RECORD OF DECISION FOR SOILS AND BUILDINGS AT THE FUSRAP MAYWOOD SUPERFUND SITE

MAYWOOD, NEW JERSEY

August 2003

US Army Corps
of Engineers®
New York District
Formerly Utilized Sites Remedial Action Program

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prepared by
U.S. Army Corps of Engineers, New York District Office, Formerly Utilized Sites Remedial Action Program

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ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cm	centimeter(s)
COC	contaminant of concern
DOE	U.S. Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
FMSS	FUSRAP Maywood Superfund Site
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
GSS	gravel separation system
HI	Hazard Index
HQ	Hazard Quotient
in	inch(es)
IRIS	Integrated Risk Information System
LUCIP	Land Use Control Implementation Plan
MCL	Maximum Contaminant Level
MCW	Maywood Chemical Works
mrem/yr	millirem per year
MISS	Maywood Interim Storage Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJ	New Jersey
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NRC	Nuclear Regulatory Commission
O&M	operation and maintenance
OU	operable unit
pCi/g	picoCuries per gram
pCi/L	picoCuries per liter
POTW	Publicly Owned Treatment Works

Ra-226	radium 226
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
Rd.	Road
RESRAD	RESidual RADiation
RfD	reference dose
RI	Remedial Investigation
RME	Reasonable maximum exposure
Rn-222	radon 222
ROD	Record of Decision
RSS	radiological soil sorting
St.	Street
Th-232	thorium 232
U-238	uranium 238
USACE	U.S. Army Corps of Engineers
yd^3	cubic yard

I. DECLARATION

A. SITE NAME AND LOCATION

Maywood Chemical Company Superfund Site
Boroughs of Maywood, Lodi, and the Township of Rochelle Park, Bergen County, New Jersey
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number NJD980529762.

Operable Unit (OU) - Soil and Buildings
(Other OUs - Groundwater Impacted by FUSRAP Waste & Contaminated Groundwater on the MISS and Non-FUSRAP Chemical Wastes are being addressed as separate actions.)

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for soils and buildings at the Formerly Utilized Sites Remedial Action Program (FUSRAP) portion of the Maywood Chemical Company Superfund Site (hereafter referred to as the "FUSRAP Maywood Superfund Site" or "FMSS"), in Bergen County, New Jersey. The selected remedial action was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9601-9675, and to the greatest extent possible, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as amended, 40 CFR Part 300. This decision is based on information contained in the Administrative Record file for the FMSS and has been made by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA). Comments on the Proposed Plan for the FMSS provided by the New Jersey Department of Environmental Protection (NJDEP) were evaluated and considered in selecting the final remedy. See responses to comments in Section III – Responsiveness Summary.

C. ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

The remedy described in this document represents one of three planned remedial actions for the Maywood Chemical Company Superfund Site. This ROD, the first OU, will address the remediation of contaminated soil, debris (e.g., buried drums), and building materials defined as FUSRAP waste at the former Maywood Chemical Works (MCW) and commercial / government properties in the vicinity of the site, in accordance with the remedial action objectives (RAOs) established in Section II.I of the Decision Summary. This ROD will also address the Stepan Company burial pits that are licensed and regulated by the Nuclear Regulatory Commission

(NRC). For the second OU, currently in the remedial investigation (RI) phase, the USACE is addressing potential groundwater contamination associated with FUSRAP waste. For the third OU, Stepan Company is addressing non-radioactive, chemical contamination on Stepan Company property and adjoining properties. Sixty-four (64) other designated FMSS properties, consisting of mostly residential and several commercial / government properties, were previously remediated under actions taken by USACE and the U.S. Department of Energy (DOE). It is anticipated that these previously remediated properties will be included in a future FMSS ROD.

The remedy presented in this document addresses the radiologically and chemically contaminated wastes defined as FUSRAP wastes remaining in soils and buildings at the FMSS. It is intended to be the final remedy for all contaminated soil and building media identified as part of this OU and meeting the definition of a FUSRAP waste, as defined in the Federal Facilities Agreement (FFA) for the site. Contaminated media present at the site include soil, buried bulk wastes (including the NRC-licensed burial pits), and buildings (all contaminated buildings are located on the Stepan Company property and the Maywood Interim Storage Site [MISS]).

The following cleanup criteria have been established for the radioactive contamination at the FMSS:

- An average of 5 picoCuries per gram (pCi/g) of radium-226 (Ra-226) and thorium-232 (Th-232) combined above background for soils on residential or unrestricted use properties.
- An average of 15 pCi/g Ra-226 and Th-232 combined above background for subsurface soils with an as low as reasonably achievable (ALARA) goal of 5 pCi/g on commercial or restricted use properties.
- An average of 100 pCi/g above background for total uranium, which equates to approximately 50 pCi/g of uranium-238 (U-238) at all properties addressed in this ROD.
- Soil and building remediation will meet the 15 millirem per year (mrem/year) above background dose limit specified in New Jersey Administrative Code (NJAC) 7:28-12.8(a)1 at all properties addressed in this ROD.
- Indoor radon air concentrations will meet the 3 picoCuries per liter (pCi/L) radon-222 (Rn-222) limit specified in the NJAC 7:28-12.8(a)2 at all properties addressed in this ROD.
- NJAC 7:28-12.8(a)1 (15 mrem/year) will be used as applicable or relevant and appropriate requirements (ARARs) for the remediation of the NRC-licensed burial pits on the Stepan Company property and will meet NRC regulations at 10 Code of Federal Regulations (CFR) 20.1402 (25 mrem/year).
- Any FMSS remediation-derived water discharged to a Publicly Owned Treatment Works (POTW) will meet or exceed the POTW's designated pre-treatment standards prior to discharge. Any FMSS remediation-derived water discharged from a point source to a surface water body or groundwater will comply with the relevant and appropriate promulgated state and Federal standards for the FMSS contaminants of concern (COCs). In the absence of specific discharge limitations, point source

discharges will meet or exceed federal maximum contaminant levels (MCLs) for each COC.

The major components of the selected remedy, Alternative 3, include the following (full descriptions of this and other Alternatives are presented in Section II.J of this ROD):

- Excavation / removal of the remaining soils and buried bulk waste with contamination above the RAOs (Section I, Declaration).
- Physical separation of excavated material (not to be confused with treatment) to sort wastes potentially requiring disposal as mixed wastes and other bulk waste from soils requiring disposal as radioactive waste.
- The USACE has elected to implement institutional and land use controls on properties in designated areas where contamination remains at levels higher than the levels established for release. The objectives of the institutional and land use controls are to limit land use to commercial/industrial, prohibit residential use and prohibit excavation in designated restricted areas.
- Off-site disposal of the FUSRAP waste materials.
- Decontamination and demolition, as necessary, of buildings on Stepan Company and the MISS.
- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State laws and regulations that are applicable or relevant and appropriate to the remedial action, and is cost effective. The selected remedy will utilize permanent solutions to the maximum extent practicable. The remedy does not satisfy the statutory preference for treatment. The treatment technologies evaluated for soil volume reduction were not found to be acceptable for implementation at the FMSS.

Five-year reviews will be conducted in compliance with CERCLA Section 121 (c) and the NCP Section 300.430(f)(4)(ii).

F. DATA CERTIFICATION CHECKLIST

The following provides the location of key remedy selection information contained in ROD Section II, Decision Summary. Additional information can be found in the FMSS Administrative Record file.

ROD Data Checklist Item	ROD Section Number Reference
Constituents of concern and their respective concentrations.	II.F.4
Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD.	II.G
Baseline risk represented by the constituents of concern.	II.H
Cleanup criteria established for constituents of concern and the basis for these criteria.	II.I
How principal threats are addressed.	II.L
Key factor(s) that led to selecting the remedy.	II.M.1
Estimated capital, annual operation and maintenance (O&M), and the total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.	II.M.3
Potential land and groundwater use that will be available at the site as a result of the Selected Remedy.	II.M.4

G. AUTHORIZING SIGNATURES

Meredith W.B. Temple
Brigadier General, U.S. Army
Division Engineer

19 Aug 03
Date

Jane M. Kenny
Regional Administrator
U.S. Environmental Protection Agency

SEP 22 2003
Date

II. DECISION SUMMARY

A. SITE NAME, LOCATION, AND DESCRIPTION

The Maywood Chemical Company Superfund Site in Bergen County, New Jersey (NJ) is listed on the U.S. Environmental Protection Agency's (EPA's) Superfund National Priorities List (NPL). The National Superfund Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number is NJD980529762. The U.S. Army Corps of Engineers (USACE) has assumed responsibilities from the U.S. Department of Energy (DOE) as lead agency for remedial action at the Formerly Utilized Sites Remedial Action Program (FUSRAP) portion of the Maywood Chemical Company Superfund Site (hereafter referred to as the "FUSRAP Maywood Superfund Site" or "FMSS"). USACE is the lead agency for site activities, and EPA Region 2 is the support agency with oversight responsibilities. Plans and activities are also being coordinated with the appropriate NJ State agencies, including the NJ Department of Environmental Protection (NJDEP). Funding for cleanup of the FMSS is provided on an annual basis by the congressional appropriations designated under the Energy and Water Development Appropriations Act.

The FMSS consists of 88 designated industrial, residential, commercial, and government properties contaminated by former thorium processing activities at the former Maywood Chemical Works (MCW). The properties are located in a highly developed area of northeastern NJ in the Boroughs of Maywood and Lodi and the Township of Rochelle Park. The FMSS is located approximately 20 kilometers (12 miles) north-northwest of New York City and 21 kilometers (13 miles) northeast of Newark, NJ (**Figure 1**). The Remedial Investigation (RI) conducted at the FMSS divided the site into five property units based on land use and media of concern:

- Maywood Interim Storage Site (MISS)
- Stepan Company
- Buildings / structures on Stepan Company and the MISS
- Residential properties
- Commercial and government properties.

Figure 1 shows the location of the properties comprising the FMSS. **Figure 2** demonstrates the locations of buildings/structures on Stepan Company and the MISS.

Sixty-four (64) of these designated FMSS properties, consisting of all residential and several commercial / government properties, were previously remediated under actions taken by DOE and USACE. This Record of Decision (ROD) does not address these previously remediated properties. The remainder of the site has been divided into three operable units (OUs) as follows:

- Soils / Buildings at the MISS, Stepan Company, and the 22 commercial and government vicinity properties. Portions of several of these properties were previously remediated under the *Engineering Evaluation/Cost Analysis for a Removal Action in*

Support of NJDOT Roadway Improvement Projects at the FUSRAP Maywood Superfund Site (FMSS). This OU includes soil, buried bulk wastes (including the NRC-licensed burial pits), and buildings (all contaminated buildings are located on the Stepan Company property and the MISS).

- Groundwater impacted by FUSRAP waste and contaminated groundwater on the MISS.
- Non-FUSRAP chemical wastes.

This ROD addresses the first OU.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The FMSS consists of 88 designated properties: The Stepan Company property, which includes contaminated buildings (as discussed in Section 2.4.6 of the Feasibility Study [FS]), and the three NRC-licensed burial pits; the MISS and contaminated building; 59 residential properties; three properties owned by the state or Federal government; four municipal properties; and 20 commercial properties. Of the 88 properties, 64 Phase I properties (including all residential and municipal properties) have already been cleaned up by DOE or the USACE. During cleanup actions on these properties, additional properties were remediated. This occurred if the contamination extended on to an adjacent undesignated property.

Radioactive contamination at the FMSS resulted from rare earth and thorium processing operations conducted by MCW and associated material storage and waste disposal practices. Historical records indicate that processing of thorium from monazite sands may have begun as early as 1895; other records indicate that thorium processing was initiated in 1916, and continued until 1957. Processing operations created wastes containing thorium and lesser amounts of radium and uranium as well as rare earths[1]. Some of these process wastes and residues were stored, treated, or disposed on the original processing site where the MISS and Stepan Company are now located. In addition, radioactivity was spread to nearby properties by the use of the waste materials as mulch and fill or through soil and sediment transport along Lodi Brook (Although currently an underground culvert, Lodi Brook was formerly an open channel).

In 1959, MCW sold the plant to the Stepan Company. In the late 1960s, Stepan Company took corrective measures at some of the former disposal areas located on the original MCW plant site property both east and west of NJ State Route 17 (NJ State Route 17 was built in the early 1930s over and through the MCW's thorium waste lagoons.). Stepan Company's corrective measures included relocation and burial of approximately 19,100 yd^3 of excavated waste materials. Between 1966 and 1968 these waste materials were relocated to three burial areas on property currently owned by Stepan Company. Stepan Company sold the portion of the original plant property located west of NJ State Route 17, now known as 96 Parkway, after relocation of the waste materials. Stepan Company currently holds a NRC license for the storage of thorium-bearing materials in Burial Pits 1, 2, and 3.

[1] Rare earths are defined as oxides of metals in the lanthanide series of elements, plus the elements of yttrium and scandium.

EPA listed the Maywood Chemical Company Superfund Site on the Superfund NPL on September 8, 1983. In late 1983, Congress assigned DOE a research and development project to clean up the radioactive wastes at the Maywood Chemical Company Superfund Site (via the FY84 Energy and Water Appropriations Act). DOE then assigned the site to FUSRAP. In 1997, the FY98 Energy and Water Development Appropriations Act transferred responsibility for the execution and administration of FUSRAP from DOE to the USACE. The inclusion of chemical contaminants under the FMSS definition of FUSRAP waste is limited to chemicals on the MISS or chemicals on vicinity properties that are commingled with or related to the radioactive waste, chemicals associated with thorium processing at MCW, and chemicals on or migrating from the MISS. The Stepan Company, which operates an active chemical manufacturing facility at the Maywood Chemical Company Superfund Site, is conducting an RI/FS on chemical, non-radiological contamination on its facility and on the adjacent property at 149-151 Maywood Avenue. The EPA is overseeing the Stepan Company RI/FS and is coordinating that RI/FS and cleanup, with USACE's FS and Proposed Plan and other USACE actions related to environmental cleanup at the Site.

DOE began investigating the FMSS and surrounding area in 1983, and during 1984 to 1985 cleaned up 25 residential properties and a portion of one commercially zoned property. Due to the limited commercial disposal capacity for radiological wastes, the excavated materials from these cleanups were stored on property that was a part of the original MCW processing site. DOE acquired this property from Stepan Company and named it the MISS. During a cleanup action conducted by DOE in 1995 and 1996, these stored materials were removed from the MISS and sent to a permanent, off-site commercial disposal facility. Also, during 1995, the cleanup of the remaining residential properties, four municipal properties (three parks and a fire station), and one commercially zoned property (96 Park Way) was initiated. These interim property cleanups were implemented as removal actions as proposed in DOE's September 1995 Engineering Evaluation/Cost Analysis (EE/CA) under CERCLA. These interim cleanup actions were completed in 2000 by the USACE.

A time critical removal action was completed by USACE during the winter of 2000 to remove contaminated sediments from portions of Lodi Brook and a swale located at the terminus of West Howcroft Road. The removal action re-established the hydraulic grade of the brook and swale, prevented additional flooding, and prevented the transport or migration of contaminated soil by flooding water.

In July 2001, the USACE published the *Engineering Evaluation/Cost Analysis for a Removal Action in Support of NJDOT Roadway Improvement Projects at the FUSRAP Maywood Superfund Site (FMSS)* for public comment. The Action Memorandum was approved in November 2001. The removal action was initiated in January 2002. With the implementation of this ROD, the removal action will be transitioned into this remedial action. Several Soils / Buildings OU properties addressed by this ROD were previously remediated through this EE/CA. Removal actions conducted on properties to be addressed by this ROD will be surveyed to ensure that the properties meet the cleanup criteria and ARARs established in this ROD.

The FS for the FMSS was completed and submitted for public comment along with the Proposed Plan in August 2002.

C. COMMUNITY PARTICIPATION

Community participation activities provide the public with an opportunity to express its views on the preferred remedial action. USACE and EPA considered State and public input from the community participation activities conducted during the RI/FS in selecting the remedial alternative to be used for the FMSS. Seven public meetings were held by DOE or the USACE between 1990 and 2000. In addition, a public meeting was held for each of the primary CERCLA documents for the FMSS: RI (1992); Baseline Risk Assessment (BRA) (1993); and FS/Proposed Plan (2002). Community participation was provided in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act.

The FS and Proposed Plan for the FMSS were released to the public in August 2002. These two documents were made available to the public in the Administrative Record maintained at the FUSRAP Public Information Center located in Maywood, NJ. The notice of availability for these two documents was published in *The Record, Our Town,* and *The Shopper News*. A public comment period was held from August 14, 2002 through September 13, 2002. An extension to the public comment period was requested. As a result, the public comment period was extended to November 11, 2002. This includes two 30-day extensions to the public comment period. In addition, a public meeting was held on August 28, 2002. At this meeting, representatives from USACE provided information and answered questions about contamination at the FMSS and the remedial alternatives under consideration. A response to the comments received during this meeting is included in the Responsiveness Summary, which is part of this ROD. A transcript of the public meeting is available to the public and has been included in the Administrative Record file and information repository.

A community relations plan, available in the Administrative Record file, has been prepared and implemented to keep the public informed of activities on-site and to invite community input. As part of the community relations plan, DOE established the FUSRAP Public Information Center, located in the Borough of Maywood, to provide information locally about activities at the FMSS. The FUSRAP Public Information Center is currently maintained by the USACE. Additionally, USACE has established a website for the FMSS at www.fusrapmaywood.com. Through the community relations program, the Federal government has interacted with the public through news releases, public meetings, informal meetings with local interest groups, availability sessions, reading materials, the internet website, and receiving and responding to public comments. Through this program and available community planning documentation, views on the assumptions regarding reasonably anticipated future land use have been solicited. Groundwater is not included in the scope of this ROD and will be addressed in a future ROD.

USACE and EPA responses to the comments received during the public comment period are included in the Responsiveness Summary, which is Section III of this ROD.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As with many Superfund sites, the problems at the FMSS are complex. The FMSS consists of 88 designated properties: the Stepan Company property, which includes three burial pits, licensed and regulated by the NRC, and contaminated buildings; the MISS, which includes a contaminated building; 59 residential properties; 3 properties owned by the State or Federal government; 4 municipal properties; and 20 commercial properties. Of the 88 designated properties, DOE or the USACE has cleaned up 64 properties (including all residential and municipal properties). The Maywood Chemical Company Superfund Site is being addressed under three separate actions coordinated by EPA Region 2. The USACE is addressing thorium and other wastes at the site defined as "FUSRAP waste" within the soils / buildings and groundwater. Stepan Company is addressing other chemical wastes (non-FUSRAP waste) at the Maywood Chemical Company Superfund Site. All three actions are being conducted under CERCLA.

Under the terms of the FFA, FUSRAP waste is defined as:

- All contamination, both radiological and chemical, whether mixed or not, on the MISS.
- All radiological contamination above cleanup levels related to past thorium processing from the MCW occurring on any of the vicinity properties.
- Any chemical or non-radiological contamination on vicinity properties that would satisfy either of the following requirements:
  - The chemical or non-radiological contaminants that are mixed or commingled with radiological contamination above cleanup levels.
  - The chemical or non-radiological contaminants that originated at the MISS or were associated with the specific thorium manufacturing or processing activities at the MCW that resulted in the radiological contamination.

The Maywood Chemical Company Superfund Site is organized into three OUs. Work covered under the scope of this ROD is highlighted in bold in the following list of OUs:

- **Soils / Buildings at the MISS, Stepan Company, and the 22 commercial and government vicinity properties contaminated with FUSRAP waste as defined above (all contaminated buildings are located on the Stepan Company property and the MISS). This OU includes the Stepan Company burial pits, licensed and regulated by the NRC.**
- Groundwater impacted by FUSRAP waste and contaminated groundwater on the MISS.
- Non-FUSRAP chemical wastes.

In 1995, DOE published the *EE/CA for the Cleanup of Residential and Municipal Vicinity Properties at the Maywood Site*. During cleanup actions on these properties, additional properties were remediated if the contamination extended onto an adjacent undesignated property.

DOE or the USACE has cleaned up these residential and municipal vicinity properties. Although the initial residential properties (pre-1986) were cleaned under a less restrictive cleanup standard, actual concentrations remaining at the properties after cleanup meet the current cleanup criteria for unrestricted use. Therefore, no residential or municipal vicinity properties are included in the scope of this decision document; all have been addressed by prior actions. Residential streets assumed to be underlain by contaminated soil are included with other inaccessible soils in the commercial / government property unit. These properties will be addressed in a future FMSS ROD.

In July 2001, the USACE published the *Engineering Evaluation/Cost Analysis for a Removal Action in Support of NJDOT Roadway Improvement Projects at the FUSRAP Maywood Superfund Site (FMSS)* for public comment. The Action Memorandum was approved in November 2001. This removal action was initiated in January 2002. During cleanup actions on these properties, additional properties were remediated if the contamination extended onto an adjacent undesignated property. With the implementation of this ROD, the removal action will be transitioned into this remedial action. Several Soils and Building OU properties addressed by this ROD were previously remediated through this EE/CA.

The first OU, the subject of this ROD, addresses the contaminated soils and buildings at the 24 remaining properties of the original 88 designated properties (see **Figures 1 and 2**). These properties are the MISS, Stepan Company, and 22 commercial and government properties. Included in the remediation are the contaminated buildings on the Stepan Company property and the MISS that meet the definition of FUSRAP waste. Several of these properties are known or suspected to have contaminated soils under permanent structures such as buildings. These soils are considered inaccessible and will be addressed at such time in the future as the property owners make these soils accessible.

Table 1 lists all designated properties, types of property, and current cleanup status. The contamination present at the FMSS poses a potential risk to human health because the EPA acceptable risk range and concentrations specified in the site-specific cleanup criteria are exceeded. In accordance with CERCLA requirements, implementation of the remedy described in this ROD addresses the remaining soils and buildings contaminated with FUSRAP waste at the FMSS. Implementation of this remedy will address a principal threat at the site through removal and off-site disposal of contaminated soils and bulk wastes considered to be 11(e)2 byproduct materials.

The second OU, the subject of a future ROD, will address potential FUSRAP contamination in the groundwater aquifer. The USACE is currently preparing the RI.

The third OU, the subject of a future ROD, is being addressed by Stepan Company for non-radiological, non-FUSRAP-related chemical contamination on Stepan Company property and on adjoining properties under both an administrative order on consent and an administrative order. Although the USACE and Stepan Company are independently preparing decision documents, the EPA is overseeing and coordinating all three actions.

E. DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the FMSS was released for public comment in August 2002. The Proposed Plan identified Alternative 4, Excavation, Treatment, and Off-site Disposal, as the Preferred Alternative for the Soils / Building OU. At the time of the public comment period, the results of the Draft Treatment Demonstration Report had not been completely evaluated, although one of the treatment technologies initially demonstrated some potential for volume reduction in off-site disposal of the FMSS waste material. The completion of this Draft Treatment Demonstration Report allowed a more complete evaluation and comparison of these results.

The Draft Treatment Demonstration Report, dated February 2003, evaluated two volume reduction technologies for radionuclide-contaminated soils, the radiological soil sorter (RSS) and the gravel separation system (GSS). The radiological soil sorting system did not operate consistently and did not provide a high level of confidence in diverting "below criteria" soil to the correct pile. Due to the high level of false negatives realized during the Demonstration, it was determined that this technology would not be effective for use at the FMSS. Studies of the FMSS soils indicate that the radiological contamination is associated with the fine particles (< 3/8-in). The GSS, consisting of a series of sieves and a rinsate system, produced a product that was consistently below the cleanup criteria for the MISS, 15 pCi/g, and thus was successful from a technical standpoint. However, the full-scale GSS was not considered implementable at the FMSS due to space limitations at the MISS for multiple stockpile areas, a large rinsate tank, additional water treatment equipment, backfill blending, and continuous re-use area availability. The GSS was not effective at the FMSS for pond sediment waste at the MISS or other wetland, organic or clayey materials that would be encountered. Use of the full-scale GSS is not considered cost-effective unless 750 cubic yards (yd^3) of material can be processed per day. Due to the volume of non-processible material that will be encountered and the nature of the excavation operations, this would be impossible to achieve. In addition, based on the above conditions, it is likely that full-scale implementation of the GSS would extend the length of time required for remediation of the FMSS. As a result of these findings, Alternative 4 was no longer considered a viable alternative for remediation of the FMSS.

