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REVISION 2

REMEDIAL ACTION WORK PLAN FOR THE MAYWOOD SITE

MARCH 1986

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

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UNITED STATES DEPARTMENT OF ENERGY

OAK RIDGE OPERATIONS

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1.0 INTRODUCTION AND OBJECTIVES

1.1 BACKGROUND

The 1984 Energy and Water Appropriations Act directed the U.S. Department of Energy (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 Borough of Maywood, Township of Rochelle Park, and Borough of Lodi, New Jersey. Remedial action at these properties is being performed under 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 (Ref. 1) or commercial operations causing conditions that Congress has mandated DOE to remedy.

1.2 PURPOSE

This work plan describes the actions completed in past years and provides a detailed description of actions planned for FY 1986 relevant to implementing remedial action at the Maywood Interim Storage Site (MISS) and vicinity properties A schedule and cost estimate for implementing these activities are also included.

1.3 MANAGEMENT APPROACH

All FUSRAP activities are under the direction of the DOE Assistant Secretary for Nuclear Energy, through the Office of Remedial Action and Waste Technology and the Division of Facility and Site Decommissioning Projects.

DOE Headquarters (DOE-HQ) has the responsibility for developing overall policy applicable to FUSRAP. DOE-HQ provides broad guidance and establishes the program budget.

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

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

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

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

1.4 REMEDIAL ACTION CRITERIA

The radiological guidelines established by DOE for the cleanup of radioactive materials under the FUSRAP are summarized in Table 1-1 and Reference 2. The Design Criteria for Formerly Utilized Sites Remedial Action Program (FUSRAP) and Surplus Facilities Management Program (SFMP) presents additional information regarding applicable federal regulations (Ref. 3).

1.5 NEPA

The National Environmental Policy Act promotes environmental considerations in federal decision making. DOE implementing guidelines for NEPA are followed in evaluating proposed interim remedial actions and final disposition of all the contaminated material. Through the NEPA process, DOE conducts the applicable level of environmental analysis and advises appropriate federal, state, and local agencies and the public of proposed interim actions.

TABLE I-1

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES

FOR THE MISS

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

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

STRUCTURE GUIDELINES (MAXIMUM LIMITS FOR UNRESTRICTED USE)

Indoor Radon Decay Products

For Radon-222 and Radon-220 concentrations in buildings, the average annual radon decay product concentration (including background) due to uranium or thorium byproducts should not exceed 0.02 of working level (WL)after remedial action. When remedial action has been performed and it would be unreasonably difficult and costly to reduce the level below 0.03 WL, the remedial action may be terminated and the reasons for termination should be documented. Remedial action shall be undertaken for any building that exceeds an annual average radon decay product concentration (including background) of 0.03 WL.

External Gamma Radiation

The level of gamma radiation at any location on a site to be released for unrestricted use, whether inside an occupied building or habitable structure or outdoors, shall not exceed the background level by more than 20 microroentgens per hour (20 μR/hr).

Indoor/Outdoor Structure Surface Contamination

	Allowable Surface Residual Contamination[d] (dpm/100 cm^2)		
Radionuclide[e]	Average[f,g]	Maximum[f]	Removable[f]
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 I-1
(continued)

Indoor/Outdoor Structure Surface Contamination (continued)

Radionuclide[e]	Allowable Surface Residual Contamination[d] (dpm/100 cm^2) Average[f,g]	Maximum[f]	Removable[f]
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 $\beta-\gamma$	15,000 $\beta-\gamma$	1,000 $\beta-\gamma$

[a]In the event of occurrence of mixtures of radionuclides, the fraction contributed by each radionuclide to its limit shall be determined, and the sum of these fractions shall not exceed 1.

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

[c]Localized concentrations in excess of these limits are allowable provided that the average over 100 m^2 is not exceeded.

[d]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.

[e]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.

[f]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.

[g]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.

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

[i]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, 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.

2.0 SITE DESCRIPTION

2.1 LOCATION

The MISS and vicinity properties are located in a highly developed area in the Boroughs of Maywood and Lodi, and the Township of Rochelle Park in the County of Bergen, New Jersey (Figure 2-1). The 11.7-acre storage site is owned by DOE; it is bounded by New Jersey Route 17 on the west, a railroad line on the north and northeast, and commercial/industrial areas on the south and southeast. The Stepan Company (formerly Maywood Chemical Works) property adjoins the MISS on the eastern side.

