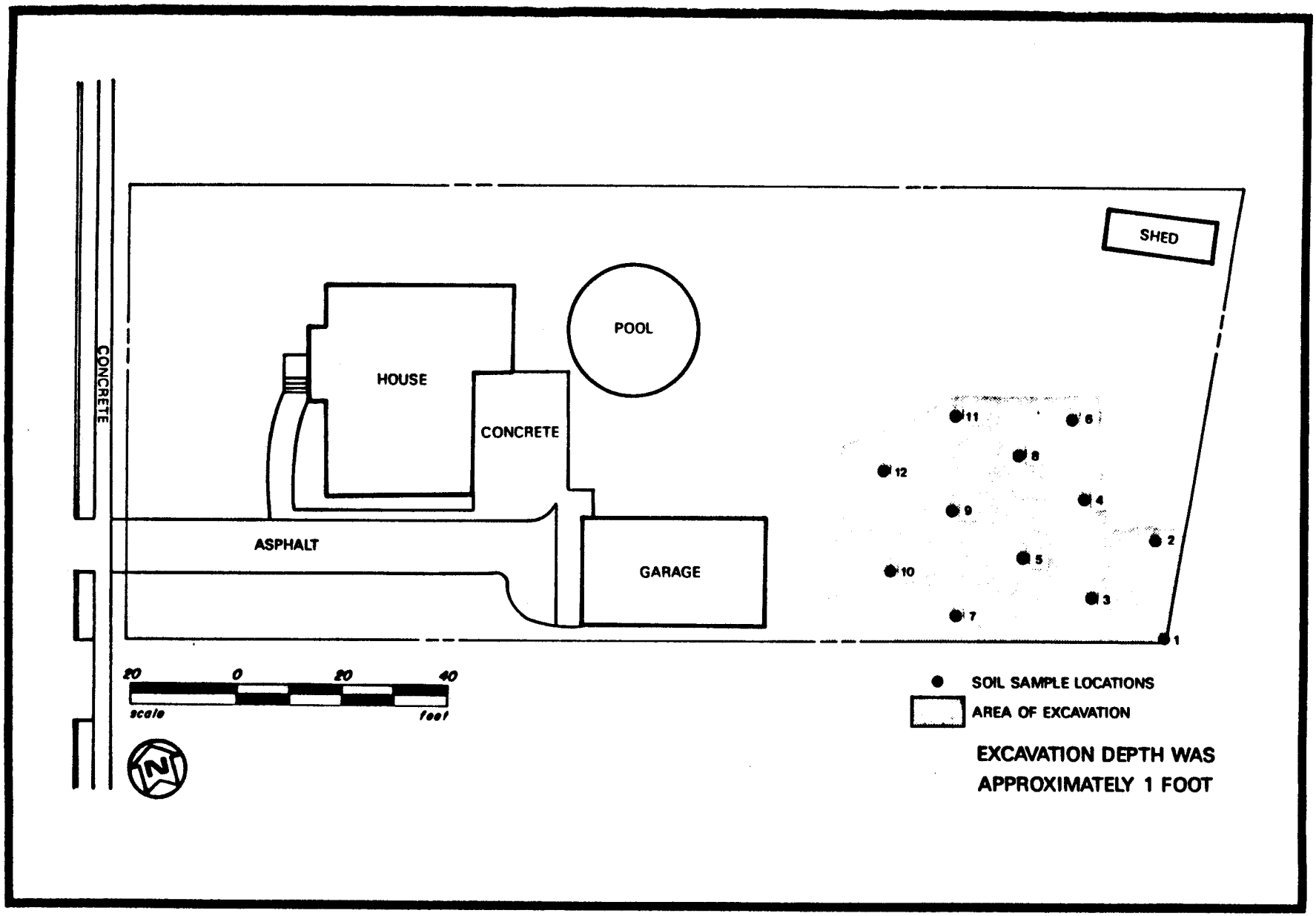


FIGURE 17 PARCEL 17, REMEDIAL ACTION AT 86 PARK WAY; BLOCK 17, LOTS 36, 37, 38, 39B