The vast majority of commenters were opposed to the Preferred Alternative, Alternative 4 (Excavation, Treatment, and Disposal), and were in favor of Alternative 3 (Excavation and Disposal). The commenters opposed the reuse of treated soil on the MISS. In addition, the commenters were concerned with potential noise and particulate releases from the operation of the treatment unit. Based upon the strong public sentiment against treatment and the infeasibility of treatment, USACE determined that a change to the remedy, as originally described in the Proposed Plan, was appropriate.

F. SITE CHARACTERISTICS

F.1 Conceptual Site Model

Constituents identified as FUSRAP waste at the FMSS include soil and other media contaminated with radionuclides (Ra-226, Th-232, and U-238), metals, and rare earth metals.

The primary sources identified by the RI include: the burial pits on Stepan Company; former retention ponds on the MISS, 149-151 Maywood Avenue, and 96 Park Way; and the former location of the thorium processing building on the northeast corner of the MISS. The principal migration pathways are groundwater, surface water, and air. **Figure 3** presents a conceptual model of release mechanisms and transport in the environment.

F.2 Surface and Subsurface Features

The surface and subsurface features for the FMSS are described below.

F.2.1 Topography, Drainage, and Surface Water

The FMSS is located in the glaciated section of the Piedmont Plateau of north-central NJ. The terrain is generally level, with highs and lows created by occasional low mounds and shallow ditches. Elevation ranges from 15 to 20 meters (51 to 67 feet) above mean sea level. The surface slopes gently to the west and is poorly drained.

The FMSS lies primarily within the Saddle River drainage basin. The MISS is located about 0.8 kilometers (0.5 miles) east of the Saddle River, which is a tributary of the Passaic River, and about 1.6 kilometers (1 mile) west of the drainage divide of the Hackensack River basin. Rainwater runoff from most of the MISS empties into the Saddle River through Westerly Brook, which flows under the property and under NJ State Route 17 through a concrete culvert. It eventually empties into the Saddle River. Neither the Saddle River nor Westerly Brook is used as a source of potable water.

Another perennial stream on the FMSS, Lodi Brook, originates as two branches on the 149-151 Maywood Avenue property. Because of construction, most of the original stream channel has been replaced by a storm drain system beneath the surface. The original stream channel has been determined from old photographs and maps. The former channel pathways basically match the distribution of contaminated materials in the Borough of Lodi. Contaminated materials were transported from the MISS via sediment deposition. A structure and parking lot at 149-151 Maywood Avenue currently cover the western branch of Lodi Brook. The easternmost branch drains the surface area outside the fence on this property and then flows underground for most of its route to the Saddle River. Some surface runoff from the MISS moves parallel to NJ State Route 17 and drains into Lodi Brook. Lodi Brook empties into the Saddle River, downstream of the Westerly Brook confluence with the Saddle River. The 111 Essex Street property lies adjacent to Coles Brook. Coles Brook flows north-northeast and is part of the Hackensack River basin. This remedial action will include excavation along these stream channels.

F.2.2 Geology / Soils

Unconsolidated material overlying the weathered bedrock consists of sands, silts, and clays deposited as a result of glaciation during the Pleistocene time period. The thickness of unconsolidated sediments varies over the FMSS. Bedrock is within 15 cm (6 in) of the surface near the northern end of the Stepan Company property where there is a pronounced bedrock high.

The overburden reaches a maximum thickness of over 7.5 meters (25 feet) in a downcut channel on the MISS property.

Unconsolidated deposits are loosely divided into three groups at the FMSS:

- A lower unit of fine-grained sands and silts with occasional coarse gravels and sands.
- A middle unit of clays and silts with occasional organic-rich soil horizons.
- An upper unit of undifferentiated sands and silts, which is much disturbed by urban development.

Historically, the glacial deposits in the vicinity of the FMSS were capped with a well-developed deciduous forest soil. Extensive agricultural and urban development has disturbed much of the original soil, and most of the current soil cover is classified as urban fill

F.2.3 Buildings / Structures and Miscellaneous Debris

Contaminated buildings are located on the Stepan Company property (Buildings Nos. 1 and 78), and on the MISS (Building No. 76). Contaminated soils are known or suspected to be located beneath many of the non-contaminated permanent buildings and structures located on Stepan Company.

Thirteen (13) buildings on the Stepan Company property and the MISS appear eligible for the National Register of Historic Places as a district based on their architectural merit. Several of these 13 buildings will require interior decontamination; the decontamination is not expected to adversely affect the character of the buildings. For this reason, no adverse effects to the buildings are expected as a result of the remedial action described in this ROD.

Buried drums commingled with radiological waste are located on the 149-151 Maywood Avenue property. The drums are believed to be in poor condition.

F.3 Sampling Strategy

Investigation activities were performed throughout the FMSS to meet the goals of the RI and further define the FS. The activities centered on collecting data and compiling information regarding surface features, contaminant sources, surface water and sediments, and hydrogeology. The investigations were initiated in the early 1980s and continued into 2001.

Surface feature investigations concentrated on aerial photographs, topographic maps, owner drawings (where available), and eyewitness accounts. Additional investigations performed included a ground-penetrating radar survey of Burial Pits 1 and 2 at Stepan Company and portions of two commercial properties.

Contaminant source investigations were performed on soils, groundwater, and air to evaluate potential waste source(s) and to further characterize radiological, chemical, and physical characteristics of materials within various media at the FMSS. These included radiological investigations using near-surface gamma radiation surveys, surface and subsurface soil sampling

with on- and off-site laboratory analyses, downhole gamma-logging, radon measurements, and gamma exposure rate measurements. In addition, building surveys at the Stepan Company and the MISS properties are currently ongoing.

Chemical investigations were performed on the soils of various properties to determine whether waste would be characterized as Resource Conservation and Recovery Act-hazardous upon removal, and whether chemical contamination existed that met the FFA definition of FUSRAP waste.

Surface water / sediment investigations were performed to determine whether radioactive or chemical contaminants originating at the MISS are migrating into (and being transported off-site by) the current surface water flow system, via Lodi and Westerly Brooks, and to determine any impact of waters from the MISS on the surface waters in the vicinity.

The hydrogeologic investigation was conducted to further define the groundwater system at the MISS and to provide additional data to supplement previous investigations. Sampling and analysis of groundwater were conducted under the groundwater RI to investigate the nature, extent, and concentrations of contaminants present in the groundwater and their potential for migration from the MISS. Groundwater is considered a separate OU at the FMSS. USACE is conducting a separate RI/FS for groundwater.

F.4 Nature and Extent of Contamination

This summary of the nature and extent of (FUSRAP) contaminated material by property unit is based on Section 4 of the RI performed by DOE and the Pre-Design Investigation performed by USACE to focus on the nature and extent of FUSRAP waste present at the FMSS. Stepan Company is conducting a separate RI/FS, which focuses on non-FUSRAP chemical contamination known to be present at the site.

F.4.1 Radionuclide Contamination

Table 2 presents a summary of the radiologically-contaminated soils and building surfaces at the FMSS; **Table 3** summarizes the volume of FUSRAP waste material estimated to require remediation based on either unrestricted or restricted use cleanup criteria. **Table 3** also provides an estimate of the volume of soils under existing buildings; these soils are termed “inaccessible” and will be remediated at such time in the future as the building owners make these soils accessible.

Figures 4 and **5** depict radiological contamination at the FMSS based on radiological sample data. **Figure 4** presents the expected areas of the FMSS exceeding the restricted use criteria. **Figure 5** presents the expected areas exceeding the unrestricted use criteria. Applying the property-specific cleanup criteria, the contamination at the FMSS ranges from shallow surface contamination (top 15.2 cm [6 in]) to depths of up to 6.4 m (21 feet). In some areas, such as the retention ponds and former thorium-processing areas on the MISS, contamination is present in varying concentrations from surface to depth. In other cases, construction activities have placed clean fill material over contaminated soils and sediments (e.g., downstream of the MISS where

the former bed of Lodi Brook was enclosed in a culvert and developed); in these cases, thin lenses of contamination may be present under several feet of uncontaminated soil.

The principal migration pathways were described under Section II.F.1, "Site Conceptual Model." Although sediment and windblown transport were historically migration pathways, results of the environmental monitoring program indicate this is no longer the case. Grass, other thick vegetation, paving, or structures cover the majority of the properties, and Lodi Brook is almost entirely contained by a culvert. Therefore, surface water transport and air re-suspension are not identified as likely current pathways for migration unless these "covers" are disturbed.

Building contamination at the FMSS is limited to relatively low levels of fixed contamination on small areas of walls and floors in a number of buildings on the Stepan Company property and the MISS.

F.4.2 Chemical or Non-Radiological Contaminants Associated with the Thorium Manufacturing or Processing Activities

The terms of the FFA clearly assign responsibility for all radiological contamination at the FMSS and all radiological and chemical contamination at the MISS to the DOE. (The USACE is now the lead Federal agency for the implementation of response actions at this site pursuant to the Energy and Water Development Appropriations Act of 1998, Pub. L. No. 105-62, 111 Stat. 1320, 1326 (1997), and subsequent Energy and Water Development Appropriations Acts. The USACE is implementing the commitments assigned to the DOE under the FFA.) However, the FFA limited the DOE responsibility for chemical contaminants unless commingled with radioactive contamination above the cleanup criteria. The DOE responsibility for chemical contamination outside the areas of radiological contamination (on properties other than the MISS) was limited by the FFA definition of FUSRAP waste to chemicals that are determined to have originated from the MISS, or are associated with the specific thorium manufacturing or processing activities at the MCW that resulted in the radiological contamination.

In order to determine the chemicals for which DOE had cleanup responsibility under the FFA, both the chemicals associated with the source materials and the source material processing were evaluated. The hazards posed by chemical contaminants associated with either monazite sands or thorium production at MCW at the FMSS were estimated to be at least an order of magnitude less than the hazards posed by radioactive contaminants at the FMSS. The radioactive contaminants pose both potential carcinogenic and non-carcinogenic health effects; principal risks are calculated to be carcinogenic risks from direct gamma and radon exposure from contaminated soils. The contaminants are bound to fine soil particles, have low solubility, and are relatively immobile in the environment unless disturbed from their current configuration.

No non-radiological contamination inside the buildings is required to be responded to by USACE.

G. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

The FMSS is located in three communities: the Borough of Maywood, the Borough of Lodi, and the Township of Rochelle Park. The Borough of Maywood is governed by a mayor and council, as is the Borough of Lodi. The Township of Rochelle Park is managed by a township committee, which includes the mayor as one of its members. **Figure 6** shows the zoning boundaries for the FMSS properties.

G.1 Current Land Use

Land use planning is guided principally by Municipal Land Use Law (Chapter 291, Laws of New Jersey, 1976) which requires that every 6 years, municipalities will re-examine and update their Master Plan and development regulations. It establishes rules, regulations, and procedures for creating municipal planning and zoning boards. It also provides these boards with guidelines for creating zoning ordinances, master plans, and other planning tools. The Borough of Maywood Master Plan was last revised in 1995, the Borough of Lodi Master Plan was last revised in 1994, and the Township of Rochelle Park Master Plan was last revised in 1997. Current land use of the FMSS properties is given in **Table 4**.

G.1.1 Borough of Maywood

Land use at the MISS, Stepan Company, and the 14 vicinity properties located in the Borough of Maywood is currently zoned for limited light industrial activities, except for a small strip of land adjacent to Maywood Avenue that is zoned for residential use (**Figure 6**). Industrial land uses comprise about 9% of the total land area of the Borough of Maywood, and includes four districts zoned limited light industrial. This classification permits light manufacturing operations as well as the related functions of processing, wholesaling, warehousing, and storage of goods.

G.1.2 Borough of Lodi

Land use on the eight vicinity properties located in the Borough of Lodi is currently zoned for commercial and industrial use (**Figure 6**). Commercial and industrial land uses comprise about 15% and 13%, respectively, of the total area of the Borough of Lodi. These vicinity properties are contained within defined commercial and industrial land use areas. However, many properties are located immediately adjacent to residential or recreational use areas. The commercial use classification in Lodi permits smaller commercial buildings, convenience stations, planned shopping centers, auto-related establishments, retail stores, and restaurants. The industrial use classification permits food processing and manufacturing, automotive-related uses, communications, and a variety of light manufacturing, office, and warehouse uses.

G.1.3 Township of Rochelle Park

Land use for the portion of the MISS, Stepan Company, and the 149-151 Maywood Avenue property that are located in the Township of Rochelle Park are currently zoned for industrial use **(Figure 6)**. The commercial and industrial land uses comprise about 17% of the

total land area of the Township of Rochelle Park. This classification permits retail trade and service establishments, eating and drinking establishments, business and professional facilities, banks and financial institutions, municipal buildings and facilities, child-care centers, storage, warehouses, truck terminals, and light manufacturing.

G.2 Future Land Use

Reasonably anticipated future use of the land at the FMSS is an important consideration in determining the appropriate extent of remediation. Future use of the land will affect the types and the frequency of exposures that may occur from any residual contamination remaining on the FMSS, which in turn affects the nature of the remedy chosen. The factors used to determine the reasonably anticipated future land use were as follows:

- Current land use
- Reasonable foreseeable future land use
- Comprehensive community master plans
- Population growth patterns and projections (e.g., Bureau of Census projections)
- Institutional controls currently in place
- Site location in relation to urban, residential, commercial, industrial, agricultural, and recreational areas
- Federal / State / local land use designation
- Historical development patterns

These criteria were used to evaluate the Soils / Buildings OU properties addressed by this ROD in the Boroughs of Maywood and Lodi and the Township of Rochelle Park as discussed below.

G.2.1 Borough of Maywood

Historically, the southern area of the Borough of Maywood has been zoned for light industrial use, and continues to experience an increase in population. The Maywood Master Plan has a well-defined industrial development area and the properties addressed by this ROD are all located inside that zone. The New York, Susquehanna, and Western Railway separate this light industrial area from a mixture of residential, commercial, and light industrial properties to the north, Interstate 80 to the west, Essex Street to the south, and Maywood Avenue to the east. The Maywood Master Plan recommends maintaining the light industrial zoning classification for all properties except for the MISS, where a commercial, high rise zoning designation has been recommended.

From 1970 to 1990, the total population in the Borough of Maywood, and Bergen County as a whole, declined, and then experienced a slight population increase from 1990 to 2000. This 20-year period of population loss has been attributed to a decrease in household size rather than emigration. The Borough of Maywood is a community that is 98% developed, with very little vacant or unused land. However, there is vacant land in other parts of Bergen County, allowing for some growth in the county. A review of population characteristics and development projects within the area has indicated a generally stable Borough population through 2000. The July 1998 Census Bureau population estimate for Bergen County is 858,529, a 4% increase since

1990. This same report estimates the population for the Borough of Maywood at 9,694, a 1.7% increase since 1990. Because of this, no major increase in demand for additional housing is anticipated.

No cultural resources, environmental justice issues, wetlands, floodplains, or critical habitats of endangered or threatened species have been identified that would impact the current limited light industrial zoning.

G.2.2 Borough of Lodi

The remaining Borough of Lodi contaminated vicinity properties have historically been zoned commercial and industrial. The Borough of Lodi Master Plan has well-defined commercial and industrial development areas. The Master Plan recommends maintaining the current land uses for all properties.

From 1970 to 1990, the total population in the Borough of Lodi, and Bergen County as a whole, declined, and then experienced a slight population increase from 1990 to 2000. According to the 2000 Decennial Census, population for the Borough of Lodi is 23,971, a 7.2% increase from the 1990 figure of 22,355 (www.census.gov). Because the population of much of the surrounding area is expected to remain stable, no major increase in demand for additional housing is anticipated.

No cultural resources, environmental justice issues, wetlands, floodplains, or critical habitats of endangered or threatened species have been identified that would impact the current commercial or industrial zoning.

G.2.3 Township of Rochelle Park

The Township of Rochelle Park Master Plan has well-defined commercial and industrial development areas. The Master Plan recommends maintaining the current land uses for all FMSS properties.

From 1970 to 1990, the total population in the Township of Rochelle Park, and Bergen County as a whole, declined. According to the 2000 Decennial Census, the population of the Township of Rochelle Park is 5,528, a 1.1% decrease from the 1990 figure of 5,5,87 (www.census.gov). Because the population of much of the surrounding area is expected to remain stable, no major increase in demand for additional housing is expected.

No cultural resources, environmental justice issues, wetlands, floodplain, or critical habitats of endangered or threatened species have been identified that would impact the current industrial zoning.

G.2.4 Reasonably Anticipated Future Land Use and Selection of Cleanup Criteria

Reasonably anticipated future land use and recommended cleanup criteria for individual properties are listed on **Table 4**.

G.3 Groundwater and Surface Water Uses

Much of the former surface water drainage patterns responsible for the spread of contamination at the FMSS have now been re-channeled and placed in culverts. Rainwater runoff from most of the MISS empties into the Saddle River via Westerly Brook, which flows under the property and under NJ State Route 17 through a concrete culvert. It eventually empties into the Saddle River. Neither the Saddle River nor Westerly Brook is used as a source of potable water.

Another perennial stream on the FMSS, Lodi Brook, originates as two branches on the 149-151 Maywood Avenue property. Because of construction, most of the original stream channel has been replaced by a storm drain system beneath the surface. The original stream channel has been determined from old photographs and maps. The former channel pathways match the distribution of contaminated materials in the Borough of Lodi. A structure and parking lot at 149-151 Maywood Avenue currently cover the western branch of Lodi Brook. The easternmost branch drains the surface area outside the fence on this property and then flows underground for most of its route to the Saddle River. Some surface runoff from the MISS moves parallel to NJ State Route 17 and drains into Lodi Brook. Lodi Brook empties into the Saddle River downstream of Westerly Brook's confluence with the Saddle River. The 111 Essex Street property lies adjacent to Coles Brook. Coles Brook flows north-northeast and is part of the Hackensack River basin. Additional information on topography, drainage, and surface water at the FMSS is presented in the RI, Sections 3.1 and 3.3.

Surface water at the FMSS is not currently impacted by site radiological contaminants, nor is a future impact expected. This is due to the relatively immobile nature of the contaminants and the stable configuration of the contaminated soils (areas are either paved, grassed, wooded, or covered by buildings and other structures that limit the transport of contaminated soils by surface waters). Current surface water use is not projected to change significantly in the future.

Groundwater at the FMSS occurs in both the bedrock Passaic Formation and the unconsolidated glacial deposits. The Passaic Formation, classified as Class II-2, is a productive aquifer that is a major source of water for public and industrial use. However, groundwater is generally not used for municipal water supply in the lower Saddle River Basin, and the bedrock aquifer in the vicinity of the site is not currently used for drinking water or other domestic use.

Groundwater is outside the scope of this remedial action; additional characterization is pending to determine the source of contaminants detected in groundwater.

H. SUMMARY OF SITE RISKS

The BRA estimates what risks the FMSS poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for the FMSS. A BRA was prepared to evaluate risk to human health and the environment from the radioactive and chemical constituents at the FMSS. This BRA was prepared to address the entire FMSS and, therefore, calculated risks from data that included groundwater, inaccessible soils, and the burial pits. Groundwater is excluded from the

evaluation of alternatives for remedial action in this ROD and will be addressed later outside the scope of this ROD.

H.1 Human Health Risk Assessment

The BRA examines both radioactive and chemical contamination, including the determination of projected central tendency (mean) and reasonable maximum exposure (RME) (upper 95% confidence limits) to individual and population risks. DOE conducted the BRA in 1993 in accordance with EPA Risk Assessment Guidance for Superfund (RAGS).

Since completion of the BRA, some volume estimates and other data have been refined using additional monitoring data and further analysis. This additional data and analysis did not affect the BRA conclusions that sufficient risk above the NCP threshold of protectiveness of 10^{-4} to 10^{-6} existed, and that a remedial action was warranted; therefore the BRA was not revised.

Information on the sampling and analyses performed for the FMSS is presented in the RI report. These data and those drawn from historical reports were used to select chemicals and radionuclides of potential concern for detailed evaluation, primarily on the basis of a comparison of FMSS concentration with mean representative background and the known or suspected toxicological or radiological properties of the compounds.

H.1.1 Identification of Contaminants of Concern (COC)

The COCs on the FMSS properties are Th-232, Ra-226, U-238, and their associated decay products.

H.1.2 Exposure Assessment

Figure 3 presents a conceptual site model of environmental transport media and principal exposure routes for contaminated soil the FMSS.

Radiological exposure rates and doses were calculated using the RESidual RADiation computer modeling system (RESRAD) computer code. Inhalation of radon progeny was estimated using the methodology of United Nations Scientific Committee on the Effects of Atomic Radiation. Doses from measured radon and gamma levels were substituted for modeled doses where available.

Surface soil statistical data were used as the exposure point concentration for all scenarios. All current land-use scenarios assumed an adult receptor.

Table 5 presents the radionuclide COCs and exposure point concentrations for each detected in soil (i.e., the concentration that will be used to estimate the exposure risk from each radionuclide COC in the soil). The table includes the range of concentrations detected for each, the exposure point concentration, and how the exposure point concentration was derived.

Risk estimates are presented for current-use and future-use scenarios for human receptors at the FMSS. Human receptors include residents, employees, and transients (e.g., visitors,

customers, trespassers, and commuters). The principal potential adverse health effect from human exposure to radioactivity is an increased lifetime risk of developing cancer. Radionuclides are not believed to present significant non-cancer toxicity except for uranium, which exhibits kidney toxicity similar to that of other heavy metals. As a result, any non-cancer risk calculated in the DOE BRA is related solely to chemical contamination.

The current use scenario assesses risk for current land uses, but assumes somewhat more exposure than actually occurs at the site for this land use. This is a conservative procedure to minimize the potential that risks will be understated or underestimated. None of the properties addressed in the FS are currently used for residential uses. Existing land uses are commercial or industrial, and the populations for these current land use scenarios are employee and transient. Some properties at the site have both employee and transient populations, in which case only the population having the greater risk is discussed.

Three different populations relating to the land use scenarios were considered for some properties addressed in this ROD: employee, resident, and transient. Both employee and transient populations were evaluated for the FMSS properties addressed in this ROD. As for the current land use scenarios, both mean ("central tendency") and RME risks were assessed.

H.1.3 Toxicity Assessment

Cancer risk from radionuclides was estimated using the RESRAD code. The code uses the RAGS methodology to estimate risks from the uptake of radionuclides and the exposure to external gamma radiation over time. In addition to providing results consistent with the basic RAGS methods, RESRAD supplements RAGS by considering the following:

- Decay and ingrowth of radionuclides over time.
- Physical removal of radionuclides (erosion, leaching, etc.) over time.
- Radiation shielding from material used as clean cover.

RESRAD uses cancer slope factors tabulated in the EPA's Health Effects Assessment Summary Tables (HEAST). This is an EPA database on toxicity values that are not available in the Integrated Risk Information System (IRIS), which is the EPA's primary source of human health toxicity values, and it lists risks over time so that an assessor may select the year of maximum exposure.

Risk and dose for Alternative 1 are from the BRA. Estimated risk and dose from Alternative 2 were based on institutional controls being implemented to preclude human exposures to site soils in excess of the FS's soil cleanup criteria.

To estimate risks and dose from Alternatives 3 and 4, input parameter values and soil concentrations presented in Appendix C of the FS were entered into the RESRAD model. Other scenario-specific information such as exposure pathways and possible cover depths were entered and the model was executed to provide final risk estimates.

H.1.4 Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

where: risk = a unitless probability (e.g., 2×10^{-5}) of an individual's developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as $(\text{mg/kg-day})^{-1}$.

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the RME estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all sources is greater than 1 in 3. The NCP identifies cancer risks of 10^{-4} to 10^{-6} as protective for site-related exposures for Superfund sites.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. A RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). A HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemicals of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. A HI<1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. A HI>1 indicates that site-related exposures may present a risk to human health. The HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI}/\text{RfD}$$

where: CDI = Chronic daily intake
RfD = reference dose.