The vicinity properties are:

- Ballod Associates property -- A 7-acre area immediately west of New Jersey Route 17 in Rochelle Park that was once used for waste storage by the Maywood Chemical Works and part of which was decontaminated in FY 1985
- Residential properties -- Eight residences on Davison and Latham Streets in Maywood and nine on Grove Avenue and Park Way in Rochelle Park that were decontaminated in FY 1984; eight residences in the Borough of Lodi that were decontaminated in FY 1985
- Sears area properties -- A 50-acre industrial/commercial area in Maywood that adjoins the Stepan Company property on the south
- Scanel property -- A commercial area located approximately 0.5 mi south of the Stepan Company property in Maywood
- Railroad property -- The New York, Susquehanna and Western Railroad adjoining the MISS, Ballod property, and Stepan Company property on the north and east
- Route 17 -- The section adjoining the MISS on the west
- One commercial and one state-owned property in Lodi

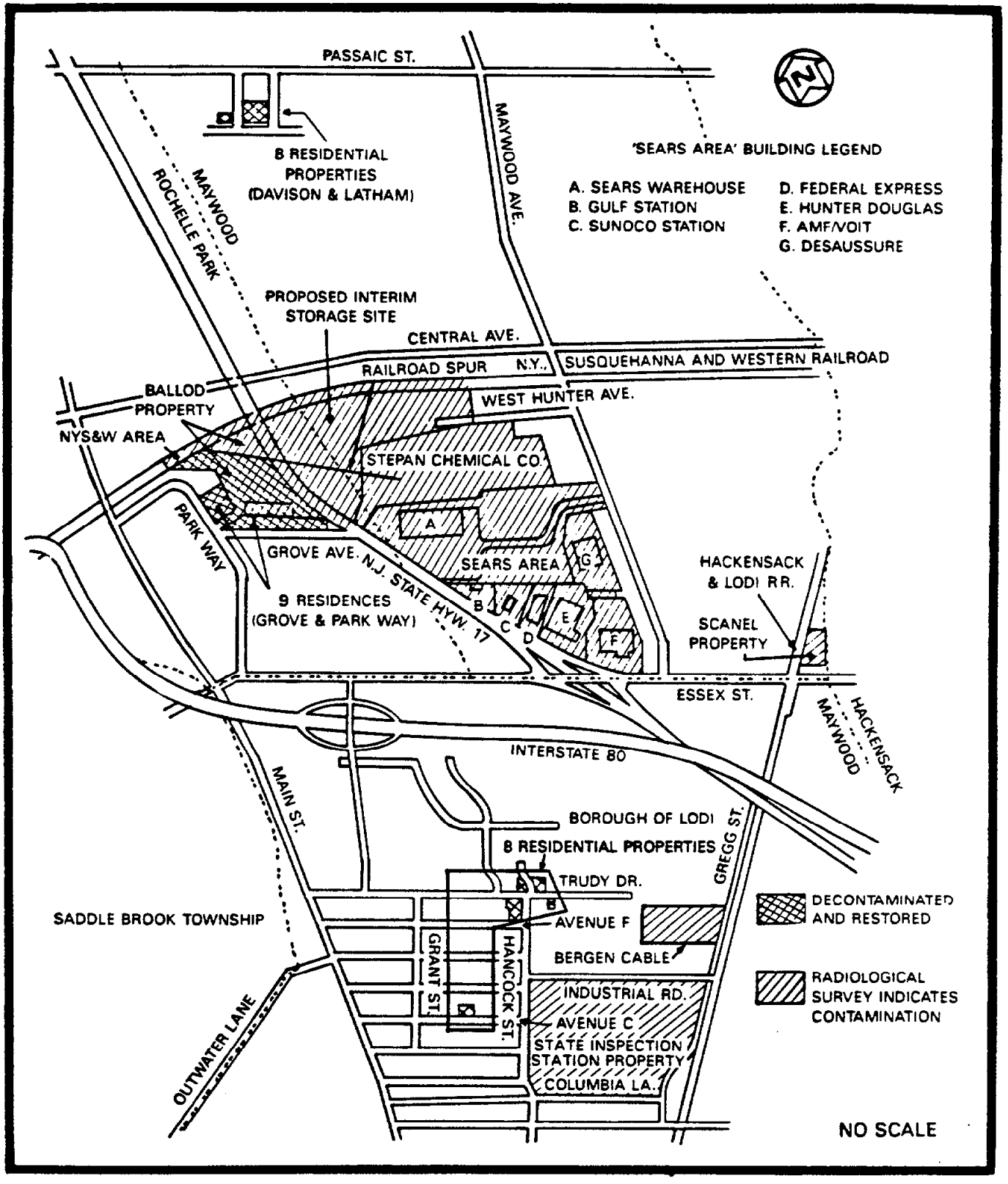

FIGURE 2-1 MAP OF THE MISS AND VICINITY PROPERTIES

2.2 CHARACTERISTICS

2.2.1 Radiological

The Stepan Company property was formerly owned by the Maywood Chemical Works, which from 1916 to 1956 processed thorium for use in the manufacture of a variety of items, including gas mantles for lighting devices. During this time, process wastes were stored west of the plant.

In 1954, the Atomic Energy Commission (AEC) issued License R-103 to the Maywood Chemical Works to possess, process, manufacture, and distribute radioactive materials. This license permitted Maywood Chemical to continue its operations under the terms of the Atomic Energy Act of 1954. Thorium processing operations ceased in 1956, and the property was sold to the Stepan Company in 1959.

In 1980, the U.S. Nuclear Regulatory Commission (NRC) requested a comprehensive survey to assess the radiological conditions at the Ballod Associates property. The survey was performed by Oak Ridge Associated Universities in February 1981 (Ref. 4). In addition, EG&G conducted an aerial radiological survey over the Stepan Company site, the Ballod Associates property, and the surrounding area in January 1981 (Ref. 5), which resulted in the discovery of other anomalies. Followup ground surveys were conducted to determine the nature of these anomalies (Refs. 6 through 14).

In 1984 Oak Ridge National Laboratory surveyed the Borough of Lodi with a mobile van. Additional properties contaminated with materials from the Stepan Company plant were identified during this survey.

In 1984 further characterization surveys were performed on residential properties in Rochelle Park and Lodi. Remedial action was completed on these properties in 1984 and 1985.