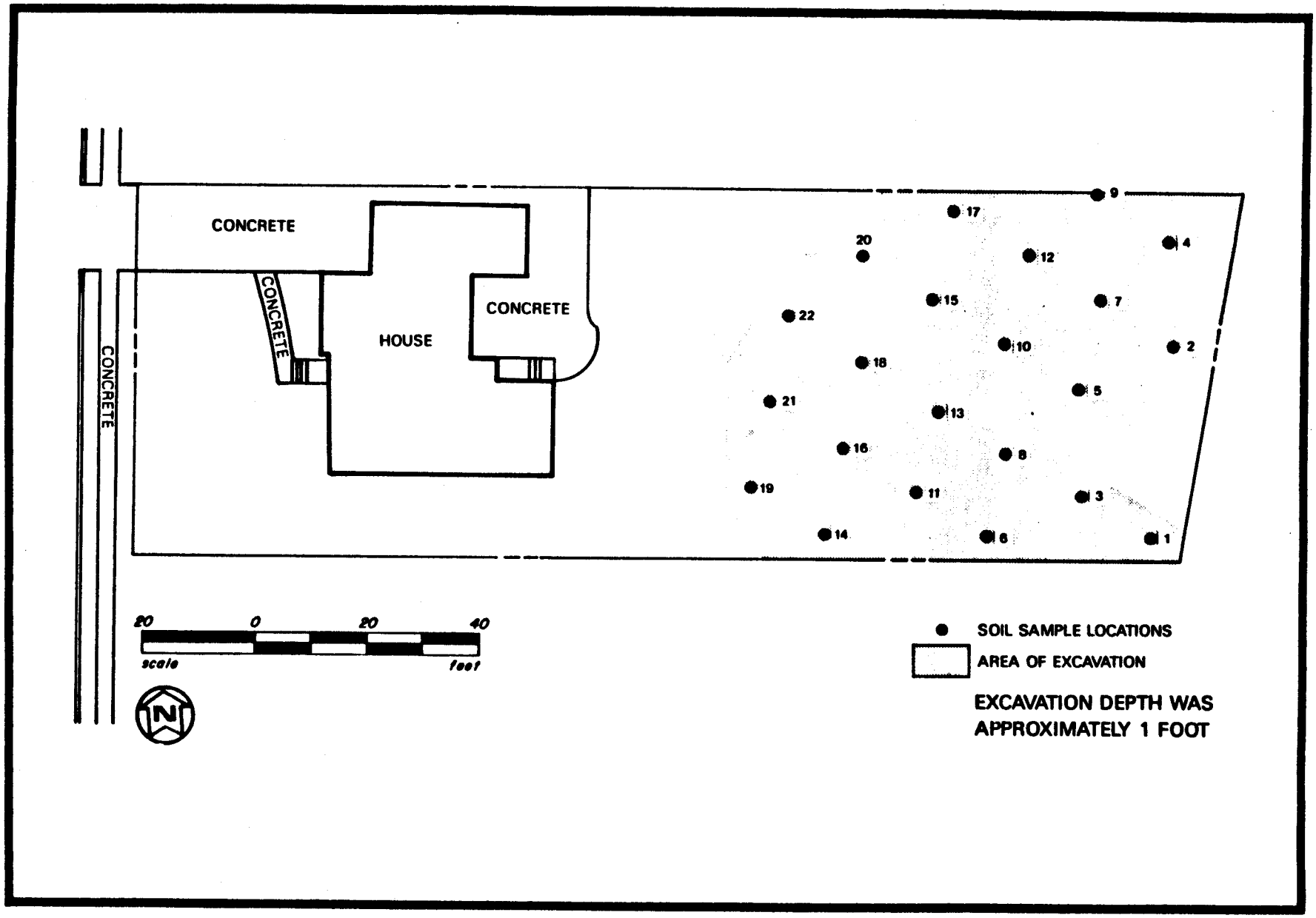


FIGURE 18 PARCEL 18, REMEDIAL ACTION AT 90 PARK WAY; BLOCK 17, LOTS 39A, 40, 41