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Radionuclides are not believed to present significant noncancer toxicity except for uranium, which has toxicity similar to heavy metals like lead. As a result, any noncancer risk calculated in the DOE BRA related solely to chemical contamination.

Estimated radiological risks for each alternative and receptor are summarized in **Tables 6** and **7**. Results are compared to the 15 mrem/yr dose limit and the CERCLA target risk range of 10^{-4} to 10^{-6}. Only Alternative 1 is not protective of human health given the ARAR dose criteria and the CERCLA risk range.

The results of the radiological risk assessment for the FMSS are presented in **Table 6**.

The results of the radiological dose assessment for the FMSS are presented in **Table 7**.

H.1.5 Uncertainties in Risk Estimates

Uncertainties attributable to the numerous assumptions incorporated in the risk estimations are inherent in each step of the risk assessment process, as discussed in detail in the BRA. Such areas of uncertainty include identification and characterization of all COCs in all media of interest, exposure scenario and intake parameter assumptions, characterization of environmental fate and transport of constituents and resultant exposure pathways and routes, and the dose conversion factors and risk estimators used in the assessment. Limited toxicity data available for chemical constituents prevented the quantitative consideration of some potential COCs. However, most of the assumptions listed in the BRA were deliberately selected to provide conservative estimates of risk (i.e., they tend to overestimate rather than underestimate potential risks). Therefore, actual risks are expected to be lower than those presented in the assessment.

H.2 Ecological Risks

An ecological risk assessment was conducted to evaluate potential effects from contamination at FMSS. The FMSS has an urban wildlife habitat and biotic diversity. The ecological assessment compared contaminant concentrations detected in various media (soil, sediment, and water) at the site with literature on contaminant toxicity to biota. Since non-urban habitats are likely in the future, and since remedial action will likely remove contaminated soils to depths affecting ecological resources, the ecological assessment concluded that cleanup criteria for the remedy should not be based on potential risks to ecological resources.

H.3 Baseline Risk Summary

Results of the BRA for the FMSS indicate that exposure to FMSS constituents under current and hypothetical future land use scenarios may result in unacceptable risks to human and ecological receptors, unless FMSS remediation is undertaken including cancer risks above the NCP protective range of 10^{-4} to 10^{-6}. The response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

I. REMEDIAL ACTION OBJECTIVES

The general remedial action objectives (RAOs) for the FMSS are to prevent or mitigate further release of FUSRAP waste to the surrounding environment and to meet the established

cleanup criteria and comply with ARARs. Pursuant to CERCLA, the FMSS RAOs were developed by considering the COCs, associated media, potential exposure pathways and receptors (Section G), ARARs (Section J.2.1), and other preliminary remediation goals. Media-specific RAOs for the FMSS were developed considering the probable pathways for impact on public health and the environment. In addition to reducing the radioactive COCs to the remediation cleanup criteria, RAOs also include the elimination or minimization of the potential for humans to ingest, come into dermal contact with, or inhale particulates of radioactivity. In general, mitigation of the exposure pathways of concern identified in the BRA is the framework for media-specific RAOs, which are identified in **Table 8**.

In establishing RAOs for radionuclides in soil and the NRC-licensed burial pits on Stepan Company property, it was determined that, at a minimum, the objective must meet the requirements of the site-specific criteria established by DOE and EPA in the 1994 dispute resolution agreement as well as the standards of NJAC 7:28-12.8(a)1, which are identified as an ARAR. In establishing RAOs for contaminated buildings, it was determined that, at a minimum, the objective must meet the requirements of NJAC 7:28-12.8(a)1, which is identified as an ARAR. Demonstrating compliance with this ARAR may require additional data collection and a site-specific exposure assessment.

J. DESCRIPTION OF ALTERNATIVES

The FS was prepared to develop and evaluate remedial alternatives (cleanup options) for the Soils / Building OU based on the RI results. Although the RI identified and evaluated conditions on 88 designated properties, only the remaining 24 designated properties are assessed in the FS. The other 64 properties have been addressed under interim removal cleanup actions (removal actions). Four cleanup alternatives were developed in the FS. Per the EPA FS guidance, the cost estimates assume a 30-year performance period for ongoing actions such as monitoring and maintenance. As discussed in Section E, the treatment technology is no longer a viable alternative, therefore Alternative 4 has been deleted.

J.1 Description of Remedy Components

Alternative 1, No Action, was developed and evaluated to provide a baseline for comparison of the other alternatives evaluated. Under this alternative, there would be no further action taken at the FMSS, and existing access restrictions, maintenance, and monitoring activities would be discontinued. Five-year reviews in accordance with the NCP and 40 CFR 300.430(f)(4)(ii) would be performed. These reviews are required by CERCLA regulations whenever a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use of the property and unrestricted exposure. The purpose of the 5-year review is to ensure that human health and the environment are being protected.

- **Treatment Components**
  No treatment components are incorporated under the No Action Alternative.
- **Containment or Storage Components**
  No containment or storage components are incorporated under the No Action Alternative.

- **Land Use Control Components**
  No land use control components are incorporated in the No Action Alternative [other than 5-year reviews as required by the NCP (40 CFR 300.430(f)(4)(ii))].

Alternative 2, Monitoring and Institutional Controls, would involve maintaining or reducing the current status of some of the properties at the FMSS, including periodic monitoring to detect any changes in the nature or extent of contamination at the FMSS.

- **Treatment Components**
  No treatment components are incorporated under Alternative 2.
- **Containment or Storage Components**
  Alternative 2 uses the existing containment features provided by soil and vegetative cover, paving, and buildings at the FMSS; no additional containment or storage components are incorporated under Alternative 2.
- **Land Use Control Components**
  A Land Use Control Implementation Plan (LUCIP) will be a component of the site Operational and Maintenance (O&M) Plan to be developed by the USACE in coordination with owners, occupants, EPA, NJDEP, municipalities, utility companies, and other interested parties to establish a layered program of controls, including monitoring to ensure integrity and allow for adjustments. The LUCIP will be submitted with the Remedial Design or Remedial Action Plans for the site remedy. Land use components incorporated under Alternative 2 include:
  - Continuing existing access restrictions at the MISS.
  - Maintaining existing cover materials including grass, building foundations, and asphalt.
  - Periodically inspecting all the properties to determine any changes in land use.
  - Obtaining deed restrictions on a property by property basis, as necessary, to prohibit changes in land use (e.g., from commercial/industrial to residential/unrestricted) or construction in contaminated soils.
  - 5-year reviews as required by the NCP [40 CFR 300.430(f)(4)(ii)].

Alternative 3, Excavation and Disposal, would involve removing contaminated soil and buried bulk waste above the appropriate cleanup criteria defined for each property in **Table 3**. Accessible soils are defined as soils that are not located under permanent structures, such as buildings and active roadways. Soils under sidewalks, parking lots, and other non-permanent structures are considered accessible, unless their removal would compromise the integrity of a permanent structure, such as a building foundation, roadway, railways, or utility corridor. Soils above the identified cleanup criteria would be excavated and shipped off-site to a disposal facility permitted or licensed to receive the specific materials being shipped. Clean soil would be used for backfill to grade as necessary.

Physical separation, using backhoes or other heavy construction equipment, of a portion of the excavated material would be done at the MISS to sort from soils requiring disposal as

radioactive waste boulders and rocks, materials potentially requiring disposal as mixed wastes, and bulk waste such as building rubble. The boulders, rocks and construction debris could be used on-site as backfill or shipped off-site to a disposal facility permitted or licensed to receive the specific materials being shipped.

Contaminated buildings would be decontaminated or demolished, as necessary to meet the criteria of 15 mrem/yr as required by NJAC 7:28-12.8(a)1. The NRC-licensed burial pits on Stepan Company will be remediated in compliance with NJAC 7:28-12.8(a)1 and 10 CFR 20.1402.

Inaccessible soils currently located under buildings and roadways would be excavated and disposed off-site as they become accessible in the future (e.g., due to renovation or demolition activities). Radon would be monitored in buildings with inaccessible soils remaining beneath them to ensure compliance with the radon limit specified in NJAC 7:28-12.8(a)2. If radon levels exceed 3 pCi/L above background at some point in the future, mitigation (e.g., sealing foundation cracks, supplementing existing ventilation systems, etc.) would be performed to return radon levels to below 3 pCi/L above background.

- **Treatment Components**
  No treatment components are incorporated under Alternative 3.

- **Containment or Storage Components**
  Alternative 3 uses the existing containment features provided by buildings and road and railroad beds at the FMSS to contain inaccessible soils until such time as they become accessible for remediation at the FMSS. At that time, the soils would be excavated and disposed off-site. No additional containment or storage components are incorporated under Alternative 3.

- **Land Use Control Components**
  A LUCIP will be a component of the site O&M Plan to be developed by the USACE in coordination with owners, occupants, EPA, NJDEP, municipalities, utility companies, and other interested parties to establish a layered program of controls, including monitoring to ensure integrity and allow for adjustments. The LUCIP will be submitted with the Remedial Design or Remedial Action Plans for the site remedy. Land use components incorporated under Alternative 3 include:

  – Periodically inspecting all the properties where soils remain above cleanup criteria for unrestricted use to determine any changes in land use;

  – Obtaining deed restrictions on a property by property basis, as necessary, to prohibit changes in land use (e.g., from commercial/industrial to residential/unrestricted) or construction in contaminated soils; and

  – 5-year reviews as required by the NCP [40 CFR 300.430(f)(4)(ii)].

J.2 Common Elements and Distinguishing Features of Each Alternative

J.2.1 Applicable or Relevant and Appropriate Requirements (ARARs)

Cleanup alternatives developed under CERCLA must comply with ARARs or establish the basis for an ARAR waiver. ARARs are promulgated Federal environmental, State environmental, facility siting laws, or regulations that specifically address the hazardous substances or circumstances of their release at a CERCLA site, or that address situations sufficiently similar to those encountered at a CERCLA site that their use is suited to a particular site.

Radionuclides in soil on the FMSS will be remediated to the criteria of 15 mrem/yr above background in compliance with NJAC 7:28-12.8(a)1.

The NRC-licensed burial pits on Stepan Company will be remediated to the criteria of 15 mrem/yr above background in compliance with NJAC 7:28-12.8(a)1 and 10 CFR 20.1402.

In a letter addressed to Envirocare of Utah, Inc., dated September 20, 2001, the NRC changed its position on the status of the radiologically contaminated soils located at the FMSS. In response to the change, USACE evaluated whether to add 10 CFR Part 40 as an ARAR, and determined that a cleanup in accordance with the EPA / DOE Dispute Resolution cleanup criteria, 10 CFR 20.1402 (for the Stepan Company NRC-licensed burial pits), and the substantive standards of NJAC 7:28-12.8(a)1 and 2, would provide a level of health and safety protection equivalent to the substantive requirements of 10 CFR Part 40, Appendix A, Criterion 6(6). As a result, a corresponding change to the ARARs was not necessary. Radiologically contaminated soil sent off-site for disposal will be treated as 11(e)(2) byproduct materials. As used here, 11(e)(2) byproduct material means the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

Contaminated buildings will be remediated to the criteria of 15 mrem/yr above background in compliance with NJAC 7:28-12.8(a)1. If contamination on building surfaces results in Rn-222 exceeding 3 pCi/L above background, appropriate remediation will be undertaken. Radon at the FMSS has been monitored and has not exceeded the 3 pCi/L above background level. The government's long term monitoring of the effectiveness of the selected remedy would include monitoring of indoor air in those buildings with inaccessible soils remaining beneath them. If Rn-222 levels exceeded the 3 pCi/L above background level at some point in the future in buildings with inaccessible soils remaining beneath them, radon mitigation actions (e.g., sealing foundation cracks, supplementing existing ventilation systems, etc.) would be implemented to return Rn-222 levels to below 3 pCi/L above background.

J.2.2 Long-term Reliability of Remedy

The long-term reliability of Alternative 1, no action, is not acceptable. Contaminants remaining in soils could become accessible to members of the public under normal circumstances of excavation and property land use changes. Alternative 2, Monitoring and Institutional Controls, also presents questionable long-term reliability, as it relies heavily on institutional controls (e.g.,

deed notices) to prevent exposures over the long-term, and the radioactive contaminants will maintain their toxicity over many thousands of years. Alternative 3, which involves excavation and off-site disposal of contaminated soils, is considered to be very reliable over the long-term; however, Alternative 3 also includes some institutional controls (e.g., deed notices), but to a lesser extent than Alternative 2.

J.2.3 Quantity of Untreated Waste and Treatment Residuals to be Disposed Off-site or Managed On-site, and Degree of Hazard Remaining in such Material

The volume of contaminated material at each property is defined in **Table 3**, relative to both accessible and inaccessible soils, and the cleanup criteria for either unrestricted or restricted use. Under Alternatives 1 and 2, all of this material would remain in place. Under Alternative 3, the total volume of accessible soil above the cleanup criteria chosen for each property totals 227,174 yd^3 (in situ). Under Alternative 3, this material would be excavated and disposed off-site without treatment.

J.2.4 Estimated Times

Estimated times to complete remedial design and construction and reach remediation goals are shown in **Table 9**.

J.2.5 Costs

Table 10 provides a cost summary for each alternative.

J.3 Expected Outcomes of Each Alternative

Alternative 1 would not achieve remedial goals and is thus unacceptable. Alternative 2 would achieve remedial goals over the short-term, but due to the long-lived nature of the contaminants (many thousands of years) and the reliance on institutional controls (e.g., deed notices), it is doubtful that this alternative would remain protective over the long-term. Alternative 3 is expected to achieve remedial goals over both the short-term and long-term.

The area currently occupied by the MISS, Stepan Company, and 149-151 Maywood Avenue has been under industrial use for more than 100 years. The limitations on available industrial property in the area are likely to result in continued industrial use of these properties. Institutional controls (e.g., deed notices) will be implemented on these properties for any remaining inaccessible soils.

K. COMPARATIVE ANALYSIS OF ALTERNATIVES

The USACE and EPA selected the preferred alternative by evaluating each of the alternatives against nine criteria established by EPA. These criteria are described below.

The advantages and disadvantages of each of the alternatives were compared using the nine CERCLA evaluation criteria established by EPA in Section 300.430(d)(9)(iii) of the NCP.

Table 11 provides a summary of this comparative analysis. The detailed comparative analysis of all the alternatives is in the FS; a summary of this comparison is provided in the following text.

K.1 Threshold Criteria (must be met)

K.1.1 Overall Protection of Human Health and the Environment

Addresses whether each alternative provides adequate protection of human health and the environment by eliminating, reducing, or controlling exposure to human or environmental receptors.

Except for Alternative 1, No Action, each of the other alternatives is protective of human health. Alternative 1 is not considered protective. Alternative 3, which includes the components of excavation and off-site disposal, ranks highest in overall protection of human health and the environment, because materials above acceptable levels are excavated from the FMSS and shipped for off-site disposal.

K.1.2 Compliance with ARARs

Addresses if a remedy would meet all of the ARARs related to the hazardous substances at the site and the circumstances of their release. ARARs are Federal and State environmental laws and promulgated regulations identified for the FMSS cleanup.

With the exception of the no action alternative (Alternative 1), all the alternatives comply with ARARs as discussed in detail in Section 3 and Appendix A of the FS. Alternatives 2 and 3 will require institutional controls (e.g., deed notices) to control land uses or construction in contaminated soils. Alternative 2 will require these restrictions on all properties at the FMSS. For Alternative 3, the USACE has elected to implement these restrictions on any properties where there are inaccessible soils or where soils above the criterion for unrestricted use remain in place. Alternative 3 would achieve compliance with ARARs by the removal and off-site disposal of contaminated materials greater than the cleanup criteria established for the Soil / Building OU.

K.2 Primary Balancing Criteria (identifies major trade-offs among alternatives)

K.2.1 Long-Term Effectiveness and Permanence

Addresses the remaining risk and the ability to protect human health and the environment over time, once cleanup levels have been met.

For the excavation alternative (Alternative 3), DOE and EPA developed site-specific cleanup criteria for Ra-226 and Th-232 combined in accordance with EPA guidance. If residual concentrations at any of these properties are above an average of 5 pCi/g combined Ra-226 and Th-232 above background for soils, institutional controls in the form of 5-year reviews and municipal notifications, deed notices, easements, covenants, or zoning controls will be implemented for these properties. For uranium, DOE developed a site-specific guideline for both U-238 (50 pCi/g) and total uranium (100 pCi/g). This criteria will meet the exposure dose limit of 15 mrem/yr above background as specified in NJAC 7:28-12.8a(1). Existing disposal facilities

will be used and are considered to be protective of human health, as well as meet pertinent environmental requirements.

Alternative 3 provides long-term effectiveness because it would remove, for permanent disposal, all soil above cleanup criteria for either safe restricted or unrestricted use from the FMSS; Alternative 3 includes some institutional controls (e.g., deed notices) but to a lesser degree than Alternative 2. Alternative 2 has questionable long-term effectiveness when compared to Alternatives 3, because it relies exclusively on institutional controls (e.g., deed notices). Overall effectiveness is further ensured by requesting that municipalities inform the USACE and EPA of any land use changes that may affect properties where radioactivity remains above an average of 5 pCi/g of Ra-226 and Th-232 combined above background concentrations.

K.2.2 Short-Term Effectiveness and Environmental Impacts

Addresses the impacts to the community and site workers during cleanup including the amount of time it takes to complete the action. Addresses the impacts to the community during off-site disposal, including transportation of the waste and impacts in the area of the disposal facility.

Potential short-term impacts to the community from the transport of the waste and potential short-term impacts to the area of the disposal facility are greater for Alternative 3. There would be no impact from Alternatives 1 and 2.

K.2.3 Reduction in Toxicity, Mobility, or Volume through Treatment

Addresses the anticipated performance of treatment that permanently and significantly reduces toxicity, mobility, or volume of hazardous substances as a principal threat at the Site.

Treatment of principal threat waste is not included in any of the remaining alternatives because no treatment method was found to be effective for the FMSS. Alternative 3 will include decontamination of contaminated building surfaces and will leave no principal threat waste at the FMSS when it is completed.

K.2.4 Implementability

Addresses the technical and administrative feasibility of an alternative, including the availability of materials and services required for cleanup.

Alternatives 2 and 3 are implementable. Alternative 2 is considered the easiest to technically implement of these alternatives since the equipment and services are readily available, and excavation would not be necessary.

K.2.5 Cost

Compares the differences in cost, including capital, operation, and maintenance costs.

The costs to implement the different alternatives have been calculated in terms of the cost in 2002 dollars (FY02$) without escalation or discounting. A summary of the overall cost for each alternative is provided in **Table 12**. Capital, operation, and maintenance costs are included in **Table 13**.

K.3 Modifying Criteria (formally evaluated after the comment period)

K.3.1 State Acceptance

Evaluates whether the State agrees with, opposes, or has no comment on the preferred alternative. This criterion is evaluated formally when comments on the Proposed Plan are reviewed.

State acceptance was evaluated formally after the public comment period on the FS and Proposed Plan. Generally, the NJDEP accepts Alternative 3 for the remedial alternative.

K.3.2 Community Acceptance

Addresses the issues and concerns the public may have regarding each of the alternatives. This criterion is evaluated formally when comments on the Proposed Plan are reviewed.

Community acceptance was evaluated formally after the public comment period on the FS and Proposed Plan. The vast majority of comments were in favor of Alternative 3 (Excavation and Disposal).

A community relations program and a community relations plan for the FMSS have been established and are maintained for the FMSS.

L. PRINCIPAL THREAT WASTES

The principal threat wastes at the FMSS consist of radiologically contaminated soils and waste materials present in the environment at the FMSS. Treatment is possible to reduce the volume of radiologically contaminated materials, but treatment is not possible to reduce the toxicity or mobility of radionuclides. Alternative 2 manages the principal threat wastes at the FMSS by controlling exposures through institutional controls (e.g., deed notices). Alternative 3) controls the principal threat wastes by excavation and off-site disposal of these materials.

M. THE SELECTED REMEDY

Alternative 3, Excavation and Disposal, with cleanup of the MISS, Stepan Company, and 5 other industrial properties to the restricted use criterion and the 17 remaining properties to the unrestricted use criterion has been selected for implementation at the FMSS. This remedy will allow unrestricted use where appropriate at the FMSS.

M.1 Summary of the Rationale for the Selected Remedy

The selected remedy meets the threshold criteria and provides the best overall balance of tradeoffs in terms of the five balancing criteria:

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume
- Short-term effectiveness
- Implementability
- Cost

The selected remedy addresses State and community concerns by removing contaminated materials from the FMSS.

The FMSS's historical commercial / industrial use, the proximity of heavily used transportation corridors (e.g., NJ State Route 17, I-80), and the well defined commercial / industrial districts justify the use of the restricted use cleanup criterion on select commercial and government properties. For the remaining properties, cleanup to the unrestricted use criterion is appropriate because of a less defined commercial district with encroaching residential developments on three sides.

M.2 Description of the Selected Remedy

The major components of the selected remedy (Alternative 3) include:

- Excavation of accessible soils to meet the ARARs and soil cleanup criteria for either restricted or unrestricted use as discussed above for each property using Federally accepted averaging methods (e.g., MARSSIM) to demonstrate compliance with the criteria.
- Remediation of the Stepan Company NRC-licensed burial pits using 10 CFR 20.1402 and NJAC 7:28-12.8(a)1 to meet the criteria of 15 mrem/yr above background.
- Physical separation (not to be confused with treatment), using backhoes or other heavy construction equipment, of a portion of the excavated material would be done to sort boulders and rocks, waste potentially requiring disposal as mixed waste (radioactive and hazardous waste), and bulk waste such as building rubble.
- Remediation of contaminated buildings / structures (or demolition and disposal as deemed appropriate at the time of work) in consultation with the property owners, as necessary to achieve the criteria of 15 mrem/yr above background as specified in NJAC 7:28-12.8(a)1 and the 3 pCi/L Rn-222 limit in NJAC 7:28-12.8(a)2.
- Excavation of inaccessible soils to meet ARARs and cleanup criteria for either restricted or unrestricted use as discussed above if the landowners make them accessible during remediation; otherwise, inaccessible soils currently located under buildings and roadways would be excavated and disposed off-site as they become accessible in the future (e.g., due to renovation or demolition activities).
- Demolition and disposal of structures on the MISS to access contaminated soils.

- Off-site disposal of all materials above the cleanup criteria at facilities authorized to accept radioactive waste. Per the September 2001 NRC Letter, USACE will dispose of radiologically contaminated soil off-site as 11(e)(2) byproduct materials. The selection of the disposal facility(s) will be made prior to implementation of the remedial action based upon what facilities have been authorized or permitted to receive such materials, and other factors such as proximity to the site, accessibility, and cost.
- 5-year reviews in accordance with CERCLA 121(c) and 300.430(f)(4)(ii).
- Requesting notification of the USACE and EPA by local municipalities of any land use changes that would affect those properties where radioactivity remains above an average of 5 pCi/g of Ra-226 and Th-232 combined above background concentrations for soils.
- Periodic Rn-222 monitoring of structures over inaccessible soils to ensure that the structure continues to provide adequate protection from these soils; mitigation of Rn-222 (e.g., sealing foundation cracks, supplementing existing ventilation systems, etc.) would be performed if indoor air levels exceed 3 pCi/L above background.
- Work with local authorities and landowners to implement land use controls (e.g., deed notices, easements, covenants, zoning controls, etc.) on a property by property basis, as necessary, for those properties where radioactivity remains above an average 5 pCi/g of Ra-226 and Th-232 combined above background concentrations for soils and/or due to the presence of inaccessible soil. Objectives of the institutional controls would be to restrict land use to commercial/industrial, prohibit residential or unrestricted use, and prohibit excavation into designated restricted areas. Institutional controls would remain in place as long as site contaminants remain above levels that allow for unrestricted use.