2.2.2 Geological and Hydrological

The MISS is centrally located within the Piedmont Plateau of north central New Jersey. The geology of the plateau in this part of New Jersey is characterized by thick sedimentary rocks deposited during the Late Triassic Period concurrently intruded by a diabase sill and dikes and covered by several flows of basalt. Collectively, this group of sedimentary and associated igneous rocks of Triassic age is known as the Newark Group. Bedrock in the area comprises consolidated deposits of the Brunswick Formation, consisting of mudstones, sandstones, and thin-bedded shales (Ref. 6).

During 1984, 17 geologic boreholes and monitoring wells were installed at the MISS. Information collected from these borings, together with data from previous work, indicates that hard bedrock lies under 4 to 23 ft of unconsolidated material and weathered bedrock. The unconsolidated material consists largely of stratified drift, which exhibits considerable variability both areally and with depth. A weathered zone between 2 and 8 ft deep commonly overlies hard bedrock. In addition, borings indicate that considerable amounts of fill material have been placed on this site during its many years of industrial use. Groundwater has generally been observed 7 to 10 ft below the ground surface.

2.3 WASTE VOLUME PROJECTIONS

Actual and projected waste volumes for the Maywood site are listed in Table 2-1.

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TABLE 2-1

WASTE VOLUMES FOR THE MAYWOOD SITE

Fiscal Year	Property	Volume (yd^3)
1984	Davison/Latham residences	2,100
	Parkway/Grove residences	1,000
	Ballod property (partial)	1,600
	SUBTOTAL	4,700
1985	Lodi residences	500
	Ballod property (partial)	29,700
	SUBTOTAL	30,200
Out Years[a]	North Ballod and Railroad	12,100
	Scanel property	6,000
	Sears area properties	60,000
	Lodi commercial properties	10,000
	Route 17	20,000
	Stepan Company burial sites	
	Site 1	17,000
	Site 2	5,000
	Site 3	18,000
	Material at the MISS	87,000
	SUBTOTAL	235,100
	TOTAL	270,000[b]

[a]Volumes for out years are estimates based on current information and are not definitive. For example, the volumes may change as the extent of contamination is defined by radiological characterization.

[b]Figures for FY 1984 and 1985 are actual volumes.

3.0 WORK PLAN

Remedial action at the Maywood site is divided into two phases. Phase I consists of removing contaminated materials from residential (first priority) and commercial vicinity properties and storing them at the MISS (Figure 3-1). During Phase II, the MISS will be cleaned up and the contaminated materials will be placed in a permanent disposal facility.