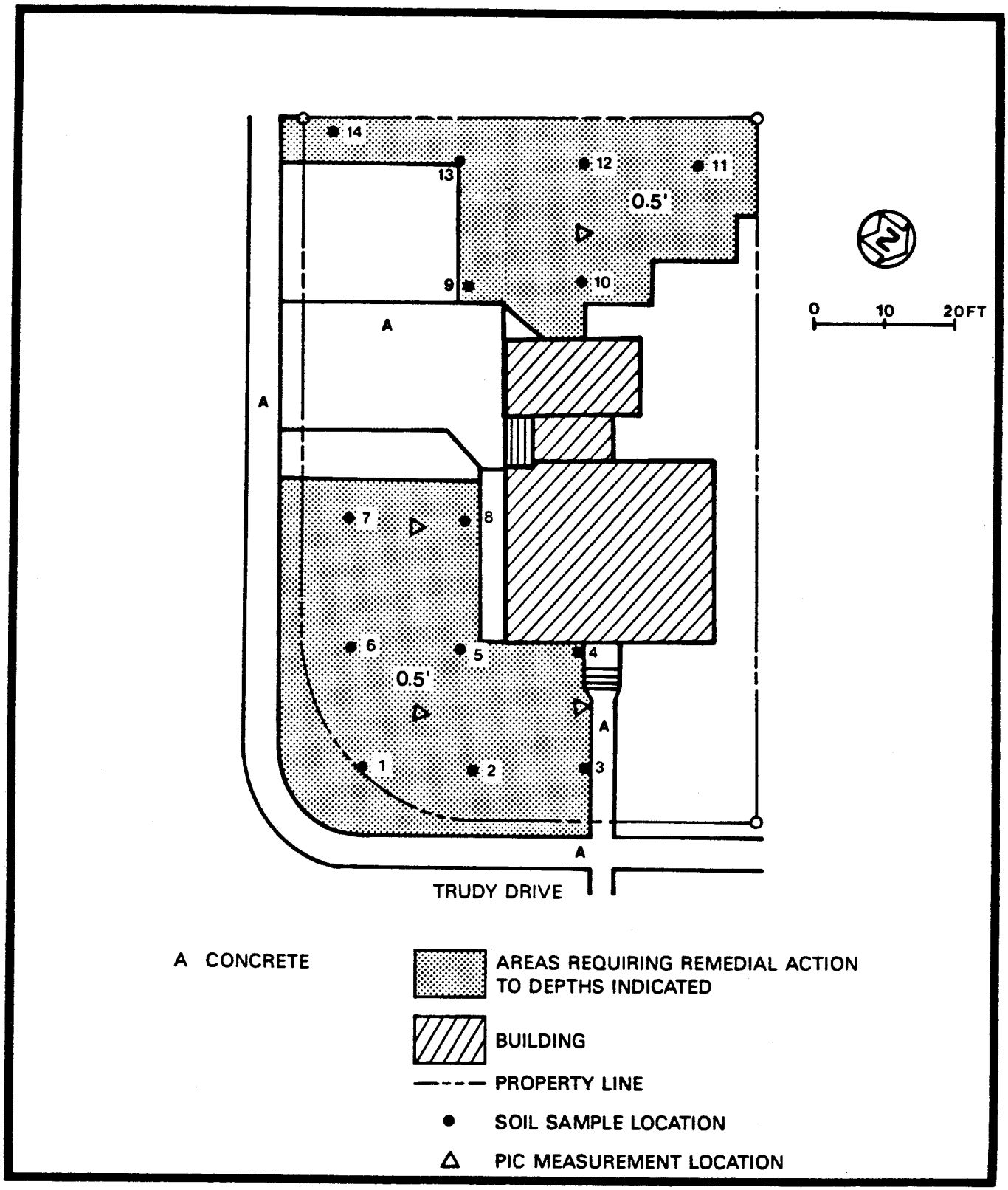


FIGURE 19 PARCEL 19, REMEDIAL ACTION AT 58 TRUDY DRIVE; BLOCK 176 G, LOT 15

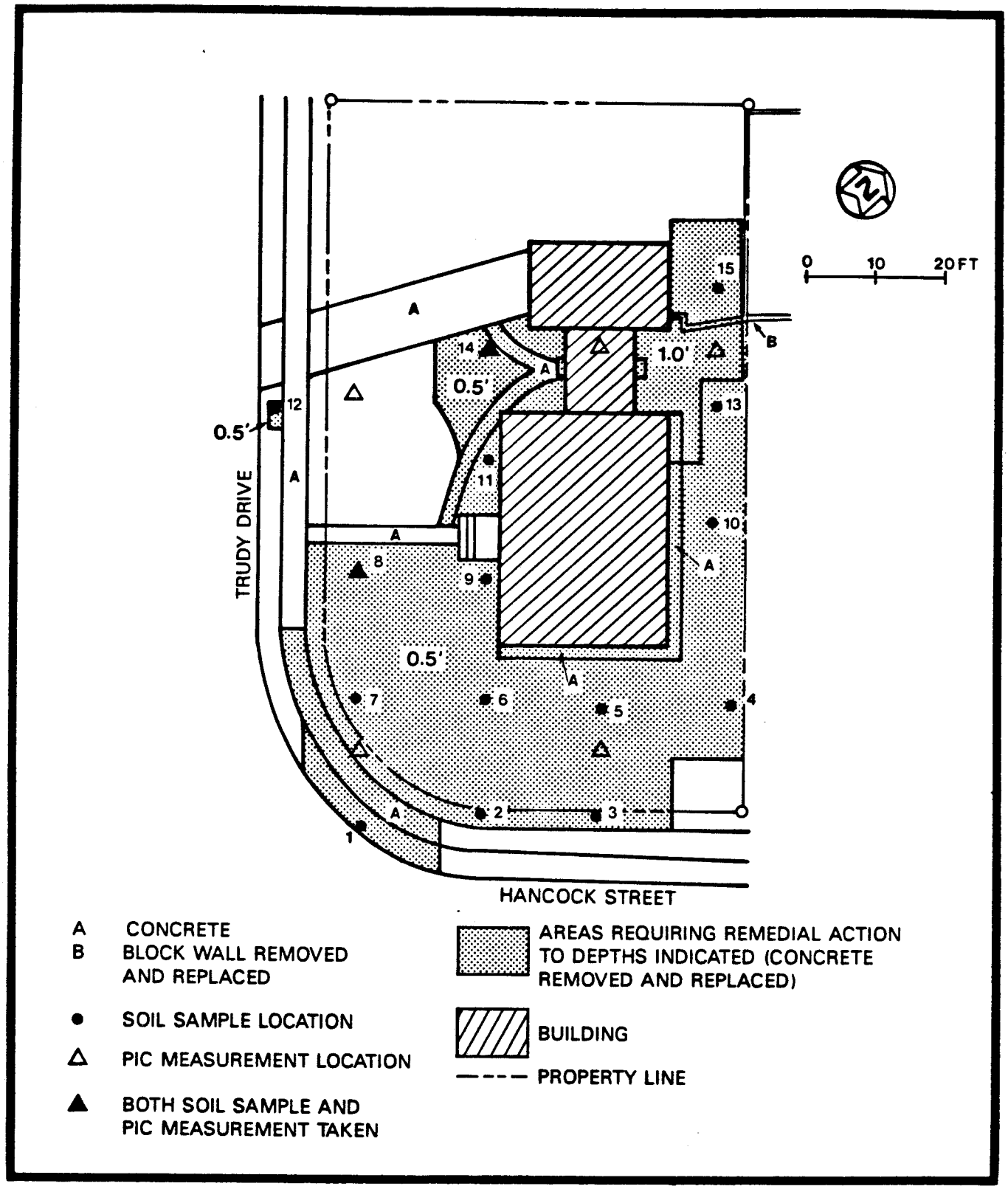