M.3 Summary of the Estimated Remedy Costs

Total costs for the selected remedy (Alternative 3) are estimated at $254 million. Costs are based on excavation and disposal of accessible soil contamination (including the Stepan Company burial pits); costs are also included for future excavation and disposal of inaccessible soils under operating buildings and transportation corridors. The cost to remove inaccessible soils is $44.5 million based on these areas being made accessible during the remediation of the accessible soils. Inaccessible soil costs have been estimated based on the accessible soils unit cost; however, uncertainties related to existing volumes and future costs related to the excavation, transportation and disposal of contaminated soil could result in significantly higher cost. **Table 13** provides a more detailed summary of the costs associated with implementation of the selected remedy.

These estimates assume that the MISS, Stepan Company, 149-151 Maywood Avenue, I-80, NJ State Route 17, Lodi Industrial Railroad, and the New York, Susquehanna, & Western Railway properties are cleaned to the restricted use criteria, and all other properties are cleaned to the unrestricted use criteria. The estimated time to implement the selected remedy is approximately 5 years after completion of remedial design, which is estimated to require an

additional year. The time to implement any of the alternatives is dependent on USACE funding, which is appropriated annually from Congress. If additional properties are cleaned to the restricted use criteria, it is likely that the project can be completed sooner and overall costs would be less.

The information in the cost estimate summary table is based on the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the selected remedy. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences (ESD), or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50% of the actual project cost.

A detailed schedule and cost estimate will be developed as a part of the remedial design phase.

M.4 Estimated Outcomes of the Selected Remedy

The FMSS RAOs, as shown in **Table 8**, would be achieved for the source media and building / structures.

The selected remedy will provide for unrestricted use and unrestricted release of 17 of the remaining 24 FMSS properties, and will allow safe commercial or industrial use of all of the properties, as shown in **Table 14**. **Table 15** provides a summary of the cleanup criteria to be achieved on these properties. Achievement of the cleanup criteria will be on a property by property basis throughout the 5-year construction duration period; at the end of the construction phase all properties will have achieved the cleanup criteria.

As shown on **Table 14**, the expected future use of the properties cleaned to the restricted use criteria is continued industrial / commercial use. The master planning documents of the involved communities support these future use assumptions. Thus, no negative socioeconomic and community revitalization impacts are expected from this remedial action. Positive impacts are expected from the excavation and removal of soils exceeding the cleanup criteria.

Residual risks to future receptors after implementation of this remedial action are within the CERCLA risk range for acceptable risks. Because of the highly industrialized nature of the FMSS, no significant environmental or ecological benefits are expected as a result of this remedial action.

The estimated outcome would also include compliance with the ARARs listed in **Table 16**.

N. STATUTORY DETERMINATIONS

The selected remedy satisfies the statutory requirements of CERCLA §121 and the NCP, as described below.

N.1 Protection of Human Health and the Environment

Human exposure to site COCs will be eliminated or controlled to levels that are protective through excavation and off-site disposal for all accessible areas. Institutional controls (e.g., deed notices) will be implemented for all properties remediated to the restricted use cleanup criteria and for all inaccessible areas until they become accessible and the remedial action is completed.

N.2 Compliance with ARARs

Table 15 provides a summary of the cleanup criteria to be achieved. Achievement of the cleanup criteria will be on a property by property basis throughout the 5-year construction duration period; at the end of the construction phase all properties will have achieved the cleanup criteria.

The selected remedy will comply with the ARARs listed in **Table 16**. USACE has elected to utilize institutional controls (e.g., deed notices) on properties where site-specific modeling shows a restricted use scenario is necessary to meet or exceed the 15 mrem/year dose-based standard identified in NJAC 7:28-1.8(a)1. In addition, institutional controls (e.g., deed notices) would be required on those properties where inaccessible soil is located.

N.3 Cost-Effectiveness

The selected remedy meets the statutory requirement for a cost-effective remedy. **Table 17** provides a cost-effectiveness matrix to demonstrate the cost-effectiveness of the selected remedy against the other alternatives evaluated.

N.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions and treatment are practicable at this site. The selected remedy represents the best balance of tradeoffs between the alternatives because it provides a permanent solution, and cost-effectively remediates those properties that are most likely to remain under industrial / commercial use. By removing soils above levels acceptable for unrestricted use at those properties which are most proximate to residences or which contain relatively low volumes of contaminated soils, the selected remedy provides for unrestricted release of the majority of the properties that comprise the site. The selected remedy is cost-effective because lower-concentration soils that are unlikely to pose an unacceptable risk (soils whose concentration ranges between the unrestricted and restricted use cleanup criteria) are left in-place at those properties most likely to remain under commercial / industrial use.

N.5 Preference for Treatment as a Principal Element

The selected remedy uses permanent solutions to the maximum extent practicable. The remedy does not satisfy the statutory preference for treatment. The treatment technologies

evaluated for soil volume reduction were not found to be acceptable for implementation at the FMSS.

N.6 Five-Year Review Requirements

Five-year reviews will be conducted in compliance with CERCLA Section 121(c) and the NCP Section 300.430(f)(4)(ii).

III. RESPONSIVENESS SUMMARY

A. OVERVIEW

In August 2002, the USACE and the EPA released the *Proposed Plan for Soils and Buildings at the FUSRAP Maywood Superfund Site* for public comment. An initial 30-day public comment period was held between August 14, 2002 and September 12, 2002. At the request of the public, the USACE and EPA granted two additional 30-day extensions. The public comment period closed on November 11, 2002. USACE hosted a public meeting on August 28, 2002, during which the USACE presented the preferred alternative and questions and comments were taken from the public for the record. A number of oral and written comments were received on the remedial alternatives evaluated in the Proposed Plan, and are addressed under Section III.C.

The preferred alternative for the FMSS that was proposed by the EPA and USACE in the Proposed Plan, and presented during the related public session was Alternative 4, Excavation, Treatment, and Disposal. This alternative includes the excavation of contaminated soil, decontamination and demolition of contaminated buildings, treatment of contaminated soil, and the off-site disposal of FUSRAP waste. Contaminated soil includes process wastes and debris and associated native soils that contain radioactivity above the cleanup goals established in the FS and Proposed Plan.

Based on comments received, the public overwhelmingly prefers Alternative 3, Excavation and Disposal, over Alternative 4 as is the preferred alternative. Based on this public opposition and the recently completed evaluation of the treatment demonstration by USACE and EPA, in consultation with the NJDEP, Alternative 3 will be selected as the remedial action for the FMSS Soils / Building OU in this ROD.

B. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Based on available records, environmental concerns regarding the former MCW can be documented as far back as 1983. In the latter part of that year, DOE representatives met with officials from the Borough of Maywood to obtain background information on the site and to discuss community concerns. As a result of that meeting, in early 1984 project representatives met with area property owners and the Mayor and Council for the Borough of Maywood to discuss planned removal of contaminated soil. A memorandum of understanding between DOE and the Borough of Maywood was signed in August 1984. The memo listed agreements between DOE and the borough on locations to be cleaned up, establishment and monitoring of an interim storage site, and efforts to find a permanent off-site disposal site in NJ.

When DOE was unable to identify a suitable in-state disposal site, State of NJ authorities were asked to assist in siting a disposal facility. Shortly thereafter, the state indicated that no community willing to host such a site had been found. As a result, all contaminated soil removed from the FMSS to date has gone to a permanent, permitted disposal location in Utah. A detailed

summary of significant community involvement developments and relevant technical milestones at the FMSS since these early interactions is presented in Section B.2, Chronology of Community Involvement.

Recent community relations efforts at the FMSS have been particularly challenging due largely to the presence of contamination in three municipalities: Boroughs of Maywood and Lodi, and the Township of Rochelle Park. Borough of Maywood officials and residents were generally opposed to the storage of contaminated soil from the other two municipalities at the MISS. Concern that the interim storage would become permanent was addressed with the removal of the soil pile in 1996. However, there are renewed concerns that the MISS will again be used for extended storage of contaminated soil from commercial and government-owned properties planned for remediation over the next several years. There are related concerns regarding potential on-site treatment and disposal of contaminated soil at the MISS.

Consequently, much of the recent community input on FUSRAP activities at the FMSS can be summarized in several overriding concerns related to:

- Potential health hazards posed by radiologically contaminated soil yet to be removed from vicinity properties,
- The potential that the soil will stored long-term on the MISS, and
- The potential that the soil will be treated and/or remain on-site in some fashion.

B.1 Community Profile

The FMSS includes property in the Boroughs of Maywood and Lodi, and the Township of Rochelle Park, Bergen County, NJ. The MISS is located on the boundary of the Borough of Maywood and the Township of Rochelle Park. Vicinity commercial and governmental properties are located in all three municipalities, with the bulk in the Boroughs of Maywood and Lodi. The MISS is zoned for limited light industrial use. Property adjacent to the MISS is zoned for limited light industrial, restricted commercial and business, and single-family residential use. Chief industries in the area are retail, professional services, and manufacturing.

The Boroughs of Maywood and Lodi are governed by a Mayor and Council, with various departments managed by a borough administrator. The government for the Township of Rochelle Park is a five-member committee that selects one of its members as Mayor on a rotating basis.

Primary population data in the vicinity of the FMSS are presented in **Table 18**.

B.2 Chronology of Community Involvement

Significant community involvement developments and relevant technical milestones at the FMSS are highlighted below. As best as can be reconstructed, items are listed chronologically within the year they occurred.

1985

- Community concern arises over a plan to store contaminated soil from Lodi properties at the MISS and the possibility that interim storage could become permanent.
- Borough of Maywood files suit to invalidate transfer of the MISS property from Stepan Company to DOE (the suit was resolved in DOE's favor in 1988).
- Separate public meetings held by U.S. Representative Robert Torricelli and NJDEP generate large citizen turnout.
- Local residents form Concerned Citizens of Maywood (CCM) to monitor activities at the site.

1988

- CCM gains official advisory group status from the Mayor and Council for the Borough of Maywood.
- DOE and Borough of Maywood officials meet on proposed removal actions at selected Borough of Maywood and Borough of Lodi properties; Borough of Maywood officials opposed to accepting contaminated soil from outside Maywood, concerned it could diminish the capacity of the MISS to store soil from Borough of Maywood properties.

1989

- DOE releases volume estimates showing the MISS has capacity to store all known contaminated materials from the Boroughs of Maywood and Lodi, and the Township of Rochelle Park; agency expresses need to proceed with removal actions.
- The Borough of Maywood Council votes not to accept contaminated materials from outside of the Borough for interim storage at the MISS, resulting in an impasse on further cleanup.
- The Mayors for the Boroughs of Maywood and Lodi, and the Township of Rochelle Park begin planning a cooperative effort to work with state and federal agencies on a permanent solution to thorium contamination.

1990

- DOE representatives and Representative Torricelli meet to discuss permanent disposal of thorium waste stored at the MISS; a commercial disposal facility in Utah is considered.
- DOE holds a public meeting to present history of the FMSS, current understanding of contamination, and regulatory process for cleanup. Residents from the three communities voice the following concerns and recommendations: opposition to permanent waste disposal at the MISS; preference for disposal at a commercial facility; concern about potential health effects from both radiological and chemical contamination, including perceived above-normal cancer incidence in one area of the Borough of Maywood; belief that regulatory process moved too slowly; and preference for consolidating documentation for all NJ FUSRAP sites into one report.

- Environmental Legislative Action Committee established by Mr. John Steuert, Mayor for the Borough of Maywood.
- The federal Agency for Toxic Substances and Disease Registry (ATSDR) conducts a health assessment in the vicinity of the FMSS; report notes the presence of radiological material above background levels at properties adjacent to the MISS, but found no heightened health risks posed by current conditions; also recommends more thorough health study once data from ongoing sampling data are available.

1991

- DOE representatives and Council members for the Borough of Maywood meet on planned removal at one home in the Borough of Lodi where immediate action is needed; DOE proposes temporary storage of the contaminated materials (an estimated 36 yd^3) at the MISS; Council rejects the proposal, restates opposition to accepting out-of-town waste; Rochelle Park Township Council also opposes the plan.
- DOE notifies the Borough of Maywood that the removal at the Borough of Lodi residence has begun, and that contaminated materials would be stored at the MISS; Borough of Maywood residents and some public officials picket outside the MISS entrance in an unsuccessful attempt to block trucks from delivering the material; the material is ultimately placed in protective storage containers in an on-site building.
- DOE representatives and county and local officials meet to discuss formation of a coalition of local officials to review DOE activities.
- DOE representatives meet with Borough of Maywood Board of Health and Township of Rochelle Park Environmental Commission.

1992

- DOE opens Public Information Center in the Borough of Maywood; CCM members picket outside the center to protest its cost and demand a halt to further shipments of contaminated waste to the MISS.
- State assemblyman for the Borough of Maywood receives a project briefing and tours the site.
- CCM presses for accelerated cleanup of FMSS, pointing to a similar radiological site in Illinois that is pursuing a contract with a commercial facility to accept its waste; CCM also criticizes local officials for their perceived cooperation with DOE, saying that a more adversarial approach is needed.
- Boroughs of Maywood officials strongly recommend that DOE contract with a commercial disposal facility to accept waste from the FMSS.
- Bergen County and local officials form the Tri-Borough and County Thorium Coalition, hires a technical consultant, through $50,000 funding provided by DOE to assist in interpreting project documents; coalition members also tour FMSS.
- ATSDR begins review and update of its 1990 public health study. Shortly thereafter, both the Borough of Maywood (prompted by persisting health concerns among the community) and EPA (prompted by the availability of new analytical data) ask

ATSDR to perform health assessments. ATSDR proceeds with its planned update of the 1990 study with the EPA consultation. ATSDR determines that the borough's request would result in a duplication of effort and declines.

- At the Borough of Maywood health officer's request, she and two other local officials tour a storage building at the MISS amid concerns about material stored there.
- Borough of Maywood emergency services personnel tour the MISS to coordinate emergency preparedness.
- DOE holds public availability session on RI report.

1993

- DOE holds public availability sessions on BRA report and Proposed Plan for site remediation.
- CCM receives a $25,000 grant from EPA and hires a second consultant to help interpret technical site information.
- ATSDR releases health consultation report requested by EPA; report found no increased health risks posed by existing site conditions, confirming findings of 1990 assessment.

1994

- DOE holds public availability session on FS cleanup alternatives.
- CCM loses status as an official advisor to the Borough of Maywood after disagreements on the borough's working relationship with DOE.
- DOE contracts with Envirocare of Utah (a commercial radioactive waste disposal facility) to accept material from the FMSS.
- Removal of the MISS waste pile begins with shipments to Envirocare totaling 5,000 yd^3.
- DOE holds public availability session on soil treatment technologies and cleanup criteria development.
- In response to strong community opposition to on-site treatment of soil from residential properties, DOE agrees not to conduct pilot-scale soil treatment studies at the MISS.

1995

- ATSDR begins another assessment involving interviews with community members to discuss health concerns associated with the FMSS.
- 10,000 yd^3 of contaminated material shipped from the MISS to Envirocare of Utah disposal facility.
- Environmental Legislative Action Committee becomes more active. The group has several meetings with DOE and contractor representatives and serves to facilitate communication between DOE and Borough of Maywood officials.

- The timing for residential property cleanups is established with input from Tri-Borough and County Thorium Coalition.
- Cleanup of remaining residential properties, four municipal properties, and one commercial site (Phase I) begins.

1996

- Last of soil stockpile is shipped from the MISS to commercial disposal facility in Utah.

1997

- Cooperative Guidance Group is established. The mission of this citizen advisory group is to provide community input on cleanup decisions for commercial and government vicinity properties. The Cooperative Guidance Group meets thirteen times during the year.
- Congress transfers FUSRAP responsibility (including FMSS) from DOE to USACE.

1998

- ATSDR releases a preliminary epidemiological study on cancer incidence in the vicinity of the FMSS. The study is conducted by the NJ Department of Health and Senior Services under a grant from ATSDR. The study's results are inconclusive, and no definitive conclusions are drawn as to whether or not excess cancers related to exposures to contamination related to the FMSS have occurred. The study report is available for review at the FUSRAP Maywood Public Information Center.
- The Cooperative Guidance Group meets nine times during the year, with USACE representatives on hand to address various issues. The group adjourned until the Proposed Plan is available for comment.
- The Communications Working Group, made up of vicinity property business owners and tenants, realtors, and local residents, is established; its mission is to develop recommendations on how the Corps can effectively communicate with stakeholders and other parties interested in the FMSS during the Phase II cleanup.
- USACE Project Manager and staff update Borough of Maywood officials at a meeting of the Mayor and Council in March.

1999

- USACE completes cleanup at remaining residential and municipal properties (except for one commercial property whose owner has not granted access) ahead of schedule; more than 43,000 yd^3 of contaminated soil removed for out-of-state disposal.
- USACE Project Manager and staff update Borough of Maywood officials at an open meeting of the Mayor and Council in May.
- FUSRAP Update newsletter released in June.
- Cleanup activities start at vicinity commercial and government-owned properties (Phase II).

- The Communications Working Group meets monthly from April to August and reports its recommendations to USACE.

2000

- Additional investigations performed to delineate soil contamination limits on Phase II properties, and to assess potential groundwater contamination.
- A Time-Critical Removal Action is completed to remedy persistent flooding and address potential contaminant movement from an on-site drainage channel and Lodi Brook.
- Project web site goes online at www.fusrapmaywood.com.
- FUSRAP Update newsletters released in January, April and August.
- Public information session held in April.
- Final Phase I property cleanup.
- The treatment demonstration started in August and was completed in December. The purpose of the demonstration was to evaluate two soil separation technologies.

2001

- Community Relations Plan update released in March, reflecting public input from a range of community sources.
- FUSRAP Update newsletter released in April.
- Public meeting held in August on an EE/CA for removal actions in support of NJ Department of Transportation roadway improvements affecting site vicinity properties; public comment period held from July 25 through August 24.
- Ongoing coordination with of NJ Department of Transportation and vicinity property owners and tenants regarding EE/CA removal actions.
- NRC characterizes the FMSS thorium contaminated waste as 11e(2) byproduct material in September.

2002

- FUSRAP Update newsletters released in January and August.
- First EE/CA removal action completed at a Borough of Lodi property in March.
- USACE Project Manager updates Borough of Maywood Mayor and Council in March.
- Borough of Maywood Administrator, Clerk and Health Officer tour the MISS in August.
- Public meeting held in August on the Proposed Plan for Soils and Buildings; public comment period held from August 14 through November 12.

C. SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

The following were received as either written comments or oral comments during the public comment period. Those comments that were similar were grouped together. Each comment is followed by a response to that comment.

1. FS Screening of Technologies

Comment: One commenter stated that on-site containment remedies were improperly eliminated from consideration based on community acceptance criteria, contrary to the requirements of the NCP.

Response: USACE did consider containment alternatives, however these were screened out prior to selecting alternatives for detailed analysis due to problems with implementability. See §3.5.2.1 of the FS.

2. Public Comment Period

Comment: One commenter stated that the USACE should not extend the public comment period and requested the name of the person(s) who requested the extension. The commenter further stated that the USACE should initiate the cleanup.

Response: The USACE does not agree that the public comment period should close after only 30 days. A timely request was made by a member of the public to extend the comment period greater than the initial 30 days. An additional 30-day extension beyond the initial extension was also requested. In accordance with 40 CFR Part 300, the USACE granted both extensions.

The USACE agrees that the cleanup should occur as expeditiously as possible. To the extent that this comment was relevant to remedy selection, it supported the remedial alternatives in the Proposed Plan that would include site cleanup (i.e., Alternatives 3,and 4) as opposed to no action (Alternative 1) or monitoring and institutional controls (Alternative 2).

3. BRA

Comment: One comment was received which questioned if the excess radiological cancer risk at 99 Essex Street was 10^{-3}. The commenter was viewing Figures 2-15 through 2-18 on Pages 2-63 through 2-66 of the *Feasibility Study for Soils and Buildings at the FUSRAP Maywood Superfund Site*, August 2002.

Response: The BRA estimates that the excess radiological cancer risk assuming residential land use and RME at 99 Essex Street is 10^{-3}. The purpose of the BRA was to estimate risks from site contaminants to human health and the environment, and to justify if there is a need for the lead agency to take action. For the 99 Essex Street property, the BRA evaluated four risk scenarios. The excess radiological

cancer risk under the current commercial land use is estimated at 10^{-5} for mean exposures and estimated at 10^{-4} for RMEs. Estimated risk is lower for the current commercial land use at 99 Essex Street than when residential land use is assumed. The residential future land use scenario assumes that site contaminants are left in place and that the land use changes from commercial to residential. If this land use change occurs, modeling shows that there is a potential for higher exposure and therefore greater potential for risk, thus justifying the need for USACE and EPA to take action. The excess radiological cancer risk assuming residential land use at 99 Essex Street is estimated at 10^{-4} for mean exposures and estimated at 10^{-3} for RME. A RME of 10^{-3} is considered unacceptable and would warrant remedial action

4. BRA

Comment: One commenter recommended that the BRA, completed in 1993, be revised. The commenter stated that the radiological risk was underestimated and was incorrectly estimated for children. The commenter based this opinion on the parameters selected for the RESRAD computer model that estimates dose. The commenter stated that the parameters were not conservative, errors were made in the calculation of risk, and errors were also made in determining background radiological levels in soils. The commenter also recommended that the BRA evaluate all 24 properties to a future use scenario of residential land use.

Response: The USACE and EPA disagree that the BRA should be revised. The BRA provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. Results of the BRA indicate that exposure to the COCs under current and hypothetical future land use scenarios may result in unacceptable risks to human and ecological receptors unless FMSS remediation is undertaken. The selected remedy will reduce the potential exposure from the COCs to comply with the exposure dose limit of 15 mrem/yr above background.

The BRA evaluated a potential future residential land use for many of the 24 Soils / Building OU properties addressed by this ROD. Properties that were not considered include the MISS, Stepan Company, NYS&W Railway, 111 Essex Street, 205 Maywood Avenue, and 61 West Hunter Avenue. Although the BRA did not evaluate these properties for a future residential land use, the USACE will remediate the 111 Essex Street, 205 Maywood Avenue, and 61 West Hunter Avenue properties to the unrestricted use cleanup criteria.

5. BRA

Comment: One commenter stated that the NCP risk range of 1 in 10,000 to 1 in a million are action ranges, not protective ranges as stated in the Proposed Plan.

Response:The USACE and EPA consider the NCP risk range of 1 in 10,000 to 1 in a million a protective range. Please refer to *Risk Assessment Guidance for Superfund, Volume 1 – Human Health Evaluation (Part D, Section 4),* December 2001.

6. BRA

Comment: One commenter requested clarification regarding the presence of rare earth elements, specifically cerium, at the FMSS and their potential impact on the BRA. The commenter also requested clarification if the trivalent form of chromium in the ranges of 20,100 mg/kg to 117,000 mg/kg would be considered toxic. The commenter was referring to the results from a focused investigation by Stepan Company to characterize chromium contamination in soil on the Maywood Chemical Company Superfund Site.

Response: The BRA did not quantitatively evaluate rare earth elements such as cerium, lanthanum, and neodymium. These are not CERCLA hazardous substances; they lack EPA toxicity values, and are not considered toxic. These constituents were found in elevated concentrations at the FMSS but were not evaluated quantitatively in the BRA because there is no toxicity data available. The BRA did however evaluate these elements qualitatively.

The chromium levels identified by the commenter are from a sample of leather materials and filter cakes on the Stepan Company Property. These chromium sample concentrations are total chromium levels. Chemical cleanup of FUSRAP waste applies only to those chemicals on the MISS. However, if chromium is co-mingled with radionuclide COCs and found to be above the RCRA hazardous waste levels during waste profiling, the waste materials will be disposed as mixed waste. Chromium toxicity varies with particular chromium compounds. Trivalent, metallic, and divalent chromium compounds generally are less toxic than hexavalent compounds. Trivalent chromium is absorbed poorly by inhalation and through intact skin, resulting in a low order of systemic toxicity. However, should trivalent chromium gain access to the systemic circulation, toxic effects may develop.