Preliminary engineering studies, performed before the start of Phase I, considered several alternative actions. Additional engineering studies assessed the feasibility of permanent on-site storage versus removal of contaminated materials to a waste storage site elsewhere in the state of New Jersey. DOE will evaluate the results of these studies and the legal requirements of governing legislation. Based on this evaluation DOE will conduct the appropriate level of NEPA assessment to select the preferred alternative for the final disposition of the contaminated materials.

The work currently planned for 1986 involves the characterization of portions of the MISS and selected vicinity properties. The details of the work plan for this work are presented in Subsection 3.3 of this document.

3.1 DESIGN ENGINEERING

In October 1983, BNI started design engineering to support NEPA activities and to develop the engineering subcontract packages (detailed 1984 cost estimates, drawings, specifications, schedules, and requisitions) necessary to support the remedial action described in Subsection 3.4.1. Design engineering for the remaining characterization surveys will be completed in 1986.

3.2 ACCESS AGREEMENTS

BNI will obtain access agreements for all required radiological surveys prior to the start of work.

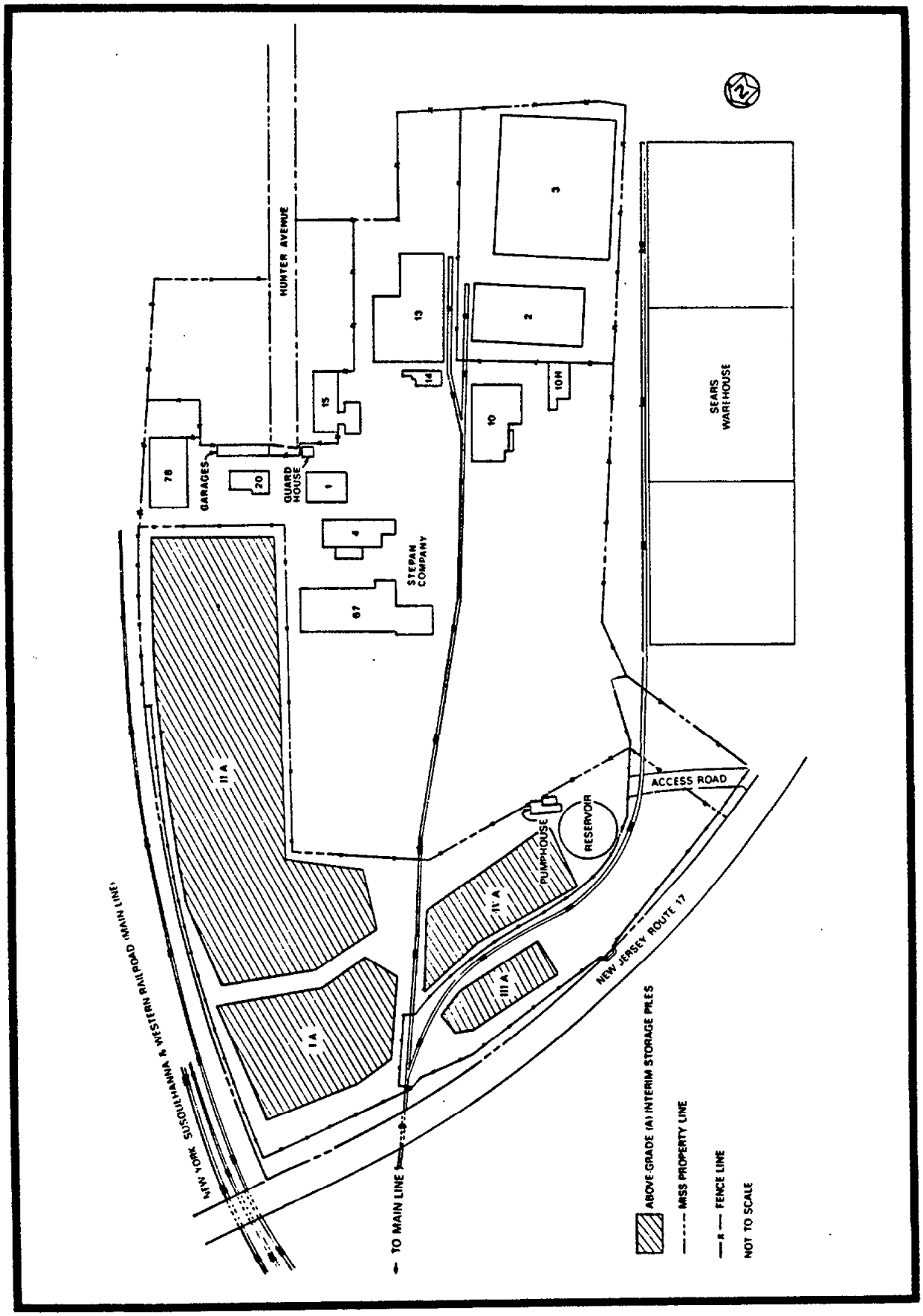

FIGURE 3-1 PROPOSED STORAGE PILES AT THE MSS

The current agreement with the New York, Susquehanna and Western Railway Company will be continued to provide an access route into the MISS and to permit conduct of radiological surveys on railroad property.

3.3 CHARACTERIZATION

In FY 1986 radiological characterization surveys will be conducted on the Sears area properties, railroad property, part of Route 17, and one commercial and one state-owned property in Lodi that are described in Subsection 2.1. In accordance with requirements of the New Jersey Department of Environmental Protection, the wastes placed in the interim storage piles at the MISS during FY 1984 and FY 1985 will also be radiologically and chemically characterized as will those parts of the MISS not covered by the storage piles.

Characterizations of the above areas will be conducted in accordance with survey plans that will be developed prior to the start of the work. Characterizations will include surface and subsurface measurements to determine concentrations of uranium-238, radium-226, and thorium-232 in soil and water.

3.4 REMEDIAL ACTIONS

3.4.1 Progress to Date

In 1984, the vicinity properties in Rochelle Park and Maywood and a portion of the Ballod Associates property were decontaminated and restored. A total of 4,700 yd^3 of material was transported to MISS for interim storage.

Remedial actions conducted in 1985 -- and completed in FY 1986 -- included:

- Decontaminating and restoring eight residences in the Borough of Lodi and a major section of the Ballod property

- Transferring excavated contaminated materials to a storage pile at the MISS