FIGURE 20 PARCEL 20, REMEDIAL ACTION AT 59 TRUDY DRIVE; BLOCK 176H, LOT 5

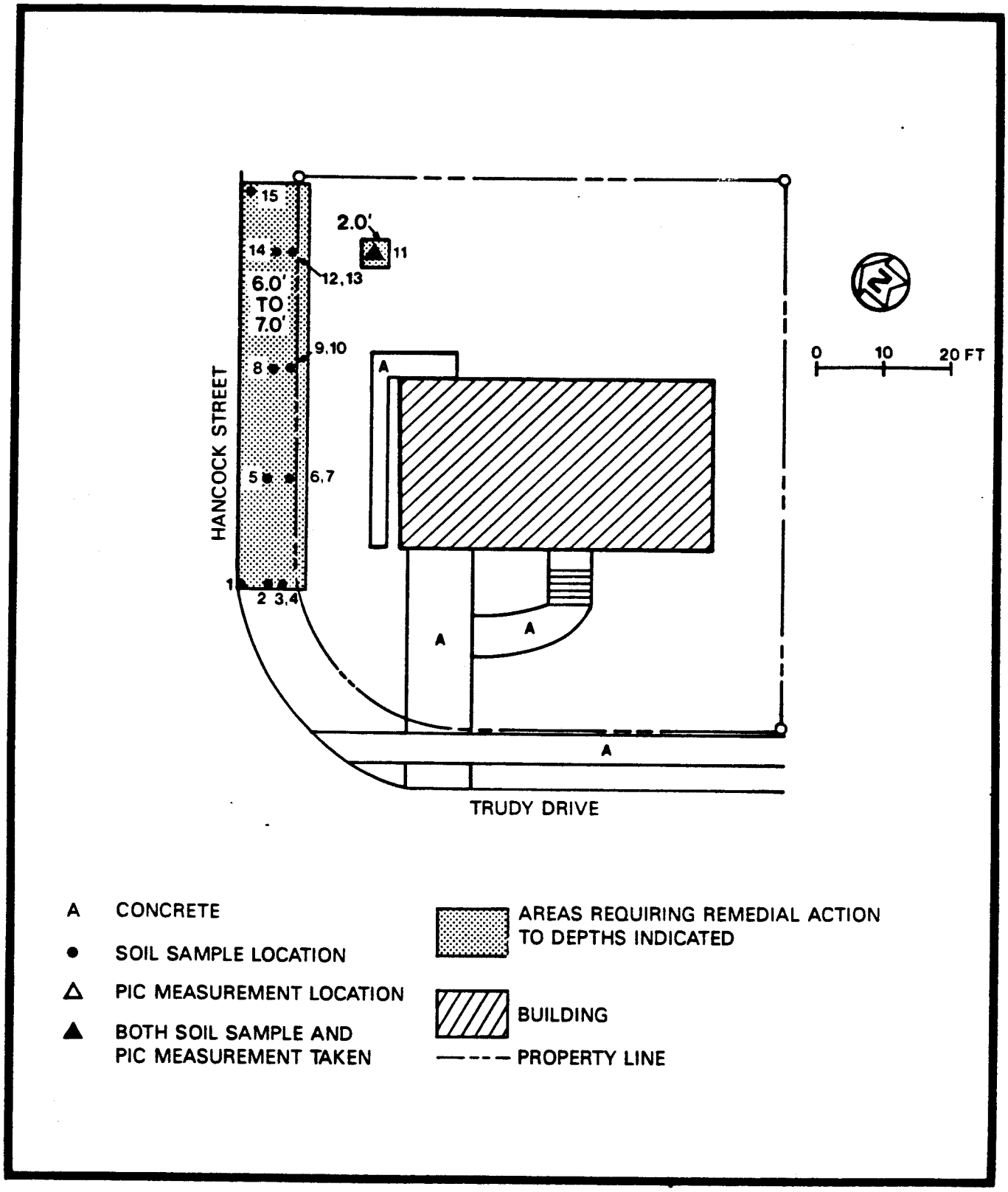