7. ARARs

Comment: The NRC recommended revisions to the Proposed Plan that would highlight the ARARs for the NRC-licensed burial pits located on Stepan Company property. The NRC commented that reference to 10 CFR 20.1402 should be included within additional text portions of the Proposed Plan. In addition, the NRC recommended that the specific language be included "U.S. Nuclear Regulatory Commission, in its evaluation of the licensed burial pits remediation, will assure compliance with 10 CFR 20.1402 by reviewing the dose modeling and final site surveys." Furthermore, the NRC requested changes to clarify that the NRC-licensed burial pits would be remediated to meet the requirements of 10 CFR Part

20.1402, and NJAC 7:28-12.8(a)1. Another commenter stated that the Proposed Plan should have listed all Federal and state laws and regulations, and Executive Orders that must be complied with during the remediation of the FMSS

Response: Changes to the Proposed Plan are included in the ROD, as necessary. The Proposed Plan adequately references compliance with 10 CFR 20.1402. The NRC-licensed burial pits on Stepan Company property will be decommissioned (excavation with off-site disposal) to the substantive requirements of 10 CFR 20.1402 (less than 25 mrem/yr above background) and the substantive requirements of NJAC 7:28-12.8(a) (less than 15 mrem/yr above background). By identifying NJAC 7:28-12.8(a) as an ARAR, the exposure dose limits established by 10 CFR 20.1402 would be met.

The USACE and EPA will provide to the NRC the final status survey for the NRC-licensed burial pits. The USACE and EPA recognize that the NRC will perform its own evaluation regarding the remediation of the NRC-licensed burial pits, and will assure compliance with 10 CFR 20.1402 by reviewing the dose modeling and final status surveys.

The Proposed Plan adequately lists ARARs for the FMSS.

8. ARARs

Comment: One commenter requested clarification if the exposure dose limit of 15 mrem/yr above background was for all pathways or was for a particular pathway.

Response: The 15 mrem/yr dose limit above background is the sum of annual external gamma radiation dose and intake dose, including the groundwater pathway.

9. Cleanup Criteria

Comment: One commenter requested clarification on what is meant by residential use and what types of land uses would be appropriate for properties remediated to residential use.

Response: The unrestricted use cleanup criterion refers to properties that would be remediated to levels suitable for residential use. The cleanup levels used for properties designated as “residential” will be adequate for any future use of the property.

All land uses would be appropriate for properties remediated to the unrestricted use cleanup criteria, subject to municipal zoning laws and regulations. Municipalities use zoning to identify the appropriate land use (e.g., residential, commercial) for a particular property. Any change in land use would be subject to local zoning laws and regulations.

10. Cleanup Criteria

Comment: Several commenters, including the Mayor and Council for the Borough of Maywood, stated that the FMSS properties located in the Borough of Maywood should be remediated to the unrestricted use cleanup criteria consistent with the properties located in the Borough of Lodi and Township of Rochelle Park. The commenters questioned the basis for the decision by DOE and USACE to remediate the properties within the adjacent municipalities to the unrestricted use cleanup criteria and were not planning to do the same for all properties located in the Borough of Maywood. The commenters were in favor of remediating the Borough of Maywood properties to less than 5 pCi/g, combined Ra-226 plus Th-232, above background. The commenters preferred that the remediated properties located in the Borough of Maywood could be used for any potential future land use. The commenters specifically requested that the 149-151 Maywood Avenue property be remediated to a level that would allow a municipal park or playground. The commenters were also concerned that it would be difficult to obtain funding in the future to further remediate properties for unrestricted use if the properties were initially remediated to the restricted use cleanup criteria. Even if funding were obtained, projects would be delayed until the properties were remediated. Several commenters questioned what the cost would be to remediate all FMSS properties located in the Borough of Maywood to the unrestricted use cleanup criteria.

Response: The USACE and EPA disagree that all properties in the Borough of Maywood should be remediated to the unrestricted use cleanup criteria. The USACE and EPA based the decision to remediate ten of the fifteen FMSS properties located in the Borough of Maywood and all properties located in the Borough of Lodi to this criterion on the proximity of residential neighborhoods and the potential for future residential land use on these properties. The USACE and EPA performed an evaluation of the reasonably foreseeable future land use of the remaining five properties located in the Borough of Maywood, and determined that the most reasonably foreseeable land use on these properties is continued commercial, light industrial, or transportation. After remediation of the site is completed, subject to municipal zoning laws and regulations and implementation of appropriate institutional controls, residual levels of contamination would not preclude a municipal park or playground from being constructed on the site, including the 149-151 Maywood Avenue property.

Historically, Congress has annually appropriated funds for FUSRAP and allowed these funds to remain available until expended. The USACE is working with Congress to establish how the funding for remediation of currently inaccessible soils will be available when these properties become available. USACE requests the assistance of property owners to provide sufficient planning information to USACE in order to identify and plan the opportunities in the future for future remediation of these properties.

The scenario assumed by the commenters (that properties initially remediated to the restricted use cleanup criteria would be used for residential purposes) should not occur with the selected remedy, since the selected remedy includes institutional controls. The selected remedy should prevent this occurrence because sites that are subject to the restricted use criteria will also have institutional controls that should prevent change in use of the property.

The USACE estimates for the selected remedy, Alternative 3, an additional $60 million would be required to remediate all FMSS properties within the Borough of Maywood to the unrestricted use cleanup criteria.

11. Cleanup Criteria

Comment: The NJDEP stated that chemical COCs exist on the MISS that require remediation to the proposed NJ Soil Cleanup Criteria. The concentrations of several metals and organic chemicals in the soil on the MISS (sporadically in terms of depth and areal extent) exceed the non-promulgated Residential Direct Contact Soil Cleanup Criteria, and some exceed both the non-promulgated Residential Direct Contact Soil Cleanup Criteria and the non-promulgated Non-Residential Direct Contact Soil Cleanup Criteria, and thus require remediation pursuant to NJDEP rules and regulations. Even if the MISS was remediated to levels below the unrestricted use cleanup criteria (radiological criteria), institutional controls would be warranted due to the presence of these chemicals. The NJDEP stated that because of these issues, the Department would not concur with the proposed remedial action.

Response: Pursuant to CERCLA requirements, no unacceptable threat of exposure to humans will be present at the site due to the non-radiological chemicals. The proposed remedy is protective of human health and the environment. Therefore the FS and Proposed Plan do not identify any chemical COCs that require remediation. The USACE agrees that several metals and organic chemicals do exist in the soil at the MISS in levels that exceed the non-promulgated NJ Soil Cleanup Criteria. Given the nature and extent of radiologically contaminated soil on the MISS however, the USACE and EPA expect that residual levels of any remaining chemicals present on the MISS will be below levels in the non-promulgated NJ Soil Cleanup Criteria. In addition, these levels would be several feet below the ground surface. Under the current land use, it is the position of the USACE and EPA that these levels would not pose a risk to human health and the environment.

USACE will perform sampling in accordance with federal standards (e.g., MARSSIM) to verify satisfaction of the cleanup levels and it is expected that the results will be consistent with the proposed NJ Soil Cleanup Criteria.

The USACE will perform a risk assessment as part of the Groundwater RI. The risk assessment will evaluate the risk to human health and the environment from

residual chemicals at the MISS that may impact groundwater. The Groundwater FS will evaluate various alternatives to address any soil impact to groundwater. The groundwater remedy will be documented in the Groundwater ROD.

12. Cleanup Criteria

Comment: One commenter stated that the FS and Proposed Plan adopt unnecessarily stringent cleanup standards, using criteria developed through agency negotiations in which the public had no opportunity to participate. The criteria contained in 40 C.F.R. § 192.41 and the applicable N.J.A.C. regulations are the appropriate criteria for the FUSRAP site.

Response: USACE and EPA considered 40 C.F.R. § 192 as a potential ARAR and determined 40 C.F.R. § 192 was not applicable or otherwise relevant and appropriate to remedial action at FMSS. The rationale for this decision is explained in Section 3.2.1.1 of the FS. The cleanup standards (i.e., the Dispute Resolution cleanup criteria) were established by formal agreement between DOE and EPA pursuant to a Federal Facility Agreement. The cleanup standards are not ARARs. Upon assuming responsibility for the FUSRAP Program, USACE agreed to accept responsibility as DOE's successor for all response actions required by Federal Facility Agreements, including abiding by the terms and conditions of any dispute resolution (See MOU between DOE and USACE signed 3/17/99). The public, including Stepan Company, was provided an opportunity to comment on the cleanup standards and the lead agency's responses to public comments are addressed in this Responsiveness Summary. In August 2002, the USACE and the EPA released the *Proposed Plan for Soils and Buildings at the FUSRAP Maywood Superfund Site* for public comment. An initial 30-day public comment period was held between August 14, 2002 and September 12, 2002. At the request of the public, the USACE and EPA granted two additional 30-day extensions. The public comment period closed on November 11, 2002. USACE hosted a public meeting on August 28, 2002, during which the USACE presented the preferred alternative and questions and comments were taken from the public for the record. USACE made a final determination to adopt the Dispute Resolution cleanup standards after confirmation that the standards were consistent with restricted and unrestricted site-specific cleanup levels calculated by USACE using the N.J.A.C. dose-based ARAR (15 mrem/yr).

13. Cleanup Criteria

Comment: One commenter stated that the FS provides no explanation of the application of the balancing factors set forth to justify remediation to unrestricted use standards. Applying these factors dictates at least 8 (and possibly 9) of the 17 properties selected for remediation to unrestricted use standards should be remediated to restricted use.

Response: The identified properties are subject to an ongoing removal action to make way for N.J.D.O.T. highway construction. Once construction is complete, soils beneath the highway will be inaccessible to any additional remedial actions. The decision to remediate these properties to the most stringent anticipated cleanup standard was made to ensure the cleanup of these properties would contribute to the efficient performance of the long-term remedial action.

14. Cleanup Criteria

Comment: One commenter requested clarification regarding the establishment of the restricted use cleanup criteria at 15 pCi/g combined Ra-226 and Th-232 above background and the unrestricted use cleanup criteria at 5 pCi/g combined Ra-226 and Th-232 above background. The commenter also requested clarification regarding the risk posed by each cleanup level. The commenter also requested clarification regarding the risk posed by the 100 pCi/g total uranium above background cleanup level. Furthermore, the commenter requested clarification if the risk considered all the COCs.

Response: The cleanup values for Ra-226 and Th-232, combined above background, were developed by EPA Region 2 and agreed to by DOE (predecessor to USACE in the implementation of FUSRAP). The total uranium value was determined by DOE and agreed to by EPA. Appendix C of the FS evaluated and presented the dose and risk of all COCs combined.

15. Cleanup Criteria

Comment: One commenter requested clarification regarding the definition of "background" used in the Proposed Plan. The commenter also requested clarification regarding the background levels for Ra-226, Th-232, and U-238 and where these levels were determined.

Response: Background concentrations of radionuclides in soil were determined from several locations in the vicinity of the FMSS that were not impacted by operations from the former MCW. These included Foschini Park located in the City of Hackensack NJ, Rochelle Park located in the Township of Rochelle Park NJ, and Borough Park located in the Borough of Maywood NJ. The average background values for Ra-226, Th-232, and U-238 were determined to be 0.7 pCi/g, 1.0 pCi/g, and 2.9 pCi/g respectively. The value for U-238 is reported at the minimum detectable activity. Background values for metals and rare earth concentrations in soil were also determined. However, since the COCs are Ra-226, Th-232, and U-238, the Proposed Plan does not discuss background for metals and rare earth elements. The FS reports background results for the COCs, metals, and rare earth elements.

16. Nature and Extent of Contamination

Comment: One commenter was concerned if the buried drums or chemical contamination found at the 149-151 Maywood Avenue property would be remediated under the Soils / Building OU.

Response: Subject to the terms of the FFA between EPA and DOE, FUSRAP waste includes any chemical or non-radiological contamination on Vicinity Properties that would satisfy either of the following: the chemical or non-radiological contaminants which are mixed or commingled with radiological contamination above cleanup levels; or, the chemical or non-radiological contaminants which originated at the MISS or were associated with the specific thorium manufacturing or processing activities at the MCW which resulted in the radiological contamination. USACE will remediate soil, debris, and building materials that are contaminated with FUSRAP waste. This includes a substantial number, if not all, of the buried drums located at 149-151 Maywood Avenue. Under the third OU, non-radioactive, chemical contamination found on Stepan Company and adjoining properties that does not meet the definition of FUSRAP waste, will be addressed with the oversight of EPA.

17. Nature and Extent of Contamination

Comment: One commenter requested clarification if the soil contamination at the 99 Essex Street was below the cleanup criteria. The commenter was viewing Figures 2-8 through 2-10 on pages 2-35 through 2-37 of the *Feasibility Study for Soils and Buildings at the FUSRAP Maywood Superfund Site*, August 2002.

Response: The property at 99 Essex Street has been designated for unrestricted use. There are several areas at the 99 Essex Street property that are above this cleanup criterion and will require remediation. Figure 2-9 on Page 2-36 of the FS shows that the property is impacted by FUSRAP waste above the unrestricted use cleanup criteria.

18. Nature and Extent of Contamination

Comment: One commenter requested clarification regarding the identification of properties contaminated with FUSRAP waste. Several other commenters requested clarification regarding the distribution of FUSRAP waste in the environment and the quantity of FUSRAP waste present in the Borough of Maywood.

Response: In 1954 the former MCW applied for and received from the Atomic Energy Commission (AEC) a license to process thorium. In 1961, the Stepan Company (which purchased MCW in 1959) was issued an Atomic Energy Commission Radioactive Materials Storage License for the thorium processing waste. Between 1966 and 1968, Stepan Company removed residues and tailings from portions of the former MCW (east and west of NJ State Route 17) and placed the waste in three burial pits on Stepan Company property. In 1981, the NJDEP found additional radiological waste west of NJ State Route 17. This led to aerial

and ground radiological surveys in 1981 by the NRC. Beginning in 1983, DOE began intrusive radiological surveys on properties in the vicinity of the former MCW. These surveys led to the discovery of radiological waste (FUSRAP waste) on properties other than the former MCW. Additional properties contaminated with FUSRAP waste were identified during previous and ongoing Removal Actions.

The FUSRAP waste was released to the environment via the Lodi Brook and by filling activities (includes discharging into waste ponds on the former MCW). In areas along the former Lodi Brook, the FUSRAP waste can be seen in veins several inches to several feet in thickness. In some areas the FUSRAP waste is located at the surface and in other areas it has been covered by uncontaminated fill and sediment deposition. In addition, some of the veins of contamination are interlaced with uncontaminated fill. In areas subject to filling activities, the FUSRAP waste is generally several feet thick and is not interlaced with uncontaminated fill. Similar to the Lodi Brook deposits, FUSRAP waste in filled areas is located at the surface and is also covered by uncontaminated fill. Development on properties contaminated with FUSRAP waste has to some extent redistributed the waste within the property.

Approximately 246,000 yd^3 of FUSRAP waste is estimated to be present within the Borough of Maywood. This includes portions of the MISS, Stepan Company, and 149-151 Maywood Avenue properties that are in the Township of Rochelle Park. Approximately 35,000 yd^3 of FUSRAP waste, is located within the Township of Rochelle Park.

19. Nature and Extent of Contamination

Comment: One commenter requested clarification regarding the half-life of the radiological COCs. The commenter also requested information regarding how long the radiological COCs would remain in the environment if remediated to the restricted use cleanup criteria, 15 pCi/g of Ra-226 and Th-232 combined, above background.

Response: The radioactive half-life is defined as the time required for a radioactive substance to lose 50% of its activity by radioactive decay. The longer the half-life, the longer it will take for a substance to no longer be radioactive. The COCs at the FMSS are primordial radionuclides because they exist naturally in the environment and have existed in the earth's crust throughout history. Of the three radiological COCs, Th-232 will remain in the environment the longest. The half-life of Th-232 is approximately 14.1 billion years. It should be noted that the established cleanup criteria are based on an evaluation of the highest exposure potential during a 1000-year period following closure of the FMSS. These evaluation models include factors such as the in-growth of the radioactive daughter products of thorium, radium, and uranium, natural environmental

influences on the radionuclide concentrations, and conservative assumptions regarding human occupancy and land use.

20. Nature and Extent of Contamination

Comment: One commenter requested clarification why the FMSS waste that is located within the NRC-licensed burial pits and waste ponds is not amenable to treatment. Another commenter recommended that this waste be evaluated for treatment. The commenter stated that treatment of this waste could reduce the amount of soil requiring off-site disposal.

Response: Under Alternative 4, the USACE planned to dispose of FMSS waste located in the NRC-licensed burial pits and waste ponds off-site without treatment. This waste stream contains much higher levels of radioactivity than is found elsewhere on the FMSS. The USACE believed that the GSS could not adequately segregate this material into "clean" versus "dirty" piles. In addition, this waste stream is commingled with other waste that has retained vast amounts of moisture. The USACE believed that the GSS could also not adequately segregate this material. As part of the treatment demonstration, FMSS waste located within the former waste ponds was run through both the GSS and SGS. The treatment demonstration confirmed USACE's initial assumption that this waste stream was not amenable to treatment. Since the FMSS waste that is located within the NRC-licensed burial pits is from a former MCW waste pond, the USACE and EPA also believe this waste would have in similar results if treated.

21. Nature and Extent of Contamination

Comment: One commenter requested clarification regarding what radioactive elements are present in the NRC-licensed burial pits.

Response: The NRC-licensed burial pits contain FMSS waste that is similar to others areas of the FMSS. Radiological isotopes present include Ra-226, Th-232, and U-238. These three isotopes are the focus of this ROD and have been determined to be the COCs for the FMSS.

22. Nature and Extent of Contamination

Comment: One commenter stated that the FS and the Proposed Plan indicate soil contamination was delineated only to restricted use criteria. As a result, the consequences of remediating certain properties to unrestricted use criteria are unknown. Without such data, a true comparison of alternatives cannot be conducted since the cost and short-term effectiveness cannot be evaluated.

Response: The FS and Proposed Plan do not indicate soil contamination was delineated only to restricted use criteria. In fact, soil contamination was delineated to both

restricted use and unrestricted use criteria (See §2.4 and Figures 2-8 through 2-11 of the FS).

23. Alternative 3 (Excavation and Disposal)

Comment: Several commenters, including U.S. Representative Steven R. Rothman and the Mayor and Council for the Borough of Maywood, preferred the selection of Alternative 3 (Excavation and Disposal). The commenters were concerned that the treatment unit would release fugitive dust emissions that could impact local residents. The commenters were also against the use of treated soil as backfill on the MISS. The commenters requested that all contaminated soil, including treated soil, be disposed off-site. The commenters stated that leaving treated soil at the MISS would adversely affect property values.

Response: The USACE and EPA concur that Alternative 3 should be selected as the remedial action for the Soils / Building OU. The USACE and EPA had originally selected Alternative 4 (Excavation, Treatment, and Disposal) as the remedy for this OU. However, USACE and EPA, in consultation with the NJDEP, have recently completed the evaluation of the treatment demonstration. This evaluation has shown that the proposed treatment technology is not effective, implementable and cost effective, and is therefore not a suitable alternative. Section E of the Decision Summary provides more details regarding the evaluation of the treatment technology. Regarding fugitive dust emission, refer to the response under Environmental Monitoring.

The NCP does not identify the depreciation of nearby property values as a consideration in selecting remedial actions on CERCLA sites. This remedial action was selected based on the nine criteria for selecting remedial actions found in Section 300.430(e)(9)(iii) of the NCP. However, community acceptance of remedial actions is a criterion, and was considered.

24. Alternative 4 (Excavation, Treatment, and Disposal)

Comment: Several commenters were in agreement with the selection of the preferred alternative (Alternative 4). In addition to the MISS, one commenter advocated the placement of treated soil on Stepan Company property.

Response: As discussed in the response to Comment 25 below, the evaluation of the treatment demonstration has shown that the treatment portion of Alternative 4 is not suitable for the contaminated soil found at the FMSS. The most promising treatment technologies were evaluated during this demonstration. Therefore, Alternative 3 will be chosen as the preferred remedy. The selected remedy is protective of human health and the environment, complies with ARARs, is cost-effective, and utilizes permanent solutions to the maximum extent practicable.

25. Alternative 4 (Excavation, Treatment, and Disposal)

Comment: Several commenters requested details on what the treatment portion of Alternative 4 would include. Several commenters were concerned about fugitive dust emissions and requested better dust control measures during the cleanup effort. In addition, considering the uncertainties and minimal cost differential with treatment, several commenters, including U.S. Representative Steven R. Rothman and the Mayor and Council for the Borough of Maywood, stated that Alternative 4 should not be recommended over Alternative 3. Since the results of the treatment demonstration were still being evaluated, the commenters questioned the effectiveness, implementability, and cost of the treatment portion of Alternative 4. Further, since the evaluation was ongoing, the commenters questioned how USACE and EPA could select Alternative 4 as the preferred alternative. In addition, several commenters requested an additional opportunity to comment on the preferred alternative, Alternative 4, if the treatment demonstration proved to be successful. One commenter stated that the treatment portion of the alternative should be performed on the property being remediated and the treated soil be placed on that property.

Response: The USACE and EPA no longer consider Alternative 4 as the preferred remedy. During the summer of 2000, the USACE performed a treatment demonstration on the MISS to evaluate technologies that seemed promising in treating the FMSS soils. The technologies that were demonstrated included radiological soil sorting and a segmented gate system. The treatment demonstration is complete, and USACE and EPA, in consultation with NJDEP, have evaluated the technologies to determine if they are effective, implementable, and cost-effective. The evaluation showed that the technologies were not suitable for the soils found at the FMSS. In addition, much public opposition to Alternative 4 was displayed. Therefore, the USACE and EPA, in consultation with the NJDEP, will select Alternative 3 and will dispose of the excavated soils without treatment.

The USACE takes all prudent measures to control fugitive dust emissions. Dust suppression is performed during cleanup activities by wetting down areas as needed, by covering trucks transporting contaminated soil, and by covering staged contaminated soil on the MISS.

26. Alternative 4 (Excavation, Treatment, and Disposal)

Comment: One commenter requested clarification if treated soil would be used as backfill at the 149-151 Maywood Avenue property. The same commenter also stated that if properties were remediated to the unrestricted use cleanup criteria with an ALARA goal consistent with the unrestricted use cleanup criteria, the use of treated soil as backfill would defeat the ALARA goal. In addition, the commenter requested that any backfill placed at the 149-151 Maywood Avenue property meet the exposure dose limits consistent with the unrestricted use cleanup criteria.

Response: Although the USACE and EPA no longer consider Alternative 4 as the preferred remedy, treated soils acquired as a result of implementation of Alternative 4, were only intended to be placed on the MISS property. Properties remediated to the unrestricted use criteria will not be backfilled with material that would void that cleanup.

27. Alternative 4 (Excavation, Treatment, and Disposal)

Comment: One commenter requested information regarding soil contamination volume estimates and the reduction of soil contamination volume through treatment. Another commenter stated that FMSS waste located within the NRC-licensed burial pits on Stepan Company property would not be amenable to treatment and would therefore adversely affect the cost savings shown from selecting Alternative 4 versus Alternative 3.

Response: The FS and Proposed Plan assume that treatment would be used for approximately 67,000 of the 288,000 yd^3 of contaminated soil that would be generated. These documents also assume that treatment would not be used for approximately 221,000 yd^3 because the properties of the FUSRAP waste is not amenable to treatment, and the FUSRAP waste is currently inaccessible and multiple mobilizations of the treatment unit would not be cost effective.

The FS and Proposed Plan estimate that approximately 40,000 of the 67,000 yd^3 (approximately 60 percent) of treated soil could be reused on the MISS as backfill. However, the recently completed evaluation of the treatment demonstration by USACE and EPA, in consultation with NJDEP, has shown that treatment is not effective, implementable, nor cost-effective for the types of FUSRAP waste found at the FMSS. The treatment demonstration results did not support the assumptions made by the FS and Proposed Plan.

The USACE and EPA agree that FMSS waste located in the NRC-licensed burial pits on Stepan Company property and the waste ponds would not be amenable to treatment. The FS and Proposed Plan cost estimate assumes that FUSRAP waste located within the pits and waste ponds would be disposed off-site without treatment.

28. Alternative 4

Comment: One commenter stated that the use of treatment, as preferred by CERCLA, is limited for soils because the treatability study is not yet complete and full implementation of treatment has not been evaluated. All indications are that treatment via physical separation would be viable across practically all areas of the Site. Remedy selection should be delayed pending a better understanding of the applicability of treatment or treatment should be aggressively pursued during remedial design. Limiting treatment and use of treated backfill to the MISS has no technical basis.