- Constructing additional access roads and preparing the site for the additional material. This site preparation included installation of a bottom liner and a leachate collection system under the new storage pile.

3.4.2 1986 Work

No remedial actions are scheduled at the MISS in FY 1986. The characterizations that will be conducted are described in Subsection 3.3.

3.4.3 Future Work

The principal work for FY 1987 will be the decontamination and restoration of the remaining commercial vicinity properties in Maywood, Rochelle Park, and Lodi, e.g., Ballod, the railroad, and Sears area.

3.5 OCCUPATIONAL EXPOSURE

An evaluation of the occupational exposure potential from decontaminating vicinity properties has led to the conclusion that, from a radiological and chemical standpoint, the health risks are insignificant.

3.6 QUALITY ASSURANCE

The provisions of the DOE FUSRAP Plan for Quality Assurance comply with DOE Order 5700.6 (Ref. 15), and apply to BNI as PMC, to subcontractors, architect-engineers, construction and service subcontractors, and other subcontractors as may be identified.

3.7 SURVEILLANCE AND MAINTENANCE

To protect the environment and the health and safety of the public and site personnel, BNI has developed a maintenance and surveillance program for the MISS. The program is designed to monitor containment of contamination and to provide physical safety and security controls; it includes plans for site security, grass mowing, and fence repair. The program will be carried out until completion of ultimate site cleanup and will ensure that applicable requirements of DOE, State of New Jersey, and other federal regulatory agencies are met.

An environmental monitoring program is also maintained at the MISS to meet federal and state requirements. Radioactivity in air (radon and thoron), surface water, and groundwater, and external gamma radiation levels are monitored. Results are documented in an annual environmental monitoring report for the MISS. During remedial action work, an operations monitoring program is established on an activity-specific basis. Typically, monitoring will be conducted for air (radon and particulates), surface water, sediments, and external radiation as appropriate.

Chemical sampling of the groundwater monitoring wells will be conducted on a routine basis to meet permit requirements of the New Jersey Department of Environmental Protection. In addition, on-site surface drainage and storm drains will be sampled. Samples will be analyzed for priority pollutants and radionuclides of concern as well as for other parameters specified by the New Jersey Pollutant Discharge Elimination System permit for the MISS.

4.0 SCHEDULE AND COST

Figure 4-1 summarizes the preliminary cost and schedule for the activities during the period FY 1984-88; the schedule for cleanup of the MISS and final disposal of the waste is presented in Figure 4-2. This schedule assumes removal of the waste to a permanent disposal site elsewhere in New Jersey; it will depend on the timely identification and construction of such a site.