FIGURE 21 PARCEL 21, REMEDIAL ACTION AT 61 TRUDY DRIVE; BLOCK 176I, LOT 6

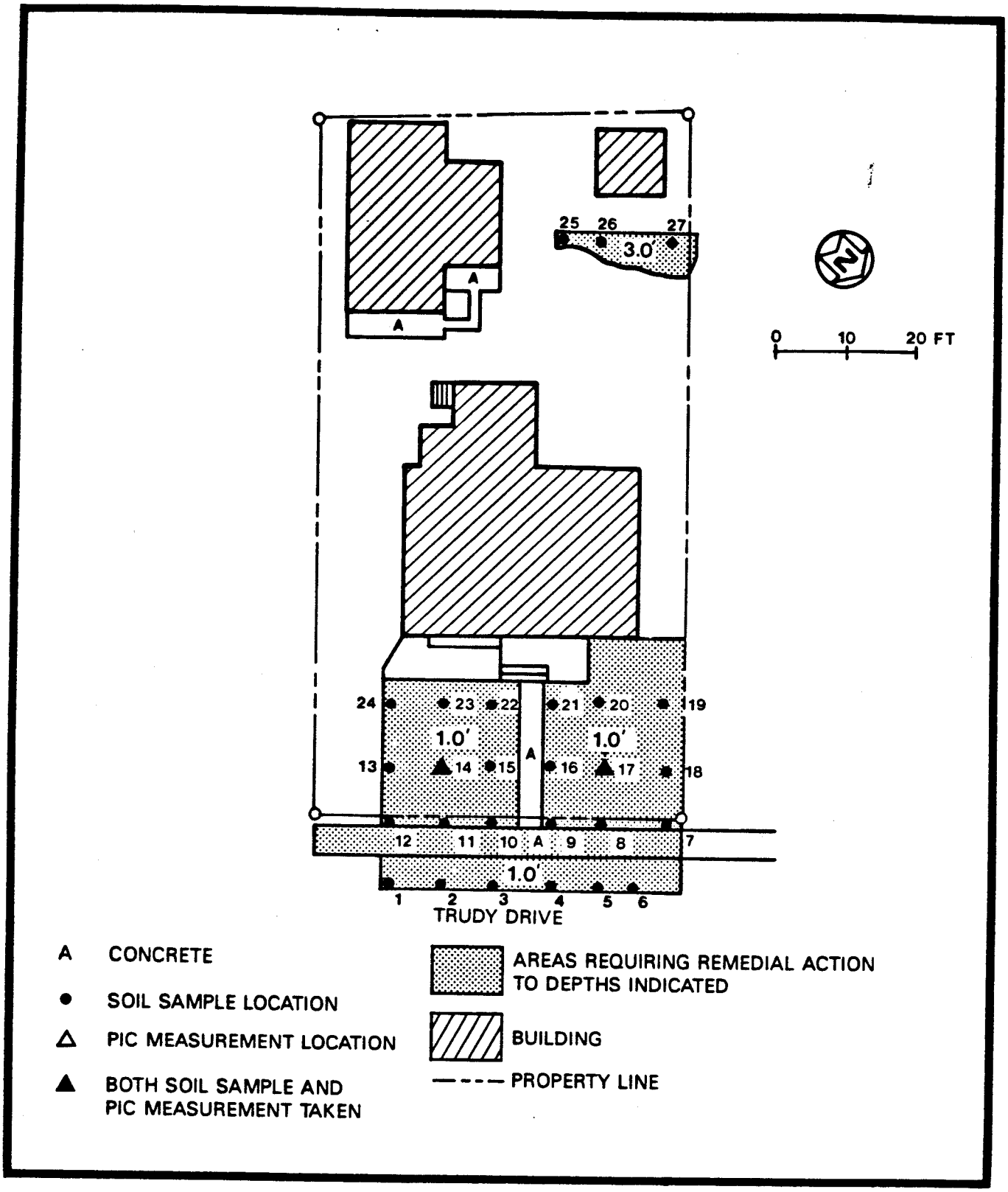