Response: The treatment demonstration is complete and shows treatment is not practicable.

29. Inaccessible Soil

Comment: One commenter requested clarification regarding the potential exposure to human health from FUSRAP Waste considered inaccessible. The same commenter requested clarification regarding the future remediation of inaccessible soil. Furthermore, the commenter questioned how long it would take USACE to plan and remediate the inaccessible soil at the 149-151 Maywood Avenue property.

Response: There is minimal exposure risk from inaccessible FUSRAP waste. Buildings and other structures prevent members of the public from inhaling and coming in contact with the FUSRAP waste. In addition, institutional controls will administratively control access to areas where inaccessible FUSRAP waste is present. Furthermore, radon monitoring within building where inaccessible soil is present is at levels that would not warrant remedial measures (e.g., venting).

Under the selected remedy, the USACE will remediate areas currently deemed inaccessible when these areas become accessible.

The owner of the 149-151 Maywood Avenue property has not contacted the USACE regarding the demolition of the structure at this property. If in the future the owner plans to expose the inaccessible FUSRAP waste below this structure, the owner should contact the USACE to assist in planning. FUSRAP waste below this structure could pose a safety hazard to workers involved in the demolition effort. The time frame for implementing the selected remedy within these areas is dependent on when these areas become accessible. Since Congress appropriates funding on an annual basis, it could take a year to initiate the selected remedy within such areas.

30. Waste Designation

Comment: One commenter stated that the NRC license for the burial pits located on Stepan Company property expired in 1992 and was never renewed by the Stepan Company. The commenter also stated that additional information should be provided regarding the regulatory and administrative process that will take place so that USACE will be able to remediate the burial pits. The commenter stated that the Proposed Plan should have addressed the Memorandum of Understanding between NRC and USACE that was published in the *Federal Register* on July 12, 2001. In addition, the commenter questioned why NRC did not take responsibility for the FMSS waste once NRC considered the waste as 11e(2) byproduct material. Furthermore, the commenter questioned how treatment could turn a portion of the waste stream into non-11e(2) byproduct material. Finally, the commenter requested additional information regarding potential chemical contamination and the affect this would have on waste designation.

Response: The burial pits located on Stepan Company property continue to be regulated by the NRC. Remediation of the burial pits will be coordinated with the NRC per the Memorandum of Understanding between the NRC and USACE that was published in the *Federal Register* on July 12, 2001. The purpose of the Memorandum of Understanding is to avoid unnecessary duplication of regulatory requirements that may hinder USACE in its remediation of sites under CERCLA. Under this agreement the NRC would exercise its discretion to suspend the license issued to Stepan Company, or portions thereof, to allow the USACE to remediate the three burial pits under FUSRAP. After the remediation is complete, the NRC will assure compliance with 10 CFR 20.1402 by reviewing the dose modeling and final status surveys for each burial pit. The NRC will terminate Stepan Company's license provided the provisions of 10 CFR 20 Subpart E-Radiation Criteria for License Termination are met.

The license issued to Stepan Company by the NRC only addresses the burial pits located on Stepan Company property. The license does not address radiologically contaminated soil or buildings on the MISS or vicinity properties. The Memorandum of Understanding between the NRC and USACE will reduce unnecessary burden on stakeholders and avoid duplication of regulatory requirements and effort by setting out cooperative conditions, consistent with the protection of the public health and safety. As such, the agreement permits the USACE to remediate soils under CERCLA that the NRC would otherwise regulate as 11e(2) byproduct material.

Evaluation of the treatment demonstration has shown that the treatment portion of Alternative 4 is not suitable for the contaminated soil found at the FMSS. Therefore, Alternative 3 will be chosen as the preferred remedy.

The USACE and DOE have analyzed hundreds of soil samples for chemical constituents. Site characterization and process information does not indicate that the FMSS waste is hazardous waste regulated under the Resource Conservation and Recovery Act.

The USACE and EPA will abide by NRC's decision regarding the classification of FMSS waste as regulated 11e(2) byproduct material.

31. Waste Designation

Comment: One commenter stated that the classification of all soils as "byproduct material" by the NRC is indefensible and should be challenged. Accepting NRC's classification of FMSS soils as "byproduct material" unnecessarily limits USACE's disposal options.

Response: USACE has considered, and will continue to consider, all reasonably available options related to the disposition of FMSS waste.

USACE believes NRC properly exercised its jurisdiction over the legal classification of FUSRAP waste from FMSS.

32. Waste Transportation and Disposal

Comment: Several commenters requested that the transport of contaminated soil from the MISS to the off-site disposal facility occur by rail not truck. Rail is located at the MISS. In addition, the commenters stated that direct rail has proven to be much safer than trucking. It was the position of the commenters that trucking could pose a safety hazard to the local population. The commenter further requested that the ROD state that the off-site disposal of soil from the MISS occur by rail.

Response: The USACE is currently planning to transport FUSRAP waste from the MISS to the off-site disposal facility by rail.

The USACE agrees that rail has proven to be a safe method for the transportation and disposal of the FUSRAP waste from the FMSS. The USACE disagrees that trucking posses a safety hazard to the local population. Trucking is used to transport the FUSRAP waste from the vicinity properties to the MISS for temporary staging until soil loadout and shipment to the off-site facility occurs as part of the efficient site operations. Since the listing of the Maywood Chemical Company Superfund Site on the NPL in 1983, there have not been any accidents during the truck transport of FUSRAP waste which have injured members of the local population.

The ROD will not specify the transportation method for the off-site disposal of this waste. If the ROD did specify the means of transport and future issues arise which delay or prevent the transportation of the waste from the FMSS via the specified transportation method, this could delay the completion of the selected remedy. The USACE would therefore be forced to stage contaminated soil at the MISS and/or suspend cleanup activities for an indefinite period of time, until the ROD is amended to allow for the alternative transportation mode. The USACE does not view this request is in the best interest of the public.

33. Waste Transportation and Disposal

Comment: One commenter stated that the Borough of Maywood requested that the FUSRAP waste be transported from the MISS within 48 hours of being staged.

Response: For financial and technical reasons it is impracticable for the USACE to transport the FUSRAP waste within 48 hours of being staged at the MISS. Prior to transport, the FUSRAP waste must be characterized to comply with manifesting requirements. Samples deemed representative of the material being shipped are collected and analyzed. This, including the completion of the manifest, generally takes more than 48 hours to complete. In addition, it is more cost effective for the

USACE to load and transport larger quantities of soil (e.g., several rail cars of FUSRAP waste). As coordinated with the Borough of Maywood, the USACE is committed to limiting the amount of staged FUSRAP waste at the MISS. However, the ROD will enable the USACE to transport vast amounts of FUSRAP waste from the FMSS. The USACE is confident that under this ROD, the FUSRAP waste would be staged at the MISS for shorter lengths of time.

34. Waste Transportation and Disposal

Comment: An overwhelming number of commenters were against the use of the Cotter Uranium Mill located near Canon City, Colorado for the disposal of FMSS waste. Several commenters cited technical issues with water infiltration under the impoundment tailing ponds and potential adverse affects to the hypalon liner from the FMSS waste, violations issued to Cotter Uranium Mill by the Colorado Department of Public Health and Environment, the scarcity of water for dust control, the condition of the railway into the Cotter Uranium Mill, long-term responsibility for the Cotter Uranium Mill, potential adverse health affects from the material on people living in Canon City and along the transportation route, potential adverse affect on real estate values in the vicinity of the Cotter Uranium Mill, potential adverse affects on local tourism, preparation of Environmental Assessment that did not address all potential impacts, and the need to prepare a Environmental Impact Statement versus an Environmental Assessment.

Response: The USACE will not dispose of FMSS waste in the Cotter Uranium Mill unless the State of Colorado and the EPA approve the facility to accept the waste. The Cotter Uranium Mill is one of several viable facilities under consideration by the USACE. To support the non-time critical removal action that was initiated during 2001, the Cotter Uranium Mill was selected as the disposal facility for FMSS waste that the NRC considers 11e(2) byproduct material. The contract with the Cotter Uranium Mill would allow the USACE to dispose of additional ROD generated 11e(2) byproduct material at this facility. However, the USACE has not disposed of any material at the Cotter Uranium Mill. FMSS waste that the NRC considers 11e(2) byproduct material is currently being disposed at another disposal facility permitted or licensed to receive the specific materials being shipped. The facility that receives this waste will not be specified under this ROD. The designate disposal facility will be determined during the implementation of the selected remedy.

35. Waste Transportation and Disposal

Comment: Several commenters advocated the use of the Cotter Uranium Mill located near Canon City, Colorado for the disposal of FMSS waste.

Response: See response to item 34.

36. Waste Transportation and Disposal

Comment: Several commenters requested additional information regarding the loading of FUSRAP waste into railcars for off-site disposal. One commenter questioned if the rail cars were open when loaded and if plastic was used to seal the cars. Several commenters were concerned with fugitive dust emissions during rail car loading. One commenter recommended loading the FUSRAP waste as sludge.

Response: The USACE is currently using railcars called gondolas for the off-site disposal of FUSRAP waste. This type of railcar is sealed on all sides except for the top. Prior to loading of the FUSRAP waste, an 18 mils thick Super Load Wrapper, commonly referred to as a burrito bag, is placed in the railcar to prevent the release of waste during shipment. The burrito bag encapsulates the waste when the open top is folded over on each side and tied closed.

The USACE takes all reasonable measures to control fugitive dust emissions during the railcar loading process. To control these emissions, water is added to the waste when necessary. Moist or wet soil is less likely to become airborne. Since the off-site disposal facility that the USACE is currently using has strict requirements regarding the moisture content of the waste, the moisture is regularly checked to ensure that there will be no free liquids present upon arrival at the off-site disposal facility. If free liquids are present upon arrival at this disposal facility, the operator may reject the railcar.

The USACE disagrees that the FUSRAP waste should be loaded in the gondola cars as sludge. Sludge is a material with high water content and low solids content. Sludge would not meet the waste acceptance criteria of the disposal facility that the USACE is currently using. Although this may reduce fugitive dust emission during loading, it could increase overall emissions at the MISS due to the additional handling required for mixing. However this would alleviate potential fugitive dust emission during the unloading process. As previously discussed, the USACE is considering using the Cotter Uranium Mill for the disposal of FUSRAP waste. This facility will accept waste with as much as 70% moisture content. Disposing of the FUSRAP waste with up to 70% moisture content would greatly increase the transportation and disposal cost for the FMSS waste, and would not enhance safety over existing operations.

37. Waste Transportation and Disposal

Comment: One commenter requested information regarding where the FUSRAP waste that is being generated as part of the Removal Action is being disposed. The commenter also questioned if using this facility is the cheapest and fastest method to dispose of the FUSRAP waste. Furthermore, the commenter questioned if other transportation and disposal methods were available that could expedite the cleanup effort.

Response: FUSRAP waste that the NRC considers regulated 11e(2) byproduct material is currently being disposed in the NRC licensed 11e(2) disposal cell at the Envirocare of Utah, Inc. facility located in Clive, Utah.

The disposal rate that the Envirocare of Utah, Inc. currently charges the USACE is considered reasonable. Other disposal facilities licensed to receive the specific materials being shipped by the FMSS are available. The USACE contractor has issued a contract to Franklin Environmental Services, Inc. that includes the disposal of FMSS waste at the Cotter Uranium Mill located near Canon City, Colorado. This contract was competitively bid and is a cost-effective solution for the disposal of FUSRAP waste. This disposal facility is currently unavailable to the USACE. The Cotter Uranium Mill is in the process of addressing issues with the State of Colorado. The USACE may initiate waste disposal at this facility when all legal issues are resolved.

The USACE does not concur that the duration of the cleanup effort could be shortened if a different disposal facility or transportation method is selected by the USACE. Transportation is conducted per DOT requirements and would be done as such regardless of where sent and although disposal facilities' waste acceptance criteria are different they are similar, thus alternate facilities would have minor impacts to schedule. USACE is currently not aware of alternative methods that would expedite the remedial action.

38. Waste Transportation and Disposal

Comment: One commenter requested clarification regarding what percentage of the cleanup costs could be attributed to FUSRAP waste transportation and disposal.

Response: For the selected remedy, Alternative 3, the FS and Proposed Plan estimate that FUSRAP waste transportation and disposal would account for approximately 35 percent of the total cleanup costs. The cost estimate is based on calendar year 2002 transportation and disposal rates. Future transportation and disposal rates may affect this percentage.

39. Waste Transportation and Disposal

Comment: Several commenters were concerned that FUSRAP waste was being transported to the MISS in unlined, uncovered trucks. Another commenter recommended the use of self-contained tucks.

Response: The USACE has verified that all FUSRAP waste is transported from vicinity properties to the MISS in lined, covered trucks. However, unlined, uncovered truck shipments of clean soil are regularly received by the USACE for a variety of purposes. From the exterior, it is very difficult to distinguish a truck carrying FUSRAP waste versus a truck carrying clean soil. It is possible that the commenter was referring to trucks carrying clean soil.

The USACE takes prudent measures to ensure that the FUSRAP waste is not released during truck transport. Prior to loading FUSRAP waste into a truck, a 6-mils thick poly sheeting material is placed in the truck to contain the waste during transport to the MISS. Each poly sheeting is used only once. Prior to leaving the property, each truck is surveyed using portable radiological monitoring instruments. The purpose of the radiological survey is to verify that the exterior of the truck has not been cross-contaminated during the loading process.

USACE purchases clean soil material from area suppliers. These suppliers use contractors to deliver the clean soil to the MISS and vicinity properties. The supplier's contractors are not under the direction of the USACE

The USACE is not planning to use self-contained trucks to transport the FUSRAP waste. This type of transport would complicate the transportation and disposal efforts and increase costs. The USACE is taking all necessary actions to meet or exceed compliance with prescribed USDOT requirements. The USACE welcomes any other considerations that should be evaluated for operation and remediation of the FMSS.

40. Waste Transportation and Disposal

Comment: One commenter stated if there are any USACE plans to transport FUSRAP waste from the FMSS via truck to a rail yard located in Paterson, NJ.

Response: The USACE is planning to transport FUSRAP waste directly from the FMSS via rail located at the MISS to the disposal facility.

41. Waste Transportation and Disposal

Comment: One commenter was against the use of International Uranium Corporation's White Mesa Uranium Mill, located near Blanding, Utah for the disposal of FMSS waste. The commenter cited technical issues with extracting uranium from the FMSS waste, short and long term impacts from transporting the FMSS waste from the MISS to this facility, licensing which permits the acceptance of 11e(2) byproduct material at this facility, and other site-specific issues. The commenter also requested clarification regarding how USACE would demonstrate that the FMSS waste meet's the waste acceptance criteria of this facility.

Response: The USACE will dispose of FMSS waste at a disposal facility licensed to receive the specific materials being shipped. The facility that receives this waste will not be specified under this ROD. The designate disposal facility will be determined during the implementation of the selected remedy.

42. Waste Transportation and Disposal

Comment: One commenter requested USACE's position regarding the disposal of FMSS waste at a Superfund site. The commenter also requested USACE's position regarding the completion or lack there of, an Environmental Impact Statement for a disposal facility. Furthermore, the commenter requested clarification regarding USACE's preference to dispose of FMSS waste cost-effectively.

Response: All disposal facilities receiving off-site shipments of waste from the FMSS must be evaluated pursuant to the procedures outlined in § 300.440 of the NCP. Under USACE policy, USACE coordinates with a prospective disposal facility regulator to ensure that the facility's license or permit is in good standing and that the regulator has no objection to the specific waste in question being stored, treated, or disposed at the facility.

The FMSS will require the offsite disposal a large volume of soil. Disposal fees make up a large percentage of the total estimated cost for the selected remedy. Therefore it is the intent of the USACE to dispose of FMSS waste as cost-effectively as possible, thus reducing the overall cost of the cleanup to the public and potential responsible party(ies).

43. Waste Transportation and Disposal

Comment: One commenter requested clarification if NRC will require processing of the FMSS waste that the NRC considers 11e(2) byproduct material. The commenter did not state what type of processing the NRC might require.

Response: The USACE is not aware of any NRC imposed requirements for the processing of FMSS waste that the NRC considers 11e(2) byproduct material.

44. Waste Transportation and Disposal

Comment: One commenter requested clarification if any FMSS waste streams would exceed 2,000 pCi/g. The commenter was aware that the DOT imposes specific requirements for the shipment of radiological waste that exceeds 2,000 pCi/g total for all radionuclides.

Response: The majority of waste shipments from the FMSS will be well below an average of 2,000 pCi/g for all radionuclides. However the potential exists that a few shipments may exceed this value. USACE is committed to complying with all applicable DOT regulations pertaining to the shipment of all hazardous materials. USACE requires their contractors to comply with all applicable federal and state regulations. Furthermore, USACE requires contractors to comply with USACE requirements for FUSRAP materials that are not regulated by DOT, EPA, or NRC.

45. Health and Safety

Comment: One commenter requested clarification regarding safety measures required for thorium decay series radionuclides.

Response: All USACE activities are required to comply with the USACE "Safety and Health Requirements Manual" (EM 385-1-1) in addition to the applicable federal and state regulations. The USACE does not take any special safety measures beyond those that would normally be found on a Superfund site that is radiologically contaminated. A Site Safety and Health Plan has been prepared for the FMSS that includes standard operating procedures that USACE contractors working at the FMSS must follow. Specific safety measures are adopted for each activity by performing an activity hazard analysis on that activity. Safety measures that USACE requires for the thorium decay series radionuclides are dependent on the concentration and potential mobility of the COCs. Generally, USACE contractors reduce the time of exposure, increase the distance from contaminated areas, and also use shielding where possible. FMSS waste is also keep moist, thus reducing the potential for airborne release and inhalation of the COCs.

46. Environmental Monitoring

Comment: Several commenters stated that FUSRAP waste handling operations at the MISS were causing off-site fugitive dust emissions to the degree that human health and the environment was being adversely affected. Another commenter recommended that air monitoring be performed along FUSRAP waste truck hauling routes.

Response: The USACE has implemented perimeter, work area, and personnel monitoring, as well as, routine gamma survey in addition to all other activities completed in accordance with the Annual Environmental Surveillance Monitoring to verify that members of the public are NOT being exposed to radionuclide emissions in the ambient air from waste handling operations at the MISS in excess of Federal regulatory levels (40 CFR Part 61 – Subpart H). To demonstrate compliance with 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAP's); National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities (Subpart H), an annual NESHAP's compliance analysis is performed for waste handling operations at the FMSS. In accordance with the guidance from the Federal regulatory agencies (USEPA, USDOE), the Clean Air Assessment Package – 1988 Personal Computer (CAP88-PC) is used to model potential off-site exposure from airborne emissions at the MISS. Airborne emissions contributing to off-site exposure could occur from areas where the radioactively contaminated soil is exposed to the elements (wind erosion) and from operations that generate airborne emissions. To determine the annual effective dose to the public from airborne emissions of radioactive particulates, multiple potential sources of particulate emissions are

included in the modeling analyses. The annual effective dose calculated by the CAP88-PC model for the maximally exposed individual is compared to the above regulatory limit to assess compliance with 40 CFR Part 61. The results of these analyses are documented in the Annual NESHAP's Compliance Report for the FMSS.

Based on the data obtained for the NESHAP Reports through personnel monitoring, and the practices of lining the trucks, air monitoring along FUSRAP waste hauling routes is not necessary. In addition, the USACE takes prudent measures to ensure that the FUSRAP waste is not released during truck transport. These measures were previously discussed. The response to Comment 39 provides more details about the truck lining practices currently used by the USACE.

47. Institutional Controls

Comment: One commenter requested clarification on the implementation of institutional controls for the 80 Industrial Road property location in the Borough of Lodi.

Response: On properties where the USACE and EPA plan to remediate to the unrestricted use cleanup standard, institutional controls will not be required unless FUSRAP waste is present on the property in areas deemed inaccessible. It is the intent of the USACE and EPA to limit the use of institutional controls to only those portions of the property where FUSRAP waste will remain above the unrestricted use cleanup criteria. The type of institutional controls will be determined by the USACE after consultation with EPA, NJDEP, and the affected property owner.

48. Institutional Controls

Comment: Several commenters requested clarification regarding the implementation of institutional controls on properties subject to such controls, including which governmental agencies would be involved in the review and implementation of such controls. The commenter recommended that a mechanism be established that would assist property owners in cases where site modifications or routine maintenance are planned. In addition, the commenter recommended that future institutional controls be modeled after the NJDEP regulations. Furthermore, the commenter stated that the Proposed Plan should clearly state that engineering controls would not be required. Given the long half-life of the radiological COCs, another commenter questioned how control of relevant records would be maintained.

Response: To address the need for institutional controls on some FMSS properties, the USACE will prepare an Institutional Control Implementation Plan. The types of institutional controls that will be implemented and the responsibility for implementing and enforcing the controls will be determined by the USACE after consultation with EPA, NJDEP, and the affected property owner. USACE will

consider all the procedures associated with New Jersey Property Law to determine the best means to implement and maintain a "deed notice".

49. Institutional Controls

Comment: One commenter stated that the extent of radiological contamination in buildings is unknown and, correspondingly, a remedial plan cannot be developed. Demolition should not be a fallback, particularly since the affected buildings are part of an operating facility and conducting demolition would constitute a taking of Stepan Company's property. Alternatives to partial demolition of buildings were not adequately evaluated. In particular, surface sealing and decontamination alone were summarily dismissed without explanation while conditions at the Site argue for their applicability. Any residual risks of contaminant release associated with future building renovations could be managed through restrictive covenants placed on the property.

Response: The USACE and EPA agree that the demolition of buildings in the vicinity of radionuclide-contaminated soils may be highly disruptive to businesses. The USACE is currently completing its evaluation of additional radiological data that has been collected within Stepan Company's buildings. USACE will consult with individual property owners regarding options for remediation of contaminated buildings and/or areas below buildings where FMSS waste is known or assumed to be present.

USACE considers FMSS waste below buildings to be inaccessible and therefore would not excavate unless the owner makes such areas accessible. USACE does not anticipate that any Stepan Company buildings will require demolition due to subsurface contamination, except the warehouse covering NRC-Licensed Burial Pit 3.

For clarification, surface sealing was eliminated as an option due to its lack of long-term effectiveness. Decontamination, partial demolition, and disposal are still considered viable remediation alternatives for the buildings/structures. A determination of the best option, including the potential for establishing institutional controls, will be discussed with each individual property owner as USACE progresses toward remediation of that property.

50. Cost Estimate

Comment: One commenter requested clarification regarding the cost estimate for Alternative 3.

Response: The Proposed Plan summarizes the cost estimate for Alternative 3. A detailed analysis of Alternative 3, as well as the other alternatives, can be found in Appendix B of the FS. The cost estimate evaluated potential costs that might be incurred by each alternative. To facilitate the estimate, a work breakdown

structure was used to estimate the cost to perform discrete activities. The overall cost is estimated by rolling up the costs from each discrete activity. To simplify the estimate, a percentage of certain costs were used to derive the costs for other activities. This is typically done for these types of estimates.

51. Funding

Comment: Several commenters stated that funding should be set aside (appropriated) to remediate properties where FUSRAP waste is located in inaccessible areas. The commenters stated that this would facilitate the eventual cleanup of properties subject to institutional controls.

Response: Historically, Congress has annually appropriated funds for FUSRAP and allowed these funds to remain available until expended. The USACE is working with Congress to establish how the funding for remediation of currently inaccessible soils will be available when these properties become available. USACE requests the assistance of property owners to provide sufficient planning information to USACE in order to identify and plan the opportunities for future remediation of these properties.

52. Public Involvement

Comment: One commenter stated that the USACE should conduct a public information program about the final plan for implementing Alternative 4 well before actual site work begins. Another commenter stated that the FMSS does not have a community relations program that considers members of the public that may be impacted by FMSS waste during transport or disposal.