The estimated total cost for work from FY 1984 through FY 1988 is $19.6 million, excluding program apportionments such as general support, system studies, and FUSRAP contingency. While the current estimate through final disposal is $113.5 million, the ultimate cost of the remedial action at Maywood will depend on the location of the permanent disposal site and, if elsewhere in New Jersey, the schedule for transfer of the materials from the MISS to that site.

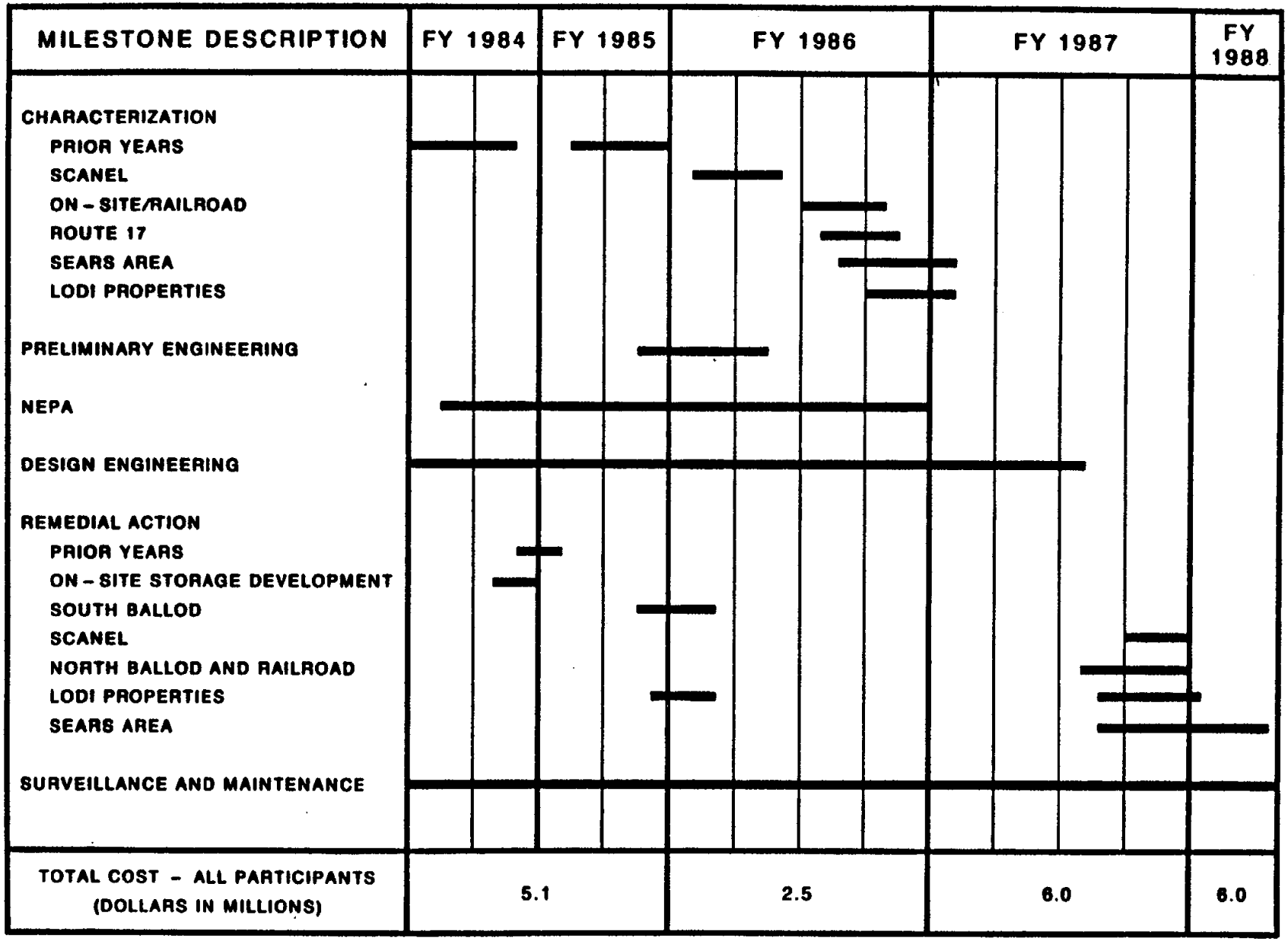

FIGURE 4-1 REMEDIAL ACTION COST AND SCHEDULE FOR THE MISS

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