FIGURE 22 PARCEL 22, REMEDIAL ACTION AT 64 TRUDY DRIVE; BLOCK 176L, LOT 3

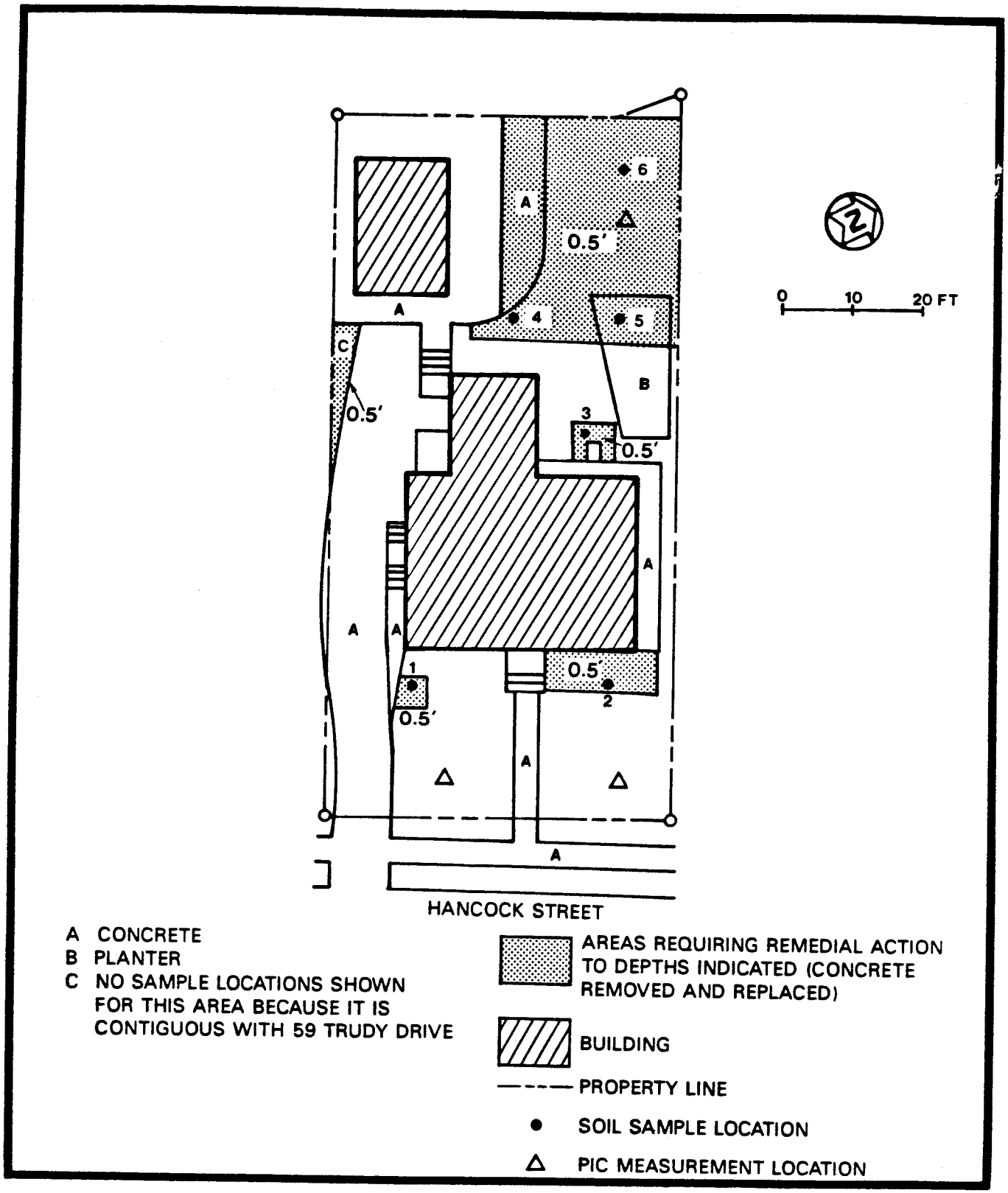


FIGURE 23 PARCEL 23, REMEDIAL