Response: The USACE and EPA no longer consider Alternative 4 as the preferred remedy. The USACE agrees that it is important to keep the community appraised of relevant developments at the FMSS. Providing the community and interested parties with all the information and documents that are being considered in the selection of remedial actions, allows meaningful input consistent with the community acceptance criteria from the NCP (Section 300.430(e)(9)(iii)(I) for selecting remedial actions. The USACE has established an active public involvement program for the FMSS. This program includes maintaining a web site, issuing a periodic newsletter that provide routine updates on site activities, staffing the FUSRAP Public Information Center located in the Borough of Maywood, and regular contact with and briefings for affected property owners, tenants, employees, and public officials. Furthermore, an administrative record file was established at the FUSRAP Public Information Center to provide the public with access to all the information used to form the basis for the remedy selection. In addition, this ROD is available to the public for review. A Notice of Availability was published in the local newspapers that informed the public that the USACE and EPA have selected Alternative 3 for the Soil / Building OU. Once approved by the USACE and EPA, the Remedial Design and supporting

documents will be made available to the public. The documents will detail how USACE will implement the selected remedy.

The USACE has complied with CERCLA regulations and guidance regarding public involvement on FSs and Proposed Plans. The success of the community relations program for the FMSS is demonstrated by the receipt of the vast majority of comments addressed herein from members of the public and organizations who may be impacted by the selected remedy in the State of Colorado. Additional comments have been received from as far away as the State of Utah. In addition to complying with CERCLA regulations and guidance regarding public involvement, USACE took other actions specifically to promote public involvement in host communities of potential disposal sites, including: participated in a 3/5/2002 public meeting held by the Cotter Corp. in the State of Colorado regarding the potential disposal of FMSS waste at the Cotter Uranium Mill, attended and participated in subsequent public meetings held in the State of Colorado by the Cotter Corp. as required by the State of Colorado legislation HB 1408, posted the FS and Proposed Plan of the FMSS website, provided copies of the Proposed Plan to several recipients in the vicinity of the Cotter Uranium Mill (Colorado Department of Public Health and the Environment, Concerned Citizens Against Toxic Waste, Concerned Citizens of Canon City, Canon City Clerk, and Chairman of the Fremont County Board of Commissioners), extended the public comment period twice, and performed interviews with local media and members of the public who live in the vicinity of the Cotter Uranium Mill.

53. Schedule

Comment: One commenter questioned the schedule and timing of the remediation effort at 99 Essex Street.

Response: The schedule for implementing the selected remedy at the 99 Essex Street property is dependent on completion of the Remedial Design, funding that is authorized by Congress, and on obtaining access to the property from the property owner. Under the Action Memorandum for the *Engineering Evaluation/Cost Analysis for a Removal Action in Support of NJDOT Roadway Improvement Projects at the FUSRAP Maywood Superfund Site (FMSS),* July 2001, the USACE could initiate a Removal Action at the 99 Essex Street property. However, the property owner has not granted property access to the USACE. The USACE will initiate the Removal Action or selected remedy when access to the property is obtained.

54. Schedule

Comment: One commenter recommended that the 99 Essex Street be remediated in multiple phases. The commenter recommended that the front parking lot be remediated in two phases. In addition, the commenter recommended that the east or west sides

of the building be remediated independently so that access can be maintained for one of the building tenants.

Response: The USACE agrees at the 99 Essex Street property, the selected remedy can be implemented in multiple phases. The Remedial Design for the 99 Essex Street property will include a phasing plan. The phasing plan will document how USACE will remediate the property under the selected remedy. Preparation of the phasing plan will be coordinated with input from the property owner and/or tenants so that USACE impact to these tenants is minimized to the extent possible.

55. Schedule

Comment: From a budgetary perspective, one commenter requested clarification regarding the estimated completion date of the selected remedy and if this date was optimistic. The same commenter requested clarification regarding the susceptibility of the FMSS budget to Federal budgetary constraints. From a transportation and disposal perspective, another commenter requested clarification regarding the estimated completion date of the selected remedy. The commenter noted that as part of the Removal Action, USACE is currently disposing of approximately 3,000 tons per month. The commenter also noted that at this rate it would take over 100 months to transport and dispose all the FUSRAP waste. A third commenter requested clarification regarding USACE plans to excavate FUSRAP waste during the winter months.

Response: The USACE can not provide a date when the selected remedy will be completed. A portion of the FUSRAP waste is inaccessible and will not be made available to the USACE for remediation. If Congress provides sufficient funding and all areas are made accessible to the USACE, the USACE estimates that the selected remedy can be completed within 6 years from release of this ROD. One year would be required for completion of the Remedial Design and supporting documents and 5 years would be required for implementing the selected remedy. The USACE believes this is an optimistic time frame. The FS and Proposed Plan estimate that $254 million would be required to complete the selected remedy, Alternative 3. To support this time frame, an annualized budget of $42.3 million would be required. This is substantially more than the FMSS has received during prior fiscal years. However, without an approved ROD, the USACE could not initiate the selected remedy at the FMSS. Given the release of this ROD and the high priority of the FMSS cleanup effort, additional funding will be requested by USACE. The USACE is not aware of any budgetary constraints imposed on the FMSS by Congress.

The above FS and Proposed Plan cost estimate assumes that two crews would be excavating approximately 150 yd^3 per day of FUSRAP waste. It also assumes that approximately 300 yd^3 per day of FUSRAP waste would be transported off-site for disposal. These rates are higher than the rates currently being achieved

under the Removal Action. If the ROD excavation and transportation rates can be maintained, it would take between four and five years for FUSRAP waste excavation, transportation, and disposal.

The USACE plans to implement the selected remedy twelve months a year. FUSRAP waste will be excavated subject to weather that does not jeopardize the health and safety of USACE contractors and members of the public, or increases the potential for an uncontrolled off-site release of FUSRAP waste into the environment.

56. Site Restoration

Comment: One commenter stated that the Proposed Plan should state that all disturbed areas would be restored to their previously existing conditions.

Response: The USACE agrees that the Proposed Plan should have been clearer regarding site restoration. In areas subject to remediation or disturbance by the USACE, it is the intent of the USACE to restore areas to previously existing conditions. On occasion, it may be impracticable or impossible to replace in kind. In such instances, the USACE will negotiate with the property owner for adequate restitution.

57. Potentially Responsible Party

Comment: One commenter requested clarification regarding the involvement of the U.S. Department of Justice.

Response: The U.S. Department of Justice represents the citizens of the U.S. in enforcing the law in the public interest. The mission of the U.S. Department of Justice, Environment and Natural Resources Division is, through litigation in the federal and state courts, to safeguard and enhance the American environment. A major function of the Division is to conduct litigation under federal statutes enacted to protect the environment and require the cleanup of hazardous waste or recover the costs of cleanup. To recover the costs of the FMSS cleanup, the U.S. Department of Justice is building a case against the potentially responsible parties.

58. Maywood Chemical Company Superfund Site

Comment: Several commenters stated that Stepan Company and the Federal Government should share the cost and effort to remediate the Maywood Chemical Company Superfund Site. Another commenter stated that this is not the final cleanup. Several commenters were concerned with potential contaminated groundwater.

Response: The Stepan Company and the Federal Government are sharing the cost and effort to remediate the Maywood Chemical Company Superfund Site. The Maywood Chemical Company Superfund Site is being addressed under three separate

RI/FSs (or OUs) overseen by EPA Region 2. The USACE is responsible for two of these, FUSRAP-contaminated soils/buildings and groundwater. EPA is overseeing the remaining RI/FS (or OU) that addresses non-radioactive, chemical contamination on Stepan Company property and adjoining properties. USACE's portion of the Maywood Chemical Company Superfund Site is referred to as the FMSS. USACE is the lead Federal agency for the FMSS. Subject to the terms of the FFA between EPA and DOE, USACE is responsible for FUSRAP waste at the FMSS. FUSRAP waste includes any chemical or non-radiological contamination on vicinity properties that would satisfy either of the following: the chemical or non-radiological contaminants which are mixed or commingled with radiological contamination above cleanup levels; or, the chemical or non-radiological contaminants which originated at the MISS or were associated with the specific thorium manufacturing or processing activities at the MCW which resulted in the radiological contamination. USACE is currently conducting a RI/FS for groundwater at the site. A separate groundwater ROD will be prepared upon conclusion of these activities.

59. Removal Action

Comment: Several commenters stated the Removal Action that USACE is currently performing would delay implementation of the selected remedy within the Borough of Maywood.

Response: The properties being remediated under the current Removal Action are considered to be part of this ROD. Cleanup of these properties will not delay implementation of the selected remedy within the Borough of Maywood. Due to the Removal Action, several properties within the Borough of Maywood have substantially been remediated. This ROD will enable the USACE to continue remediating properties within the Borough of Maywood.

60. 1985 Cooperative Agreement Between DOE and Stepan Company

Comment: One commenter questioned the status of the 1985 Cooperative Agreement between DOE and Stepan Company and whether it was still legally binding. The commenter noted that the Agreement provided specific responsibilities for each signatory and addressed the permanent disposal of FMSS waste within DOE managed facilities. The commenter noted the names of three non-DOE managed disposal facilities that could accept FMSS waste that the NRC considers regulated 11e(2) byproduct. One of these facilities is currently receiving FMSS waste and a second facility is under contract to receive FMSS waste.

Response: Upon assuming responsibility for FUSRAP, USACE accepted responsibility as DOE's successor for all response actions required by Federal Facility Agreements executed between DOE and EPA. To this date, USACE has not accepted responsibility as DOE's successor to the 1985 Cooperative Agreement between DOE and Stepan Company.

61. Disposition of the MISS Following Site Cleanup

Comment: One commenter stated that after the MISS is remediated by the Federal Government, the property should be given back to the Stepan Company so that property taxes could once again be collected for this property.

Response: The USACE agrees that the MISS may once again support the tax base for both the Borough of Maywood and the Township of Rochelle Park. At the completion of the selected remedy, the USACE will transfer responsibility for the MISS to the DOE Long Term Stewardship Program. The DOE is responsible for all FUSRAP sites where institutional controls are required. If in the future the Federal Government determines that the MISS is a surplus property, the MISS will be disposed in accordance with the United States Code Title 40 Section 484.

TABLES

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Table 1. Status of the FMSS Properties

Property Unit	Property Address	Type of Property	Status	Cleanup Criteria
MISS	100 West Hunter Avenue, Maywood and Rochelle Park	Federal	A	Restricted Use
Stepan Company	100 West Hunter Avenue, Maywood	Commercial	A	Restricted Use
Commercial / Government	149-151 Maywood Avenue, Maywood	Commercial	A	Restricted Use
	Interstate 80, Lodi: (1) east right-of-way and (2) beneath road west right-of-way	State	(1) A (2) B	Restricted Use
	NJ State Route 17, Maywood and Rochelle Park	State	A	Restricted Use
	167 NJ State Route 17, Maywood	Commercial	A	Unrestricted Use
	239 NJ State Route 17, Maywood	Commercial	A	Unrestricted Use
	111 Essex Street (St.), Maywood	Commercial	A	Unrestricted Use
	Lodi Industrial Railroad, Maywood	Commercial	A	Restricted Use
	72 Sidney St. (a.k.a. 88 Money St.), Lodi	Commercial	A	Unrestricted Use
	8 Mill St., Lodi	State	A	Unrestricted Use
	80 Industrial Road (Rd.), Lodi	Commercial	A	Unrestricted Use
	80 Hancock St., Lodi	Commercial	A	Unrestricted Use
	100 Hancock St., Lodi	Commercial	A	Unrestricted Use
	170 Gregg St., Lodi	Commercial	A	Unrestricted Use
	150*, 160, 174 Essex St., Lodi	Commercial	A	Unrestricted Use
	99 Essex St., Maywood	Commercial	A	Unrestricted Use
	113 Essex St., Maywood	Commercial	A	Unrestricted Use
	200 NJ State Route 17, Maywood	Commercial	A	Unrestricted Use
	New York, Susquehanna, & Western Railway	Commercial	A	Restricted Use
	85, 87, 99–101 NJ State Route 17, Maywood	Commercial	A	Unrestricted Use
	137 State Route 17, Maywood	Commercial	A	Unrestricted Use
	23 West Howcroft, Maywood	Commercial	A	Unrestricted Use
	50 and 61 West Hunter Avenue, and 205 Maywood Avenue, Maywood	Commercial	A	Unrestricted Use
	96 Park Way, Rochelle Park	Commercial	B	
	Lodi Municipal Park, Lodi	Municipal	B	
	Fire Station No. 2, Lodi	Municipal	B	
	Fireman's Memorial Park, Lodi	Municipal	B	
	John F. Kennedy Municipal Park, Lodi	Municipal	B	
Residential	136, 142* West Central Avenue, Maywood	Residential	B	
	200 Brookdale St, Maywood	Residential	B	
	454, 459, 460, 464, 468 Davison Avenue, Maywood	Residential	B	
	459, 461, 467 Latham St., Maywood	Residential	B	
	10, 22, 26, 30, 34, 38, 42 Grove Avenue, Rochelle Park	Residential	B	
	86, 90 Park Way, Rochelle Park	Residential	B	
	79 Avenue B, Lodi	Residential	B	
	59, 90 Avenue C, Lodi	Residential	B	
	108, 112, 113 Avenue E, Lodi	Residential	B	
	121, 123 Avenue F, Lodi	Residential	B	
	58, 59, 60, 61, 62, 64 Trudy Drive, Lodi	Residential	B	
	3, 4, 5, 6, 7, 8, 9*, 10 Hancock St., Lodi	Residential	B	
	2, 4, 6, 7, 11 Branca Court, Lodi	Residential	B	
	14, 16, 18, 20, 22, 24, 26, 28*, 34, 46* Long Valley Rd., Lodi	Residential	B	
	11, 17, 19* Redstone Lane, Lodi	Residential	B	
	106 Columbia Lane, Lodi	Residential	B	
	99 Garibaldi Avenue, Lodi	Residential	B	
	5, 7 Shady Lane	Residential	B	

A = Property to be addressed by this ROD.
B = Removal action completed on property.
* = Identifies property addresses that were not originally designated, but where contamination was remediated during other cleanup activities. These properties are in addition to the 88 originally designated properties at the FMSS.

Table 2. Radionuclide-Contaminated Media Present at the FMSS

Contaminated Media	Property Unit	Analyte	Maximum Concentration of Contaminants Detected[a]	
			Surface Soil (pCi/g)	Subsurface Soil (pCi/g)
Soil and bulk wastes contaminated with: Th-232 Ra-226 U-238	MISS	Th-232	790	1,699
		Ra-226	24	447
		U-238	All surface samples were below detection limits	367
	Stepan Company	Th-232	380	1,592 (sample from Burial Pit 1)
		Ra-226	130	333
		U-238	8.2	170
	Commercial / Government	Th-232	1,981	625
		Ra-226	493	116
		U-238	216	191
Building Surface Contamination – Fixed	All suspect contaminated buildings are located on Stepan Company property and the MISS. Contamination was only slightly above guidelines and the extent of contamination was minimal. Contamination is limited to fixed radioactive contamination.			

[a] The minimum detect of each contaminant was either below detection limits or within the range of background concentrations. Surface soils are defined here as the top 6-in.; subsurface soils are all soils below the 6-in. interval.

Table 3. FMSS Contaminated Soil Volume Estimates

Site	In Situ Soil Volume to Restricted Use Criteria[1] (cubic yards [yd^3])		In Situ Soil Volume to Unrestricted Use Criteria[2] (yd^3)		Comments
	Accessible	Inaccessible	Accessible	Inaccessible	
Lodi Properties					
8 Mill St.	N/A	N/A	2,357	0	
I-80 (west right-of-way and underneath roadway)	107	3,000	N/A	N/A	Volume of inaccessible soils under I-80 was identified in a March 29, 1996, letter from Susan Cange, DOE FMSS Manager, to Angela Carpenter, EPA Maywood Manager.
160 &174 Essex St.	N/A	N/A	1,845	254	See Note 5
170 Gregg St.	N/A	N/A	14	0	
80 Industrial Rd.	N/A	N/A	690	916	See Note 5
80 Hancock St.	N/A	N/A	868	3,440	See Note 5
100 Hancock St.	N/A	N/A	954	866	See Note 5
72 Sidney Street (a.k.a. 88 Money St.)	N/A	N/A	58	0	Actual 1,500 yd^3 excavated during Non-Time Critical Removal Action
Maywood Properties					
NJ State Route 17	0	20,000	N/A	N/A	See Note 5
23 Howcroft Rd.	N/A	N/A	4,552	338	See Note 5
149–151 Maywood Avenue	74,741	20,485	N/A	N/A	See Note 5
205 Maywood Avenue, 50 and 61 West Hunter St.	N/A	N/A	59	0	
137 NJ State Route 17	N/A	N/A	965	0	
Lodi Industrial RR	1,317	185	N/A	N/A	
167 NJ State Route 17	N/A	N/A	8,001	400	See Note 5
200 NJ State Route 17	N/A	N/A	375	0	
239 NJ State Route 17	N/A	N/A	3,393	156	See Note 5
85, 87, 99–101 NJ State Route 17	N/A	N/A	2,066	0	
99 Essex St.	N/A	N/A	423	0	
111 Essex St.	N/A	N/A	3,617	0	
113 Essex St.	N/A	N/A	514	0	
New York, Susquehanna &Western Railway	2,900	3,100	N/A	N/A	Contaminated soil directly under railroad tracks considered inaccessible.
Stepan Company					
100 West Hunter Avenue[3]	44,125	974	N/A	N/A	
MISS					
MISS (100 West Hunter Avenue)	73,233	0	N/A	N/A	
Subtotal [4]	196,423	47,744	30,751	6,370	
	244,167		37,121		
Total [4]	281,288				

1) Restricted Use Criteria: An average of 15 pCi/g of combined Ra-226 and Th-232 above background in subsurface soils with an ALARA goal of 5 pCi/g; and 50 pCi/g of U-238 above background at any depth.

2) Unrestricted Use Criteria: An average of 5 pCi/g of Ra-226 and Th-232 combined average concentration above background and 50 pCi/g of U-238 above background for soils.

3) Stepan Company volume includes contaminated material in NRC-licensed Burial Pits 1, 2, and 3 (approximately 19,100 yd^3). Burial Pit 3 is not considered inaccessible because the Stepan Company warehouse over Burial Pit 3 will be demolished to access the burial pit.

4) Total in situ volume (i.e.: volume of soil in the ground without accounting for volume growth due to swell and overexcavation) of contaminated media includes waste volume from the properties that are addressed by this ROD. Volumes associated with other past or ongoing cleanup actions are not included in this total. An additional 12,500 yd^3 of inaccessible soils are estimated to be present under streets adjacent to Phase I residential properties and have been included with the inaccessible Phase II properties. These soils will be addressed with the inaccessible soils at the commercial / government properties.

5) Due to limited data, the volume of inaccessible soil was estimated.

N/A = Indicates that the proposed cleanup criteria would not be applied to this property.

Source = BNI 1997. Volume Register, Revision 11; S&W 2001. Volume Register, Revision 0.

Table 4. Reasonably Anticipated Future Land Use and Recommended Cleanup Criteria

Property	Reasonably Anticipated Future Land Use	Recommended Cleanup Criteria	Factors to Consider during Remedial Design when Selecting Appropriate Controls
Borough of Maywood			
MISS	Limited light industrial	Restricted use	Property is Federally-owned; former MCW waste burial location; significant volumes of contamination present; industrial use for over 100 years
Stepan Company	Limited light industrial	Restricted use	Property is site of former MCW and current chemical manufacturing company; significant volumes of contamination present; industrial use for over 100 years; presence of inaccessible soils
23 Howcroft Rd.	Limited light industrial	Unrestricted use	Significant volumes of contamination present; although industrial use for over 40 years, because of location, future residential use is possible; proximity to residential properties; presence of inaccessible soils
149-151 Maywood Avenue	Limited light industrial	Restricted use	Property is site of former MCW and current distribution warehouse; significant volumes of contamination present; industrial use for over 100 years; presence of inaccessible soils
205 Maywood Avenue, 50 and 61 West Hunter Avenue	Limited light industrial	Unrestricted use	Minimal volume of contamination present; no inaccessible soils. Neighbors Stepan Company and is part of well-defined Maywood commercial / light industry district.
137 NJ State Route 17	Limited light industrial	Unrestricted use	Moderate volume of contamination present; no inaccessible soils. Fronts NJ State Route 17 and neighbors 149-151 Maywood Avenue. Property is part of well-defined Maywood commercial/light industry district.
167 NJ State Route 17	Limited light industrial	Unrestricted use	Current use of property as a gas station; significant volumes of contamination present; presence of inaccessible soils. Fronts NJ State Route 17 and neighbors 149-151 Maywood Avenue. Property is part of well-defined Maywood commercial / light industry district.
200 NJ State Route 17	Limited light industrial	Unrestricted use	Minimal volume of contamination present; no inaccessible soils. Fronts NJ State Route 17 and is part of well-defined commercial district along NJ State Route 17 and Essex Street.
239 NJ State Route 17	Limited light industrial	Unrestricted use	Current use of property as a gas station; significant volumes of contamination present; presence of inaccessible soils. Fronts NJ State Route 17 and neighbors 149-151 Maywood Avenue. Property is part of well-defined Maywood commercial / light industry district.
85,87,99-101 NJ State Route 17	Limited light industrial	Unrestricted use	Minimal volume of contamination present; no inaccessible soils. Fronts NJ State Route 17 and neighbors 149-151 Maywood Avenue. Property is part of well-defined Maywood commercial / light industry district.
99 Essex St.	Limited light industrial	Unrestricted use	Minimal volume of contamination present; no inaccessible soils. At the corner of NJ State Route 17 and Essex Street. Part of well-defined commercial district along NJ State Route 17 and Essex Street.

Table 4. Reasonably Anticipated Future Land Use and Recommended Cleanup Criteria (continued)

Property	Reasonably Anticipated Future Land Use	Recommended Cleanup Criteria	Factors to Consider during Remedial Design when Selecting Appropriate Controls
Lodi Industrial Railroad	Limited light industrial	Restricted use	Current use of property as transportation (railroad) corridor; size of property prohibits residential developments; presence of inaccessible soils
111 Essex St.	Limited light industrial	Unrestricted use	Property location between railroad corridor and creek; significant volumes of contamination present.
113 Essex St.	Limited light industrial	Unrestricted use	Moderate volume of contamination present; no inaccessible soils. Fronts Essex Street and is part of the well-defined commercial district on Essex Street.
New York, Susquehanna & Western Railroad	Limited light industrial	Restricted use	Current use of property as transportation (railroad) corridor; size of property prohibits residential development; presence of inaccessible soils
NJ State Route 17	Right-of way	Restricted use	Current use of property as transportation (State highway) corridor; all soils inaccessible
Borough of Lodi			
8 Mill St.	Limited light industrial	Unrestricted use	Moderate volume of contamination present; no inaccessible soils; property bounded by residential properties on west and south sides
Interstate 80	Right-of way	Restricted use	Current use of property as transportation (interstate) corridor; substantial volume of inaccessible soils relative to accessible soil volume
160 & 174 Essex St.	Commercial	Unrestricted use	Moderate volume of contamination present; no inaccessible soils. Fronts Essex Street and is part of well-defined commercial district along Essex Street
170 Gregg St.	Industrial	Unrestricted use	Minimal volume of contamination present; no inaccessible soils. Part of well-defined light industry district
80 Industrial Rd.	Industrial	Unrestricted use	Proximity of property to existing large residential neighborhoods and recreational parks; property bounded by residential property on west side
80 Hancock St.	Industrial	Unrestricted use	Proximity of property to existing large residential neighborhoods and recreational parks; property bounded by residential property on west side
100 Hancock St.	Industrial	Unrestricted use	Proximity of property to existing large residential neighborhoods and recreational parks; property bounded by residential property on north and west side
72 Sidney St. (a.k.a. 88 Money St.)	Commercial	Unrestricted use	Minimal volume of contamination present; no inaccessible soils. Fronts NJ State Route 46 and part of well-defined commercial district along NJ State Route 46

Table 5. Summary of Radioactive COC and Exposure Point Concentrations for Contaminated Soils at the FMSS

COC	Detected Concentration (pCi/g) (above background)		Exposure Point Concentration (pCi/g) (less background)		Statistical Measure
	Surface	Subsurface	Surface	Subsurface	
Th-232	0.4 - 380	0.2 - 1,699	2.49 - 24.73	0.83 - 526.13	UCL_{95}
Ra-226	0.3 - 130	0.2 - 447	0.38 - 5.13	0.23 - 126.39	UCL_{95}
U-238	1.1 - 80	0.5 - 304	2.18 - 15.53	1.34 - 132.36	UCL_{95}

Table 6. Radiological Risk Estimates

Alternative	Receptor Risks (lifetime^{-1}) (a)		
	Residential	Industrial	Transient / Maintenance
1	2×10^{-2}	4×10^{-3}	B
2	b	3×10^{-4}	B
3 (criteria)	1×10^{-4}	1×10^{-4}	1×10^{-4}
3 (residuals)	5×10^{-5}	b	B

(a) All values rounded to one significant digit.
(b) Not evaluated for this alternative.