ACTION AT 3 HANCOCK STREET; BLOCK 176H, LOT 4

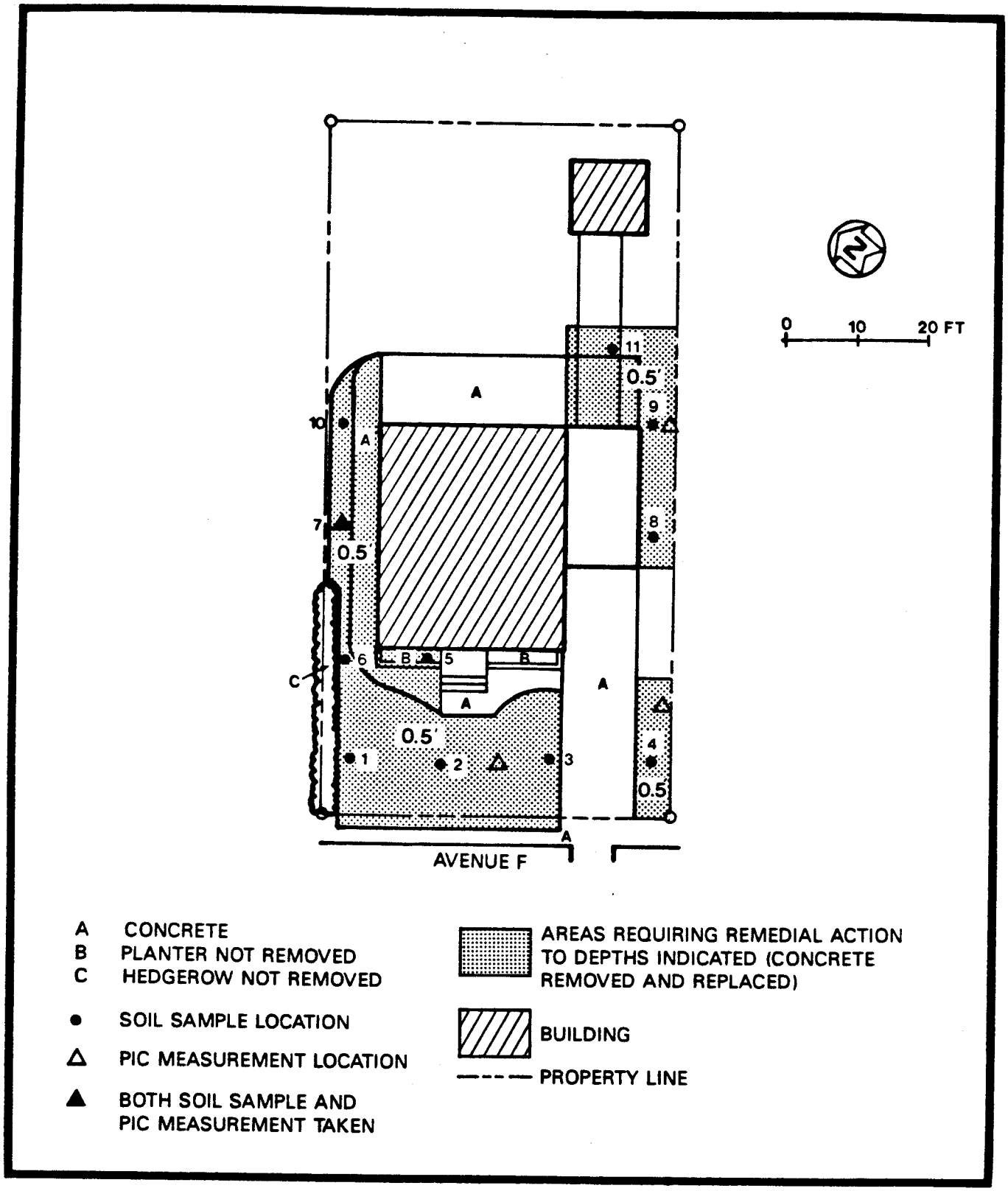
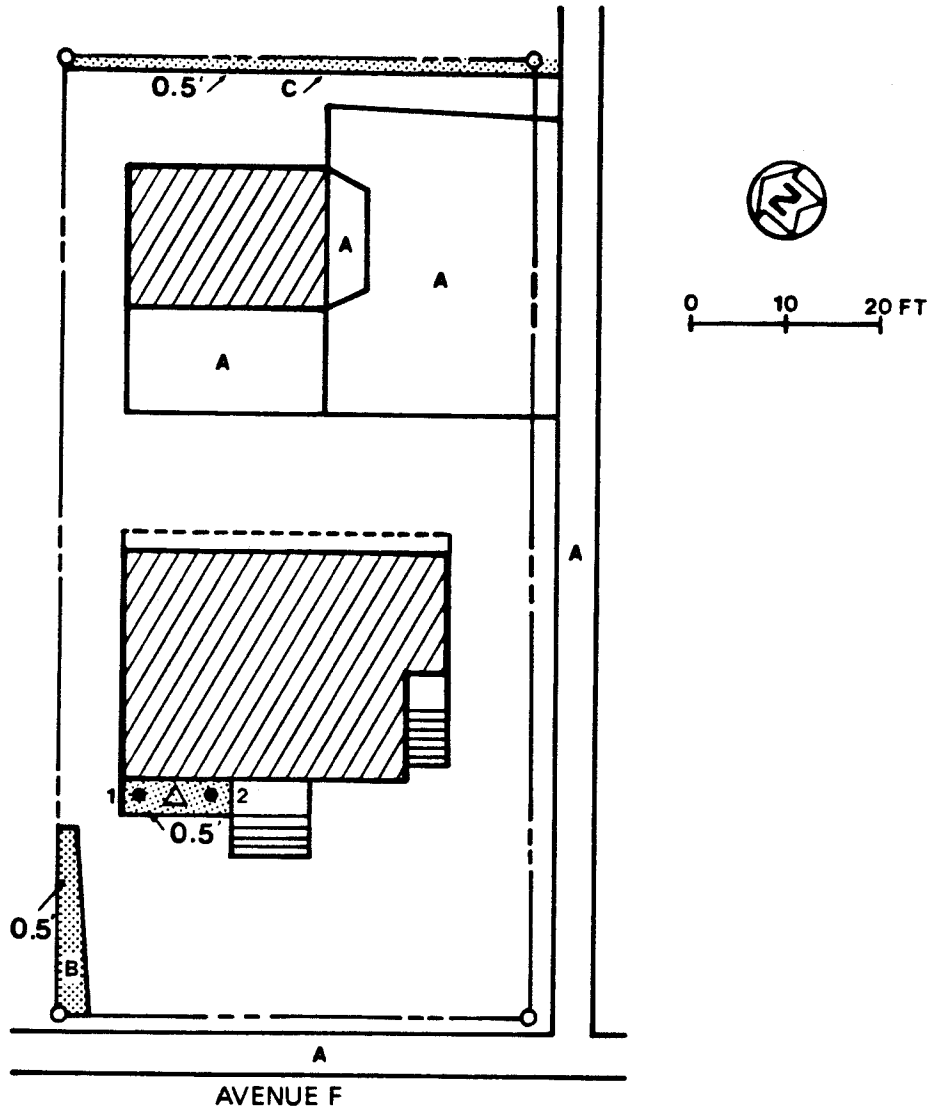


FIGURE 24 PARCEL 24, REMEDIAL ACTION AT 121 AVENUE F; BLOCK 223A, LOTS 60, 61



A CONCRETE

B NO SAMPLE LOCATIONS SHOWN FOR THE AREA BECAUSE IT IS CONTIGUOUS WITH 121 AVENUE F

C NO SAMPLE LOCATIONS SHOWN FOR THE AREA BECAUSE IT IS CONTIGUOUS WITH 58 TRUDY DRIVE

AREAS REQUIRING REMEDIAL ACTION TO DEPTHS INDICATED

BUILDING

PROPERTY LINE

SOIL SAMPLE LOCATION

PIC MEASUREMENT LOCATION

FIGURE 25 PARCEL 25, REMEDIAL ACTION AT 123 AVENUE F; BLOCK 223A, LOTS 62, 63

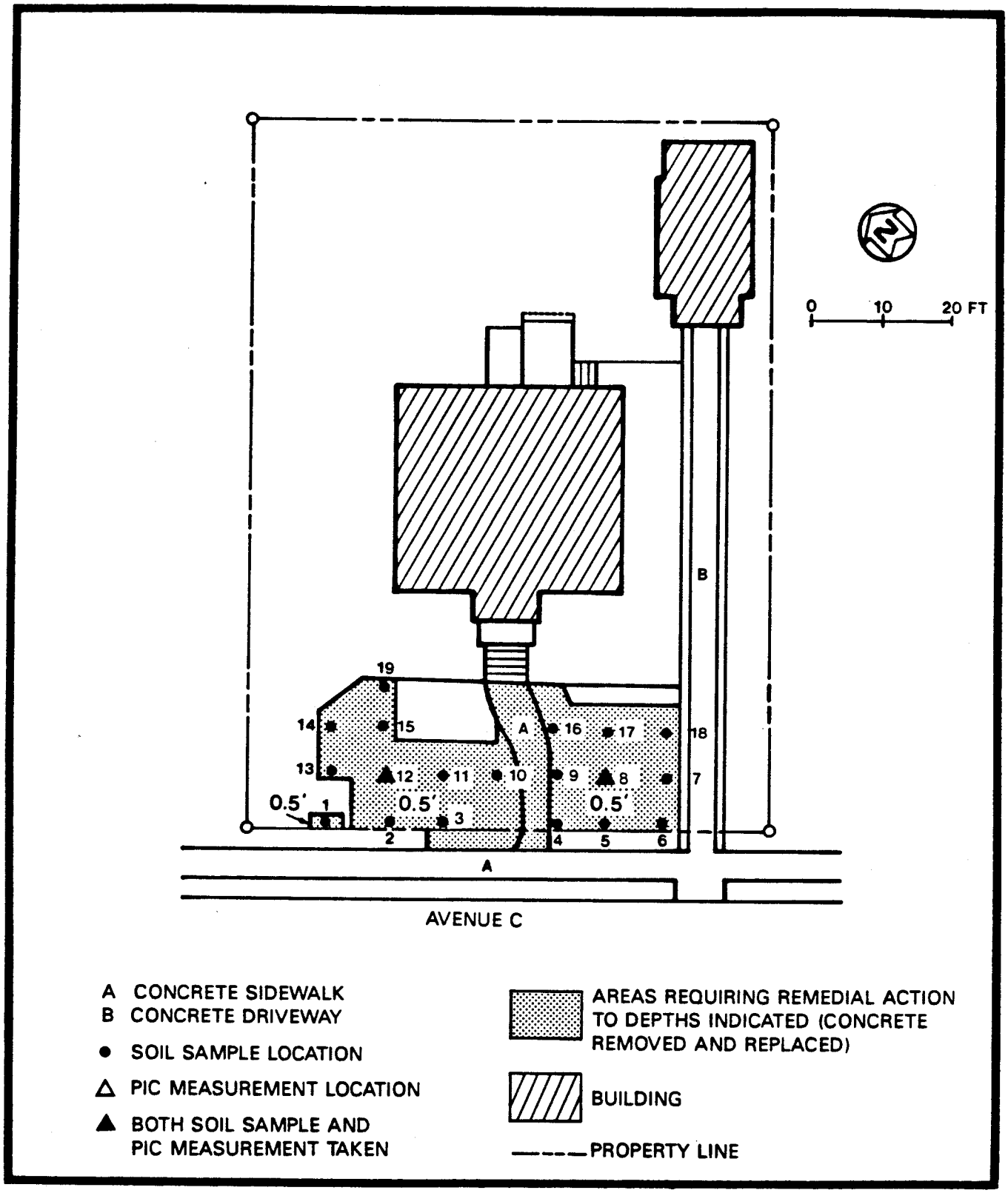


FIGURE 26 PARCEL 26, REMEDIAL ACTION AT 59 AVENUE C; BLOCK 212, LOT 11, 12, 13