Table 7. Radiological Dose Estimates

Alternative	Receptor Dose (mrem/yr) (a)		
	Residential	Industrial	Transient / Maintenance
1	859	281	191[(c)]
2	b	15	b
3 (criteria)	7	6	6
3 (residuals)	3.5	b	b

(a) All values rounded to significant digit.
(b) Not evaluated for this alternative.
(c) Maximum as reported from BRA property 6H. Property 7H not evaluated.

Table 8. FMSS Remedial Action Objectives

Environmental Media	RAOs
Source Media (soil and bulk waste)	To eliminate or minimize the potential for humans to ingest, come into dermal contact with, or inhale particulates of radioactive constituents, or to be exposed to external gamma radiation. To reduce radium and thorium concentrations in soil including the NRC licensed burial pits to levels in accordance with EPA / DOE dispute resolution cleanup criteria. An average of 15 pCi/g combined Ra-226 and Th-232 above background for the subsurface soils with an ALARA goal of 5 pCi/g; institutional controls to prohibit future residential use will be used. For unrestricted use, the cleanup criterion is an average of 5 pCi/g combined Ra-226 and Th-232 above background for soil. To reduce FMSS site concentrations of U-238 to 50 pCi/g (which is essentially 100 pCi/g total uranium) above background. These levels are considered protective for unrestricted use. To comply with exposure dose limits of 15 millirem per year (mrem/yr) as specified in NJAC 7:28-12.8(a)1.* To reduce the potential for environmental impacts and reverse the temporary disturbance of existing wetland habitats through removal of sediments exceeding the cleanup criteria. To eliminate or minimize toxicity, mobility, and/or volume of contaminated soils. To eliminate or minimize the potential migration of COCs into stream and storm drain sediments by surface water runoff. To eliminate or minimize the potential migration of COCs by infiltration or percolation that would result in contamination of the groundwater. To comply with ARARs.
Buildings / Structures	To comply with exposure dose limits of 15 mrem/yr as specified in NJAC 7:28-12(a)1.* To prevent radon concentrations in buildings from exceeding 3 pCi/L above background as specified in NJAC 7:28-12.8(a)2 . To eliminate or minimize toxicity or mobility, and/or volume of COCs. To comply with ARARs.

* The exposure dose limit of 15 mrem/yr above background, as specified in NJAC 7:28-12(a)1, applies to the sum of annual radiation, which includes the combined dose from both sources media (soil and bulk waste) and the building / structures.

Table 9. Estimated Completion Times for the FMSS Alternatives

Alternative	Implementation Timeframe	Time to Achieve Remedial Goals
Alternative 1: No Action	0 years	Remedial goals are not achieved
Alternative 2: Monitoring and Institutional Controls	2 years (1 year remedial design, 1 year to achieve permanent institutional controls)	2 years
Alternative 3: Excavation and Disposal	6 years (1 year remedial design, 5 years excavation, disposal, and site restoration)	6 years

Table 10. FMSS Cost Summary

30-Year Cost in Thousands, $FY02

HTRW WBS Number	Activity	Alternative 1 No Action	Alternative 2 Monitoring & Institutional Controls	Alternative 3 Excavation & Disposal
33	**HTRW REMEDIAL ACTION**	**0**	**0**	**151,233**
33.01	Mobilization and Preparatory Work	0	0	1,220
33.02	RA Monitoring, Sampling, & Analysis	0	0	12,937
33.05	Surface Water Collection / Control	0	0	664
33.06	Groundwater Collection / Control	0	0	331
33.08	Solids Collection / Containment[1]	0	0	19,160
33.10	Drums / Tanks / Structures / Misc. Removal	0	0	201
33.13	Physical Treatment	0	0	0
33.15	Soil Stabilization	0	0	1,240
33.17	Decontamination and Decommission	0	0	993
33.19	Disposal	0	0	89,767
33.20	Site Restoration	0	0	8,968
33.21	Demobilization	0	0	148
33.22	General Requirements	0	0	15,606
34	**HTRW O&M**	**290**	**13,328**	**7,230**
34.02	Monitoring, Sampling, & Analysis	290	8,159	2,922
34.22	General Requirements	0	5,169	4,308
	[2] TOTAL REMEDIAL ACTION AND O&M	**290**	**13,328**	**158,463**
	Prime Contractor (12% Subtotal RA + O&M)	0	0	19,016
	Remedial Design [10% (Total Direct – Disposal)]	29	1,333	8,496
	SUBTOTAL PROJECT COST	**319**	**14,661**	**185,975**
	Construction Contingencies (25% Subtotal Project)	80	3,665	44,370
	TOTAL PROJECT COST	**399**	**18,326**	**230,345**
	Program Management (10% Total Project)	40	1,833	23,072
	TOTAL	**439**	**20,159**	**253,417**

[1] Includes burial pits 1, 2, and 3.

[2] Includes project overhead and profit

Table 11. Comparative Evaluation of Alternatives 1–3

Criteria	Alternative 1 No Action	Alternative 2 Monitoring and Institutional Controls	Alternative 3 Excavation and Disposal
Overall Protectiveness of Human Health and the Environment	Low	Low/Medium	Medium/High
Compliance with ARARs	Low	Medium	High[1]
Long-term Effectiveness and Permanence	Low	Low	High[1]
Short-term Effectiveness; Includes Potential for Environmental Impacts	Low	Medium	High[1]
Time to implement[2]	Not Applicable	2 years	5 years
Reduction in Toxicity, Mobility, or Volume Through Treatment	Low	Low	Low
Implementability	Not applicable	High[1]	High[1]
Cost in FY02 dollars[3]	$439,000	$20,000,000	$254,000,000
State or Support Agency Acceptance	Low	Low	High[1]
Community Acceptance	Low	Low	High[1]

1 Most favorable ranking.
2 Time to implement is dependent on USACE funding, which is appropriated annually from Congress.
3 FY02 dollars denotes 30-year cost for the alternative with no adjustment for inflation or discount factor. Note that all alternatives would require O&M activities such as environmental monitoring beyond the 30-year time period used in the cost estimate.

Table 12. Estimated Cost of Cleanup Alternatives

Alternative	Description	Costs (FY02$)
1	No Action	$439,000
2	Monitoring and Institutional Controls	$20,000,000
3	Excavation and Disposal	$254,000,000

Table 13. FMSS Cost Summary

HTRW WBS Number	Activity	Alt. 3 – Excavation and Disposal
33	**HTRW REMEDIAL ACTION** Total of all remedial action implementation costs. Does not include remedial design, O&M, or program management.	**151,233**
33.01	Mobilization and Preparatory Work Includes all preparatory work required during remedial action. This includes construction submittals; mobilization of personnel, facilities, and equipment; construction of temporary facilities; temporary relocations; setup of decontamination facilities and institutional controls. It is assumed that there is an existing trailer and storage facilities on-site.	1,220
33.02	Remedial Action Monitoring, Sampling, & Analysis RA air, water, sediment and soil sampling, monitoring, testing and analysis. Includes sample taking, shipping samples, and sample analysis by on-site and off-site laboratory facilities. Sampling costs during RA are based on the annual costs of monitoring of all media (5 years total remedial action time). A final status survey of soil would be conducted prior to backfill of the properties to confirm that cleanup criteria have been met.	12,937
33.05	Surface Water Collection / Control Provides for the collection and control of contaminated surface water through erosion control measures and civil engineering structures such as berms and dikes. Includes the collection of surface water through tanks and pump systems. Includes transport to treatment plant.	664
33.06	Groundwater Collection / Control Provides for the remedial action collection and control of contaminated groundwater encountered during soil excavation through the construction of piping, tanks, and pump systems. Includes transport to treatment plant.	331
33.08	Solids Collection / Containment Provides for excavation of contaminated soils and bulk waste.[1]	19,160
33.10	Drums / Tanks / Structures / Misc. Removal Includes the demolition and removal during remedial action of HTRW contaminated structures. Building No. 76, located at the MISS, would be completely demolished in order to access contaminated soils, leaving an estimated final building rubble volume of 2,043 yd^3, which would be disposed off-site at a local landfill. Asbestos removal activities are assumed not to be necessary.	201
33.13	Physical Treatment As part of this remedy, a full-scale treatment demonstration was conducted on the site soils to determine the effectiveness, implementability, and cost-effectiveness of treatment prior to processing all the contaminated site soils. The treatment demonstration was located on site at the MISS.	3,856
33.15	Soil Stabilization One percent of the total in situ soil volume is assumed to be mixed waste. Soil stabilization would include mixing the mixed waste with a 50% mixture of lime / portland cement and storing in 55-gallon drums for disposal. This process would take place at a designated area located near the rail spur. There are 3,087 yd^3 of mixed waste. Final volume for disposal is 6,174 yd^3.	1,240
33.17	Decontamination and Decommission This item provides for all the work associated with the decontamination and final status survey of the contaminated Stepan Company and MISS buildings.	993

Table 13. FMSS Cost Summary (continued)

HTRW WBS Number	Activity	Alt. 3 – Excavation and Disposal
33.19	Disposal Disposal during remedial action provides for the final placement of waste at third party facilities that charge a fee to accept waste depending on a variety of waste acceptance criteria.	89,767
33.20	Site Restoration Site restoration during remedial action includes topsoil, seeding, landscaping, restoration of roads and parking, and other hardscaping disturbed during site remediation.	8,968
33.21	Demobilization Provides for all work associated with remedial action plant takedown and removal of temporary facilities, utilities, equipment, material, and personnel.	148
33.22	General Requirements Consists of general remedial action requirements that are not specifically identifiable in the other systems such as indirect, overhead, profit, health and safety, and other general requirements.	15,606
34	**HTRW Operation & Maintenance (O&M)** This category summarizes the total expected O&M costs.	**7,230**
34.02	Monitoring, Sampling, & Analysis[5] Provides for all work during post construction Operation and Maintenance (O&M) associated with air, water, sediment and soil sampling, monitoring testing, and analysis. Includes sample taking, shipping samples, and sample analysis by on-site and off-site laboratory facilities. Also includes report preparation and CERCLA five-year reviews. Groundwater monitoring wells currently in place at the FMSS would be replaced once during the thirty-year monitoring period.	2,922
34.22	General Requirements Consists of general O&M requirements that are not specifically identified in other WBS elements, such as overhead, profit, health and safety.	4,308
	TOTAL REMEDIAL ACTION AND O&M[2]	**158,463**
	Prime Contractor Prime Contractor costs are estimated at 12% of the Subtotal Remedial Action and O&M Cost.	19,016
	Remedial Design Remedial Design costs are estimated at 10% of the Total Remedial Action and O&M Cost minus disposal costs.	8,496
	SUBTOTAL PROJECT COST	**185,975**
	Construction Contingencies (25% Subtotal Project)	44,370
	TOTAL PROJECT COST	**230,345**
	Program Management (10% Total Project)	23,072
	TOTAL	**253,417**

30-Year Cost in Thousands, $FY02

[1] Includes Burial Pits 1, 2, and 3.

[2] Includes project overhead and profit

Table 14. Reasonably Anticipated Future Land Use and Recommended Cleanup Criteria

Property	Reasonably Anticipated Future Land Use	Cleanup Criteria[a]	Available Uses of Land After Remedial Action
Borough of Maywood			
MISS	Limited light industrial	Restricted use	Commercial use
Stepan Company	Limited light industrial	Restricted use	Commercial use
23 Howcroft Rd.	Limited light industrial	Unrestricted use	Unrestricted use
149-151 Maywood Avenue	Limited light industrial	Restricted use	Commercial use
205 Maywood Avenue, 50 and 61 West Hunter	Limited light industrial	Unrestricted use	Unrestricted use
137 NJ State Route 17	Limited light industrial	Unrestricted use	Unrestricted use
167 NJ State Route 17	Limited light industrial	Unrestricted use	Unrestricted use
200 NJ State Route 17	Limited light industrial	Unrestricted use	Unrestricted use
239 NJ State Route 17	Limited light industrial	Unrestricted use	Unrestricted use
85,87,99-101 NJ State Route 17	Limited light industrial	Unrestricted use	Unrestricted use
99 Essex St.	Limited light industrial	Unrestricted use	Unrestricted use
111 Essex St.	Limited light industrial	Unrestricted use	Unrestricted use
113 Essex St.	Limited light industrial	Unrestricted use	Unrestricted use
Lodi Industrial Line	Limited light industrial	Restricted use	Commercial use
New York, Susquehanna & Western Railroad	Limited light industrial	Restricted use	Commercial use
NJ State Route 17	Right-of way	Restricted use	Commercial use
Borough of Lodi			
8 Mill St.	Limited light industrial	Unrestricted use	Unrestricted use
Interstate 80	Right-of way	Restricted use	Commercial use
160 & 174 Essex St.	Commercial	Unrestricted use	Unrestricted use
170 Gregg St.	Industrial	Unrestricted use	Unrestricted use
80 Industrial Rd.	Industrial	Unrestricted use	Unrestricted use
80 Hancock St.	Industrial	Unrestricted use	Unrestricted use
100 Hancock St.	Industrial	Unrestricted use	Unrestricted use
72 Sidney St. (a.k.a. 88 Money St.)	Commercial	Unrestricted use	Unrestricted use

[a] Table 15 provides a summary of the cleanup levels to be achieved.

Table 15. COCs and Cleanup Criteria

FMSS COCs		Cleanup Criteria	Source of Cleanup Criteria
Radionuclides in Soil	Ra-226 Th-232	**Restricted Use:** An average of 15 pCi/g combined Ra-226 and Th-232 above background in subsurface soils with an ALARA goal of 5 pCi/g **Unrestricted Use:** Average of 5 pCi/g combined Ra-226 and Th-232 above background for soils	DOE / EPA Agreement on Site-Specific Cleanup Criteria for the FMSS (see Appendix C of the FS for complete terms of this agreement).
	U-238	100 pCi/g of total uranium; 50 pCi/g of U-238	Site-specific uranium guideline (DOE 1994b) (See Appendix C of the FS).
Building Surface Contamination	Radionuclides	Maintain an exposure dose limit of 15 mrem/yr.	NJAC 7:28-12.8(a)1
Radon in Structures	Rn-222	Prevent Rn-222 concentrations in buildings from exceeding 3 pCi/L above background.	NJAC 7:28-12.8(a)2.

Table 16. Description of ARARs for the Selected Remedy

Potential Requirement	Citation	Description of Requirement	ARAR Status	Action to be Taken to Attain Requirement
Nuclear Regulatory Commission Regulations	10 CFR 20.1402	This regulation requires remediation of NRC-licensed portions of a site to the extent that residual radioactive contamination above background does not exceed 25 mrem/yr and has been reduced to levels that are as low as reasonably achievable.	Yes	The selected remedy will comply with this regulation through excavation and disposal of all soils in the NRC-licensed burial pits that exceed the cleanup criteria.
NJ Groundwater Quality Standards and NJDEP Effluent Standards for Site Remediation Projects	NJAC 7:9.6 Appendix, Table 1 (Class II-A Groundwater); N.J.A.C. 7:14A-12 Appendix B (FW-2 surface waters)	These standards list point-source discharge limitations for specific contaminants	Yes	The selected remedy will comply with these regulations through compliance with NJDEP permits for all off-site point source discharges.
Resource Conservation and Recovery Act	40 CFR 262.11	This regulation requires the generator of a solid waste to make a hazardous waste determination	Yes (an ARAR for Alternatives 3 & 4)	The generator of a hazardous waste will comply with this regulation by determining whether excavated soils contain hazardous wastes.
NJ Freshwater Wetlands Mitigation Requirements	NJAC 7:7A Subchapter 15	This regulation generally requires mitigation of wetlands impacted by regulated activities in fresh water wetlands and State open waters	Yes	The selected remedy will comply with these regulations through excavation and disposal of sediments within affected wetlands that exceed the cleanup criteria.
NJ Remediation Standards for Radioactive Materials	NJAC 7:28-12.8(a)1*	This standard requires remediation of a site to the extent that residual radioactive contamination above background in soils does not exceed 15 mrem/yr. NJAC 7:28-12.8(a)1 applies to soils and the NRC-licensed burial pits. Only the substantive requirements of this regulation apply to the selected remedy.	Yes	The selected remedy will comply with this regulation through remediation to the extent that the substantive standards of NJAC 7:28-12.8(a)1 are not exceeded.
	NJAC 7:28-12.8(a)2*	This standard requires that radon gas in indoor air does not exceed 3 pCi/L radon-222. NJAC 7:28-12.8(a)2 applies to buildings. Only the substantive requirements of this regulation apply to the selected remedy.	Yes	The selected remedy will comply with this regulation through remediation to the extent that the substantive standards of NJAC 7:28-12.8(a)2 are not exceeded.

* The exposure dose limit of 15 mrem/yr above background, as specified in NJAC 7:28-12(a)1, applies to the sum of annual radiation, which includes the combined dose from both sources media (soil and bulk waste) and the building / structures.

Table 17. Matrix of Cost and Effectiveness Data for the FMSS

Relevant Considerations for Cost-Effectiveness Determination

- Contamination in soils is widespread and ranges from surface soils to depths of up to 20 feet or more. Total in-situ volume of material contaminated above restricted use cleanup criteria is 244,167 yd^3; total in-situ volume of material contaminated above unrestricted use is approximately 37,121 yd^3.
- Baseline risk for potential current and future uses of the site in the absence of existing controls exceed the CERCLA risk range
- Site is located in densely populated area with a mix of residential, commercial and industrial land uses

Alternative (box is shaded if cost-effective)	Total Cost in FY02$	Incremental Cost	Long-term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and Volume through Treatment	Short-Term Effectiveness
1) No Action	$439,000	—	No reduction in long-term risk; Baseline risks unacceptable	No treatment included	No short-term risks to workers or the communities from taking an action
2) Monitoring and ICs	$20,000,000		Questionable effectiveness over the long-term due to the reliance on institutional controls to prevent exposures over the long life of the contaminants	No treatment included	No short-term risks to workers or members of the public from imposing durable institutional controls
3) Excavation and Disposal	$254,000,000		Effectively reduces long-term risk to acceptable levels via excavation and disposal of contaminants	No treatment included	Short-term risks to workers and the public due to excavation of soils. Highest short-term risks are risks due to construction and transportation activities; short-term risks due to contaminated soils are acceptable.

Cost-Effectiveness Summary: Alternatives 1 and 2 are not considered to be cost-effective because they do not provide a long-term effective solution to the unacceptable risks presented by the presence of radioactive contaminants at the site. Alternative 3 is considered cost-effective.

Table 18. Primary Population Data in the Vicinity of the FMSS

Locality	2000 Census Population	Percent Change from 1990
Bergen County	884,118	+ 7.1%
Borough of Lodi	23,971	+ 7.2%
Borough of Maywood	9,523	+ 0.5%
Township of Rochelle Park	5,528	- 1.1%

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FIGURES

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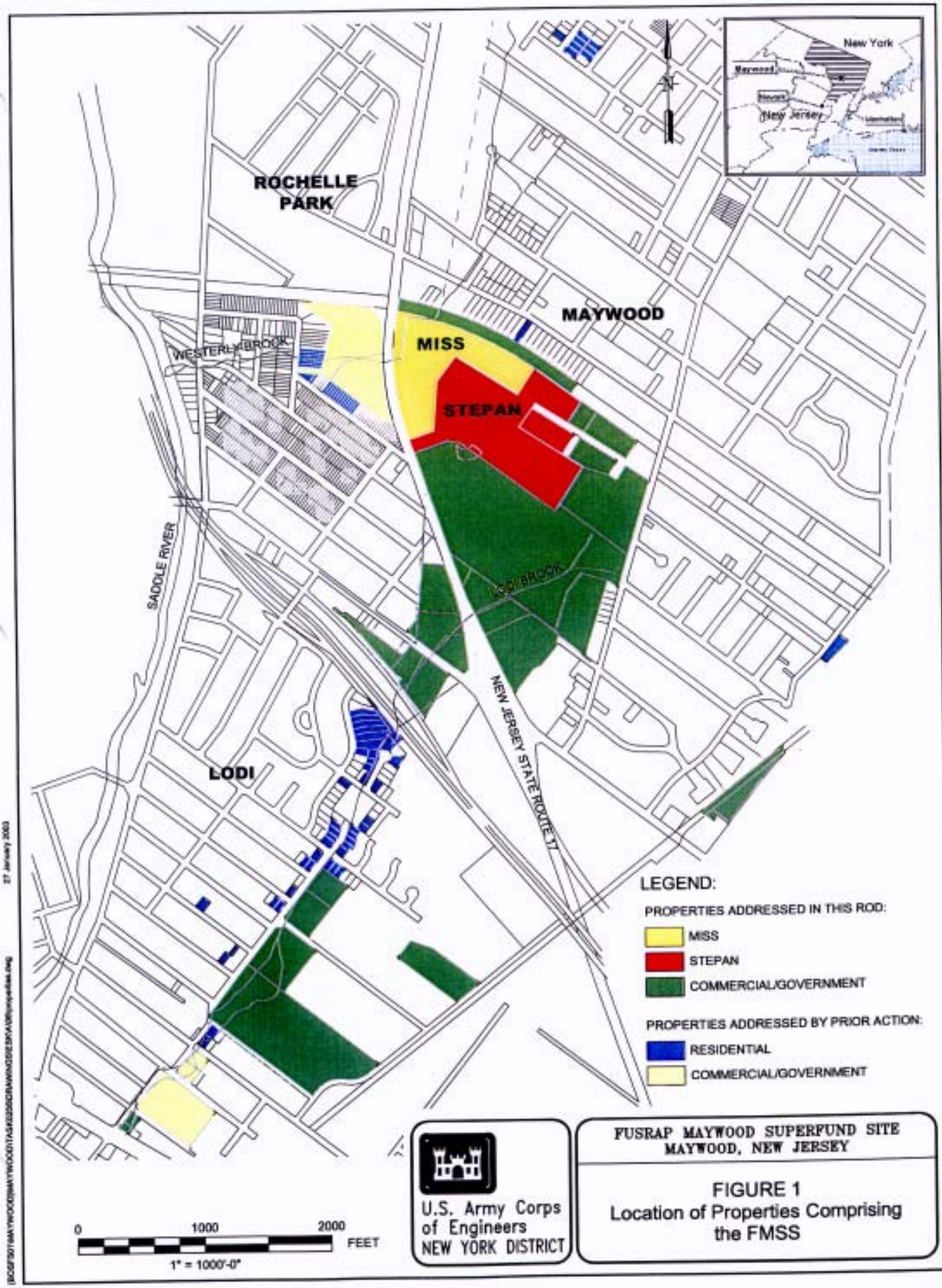
New York
New Jersey
ROCHELLE PARK
MAYWOOD
MISS
STEPAN
WESTERLY BROOK
SADDLE RIVER
LODI BROOK
NEW JERSEY STATE ROUTE 17
LODI
LEGEND:
PROPERTIES ADDRESSED IN THIS ROD:
MISS
STEPAN
COMMERCIAL/GOVERNMENT
PROPERTIES ADDRESSED BY PRIOR ACTION:
RESIDENTIAL
COMMERCIAL/GOVERNMENT
0
1000
2000
FEET
1" = 1000'-0"
U.S. Army Corps of Engineers
NEW YORK DISTRICT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY
FIGURE 1
Location of Properties Comprising the FMSS

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LEGEND:

STEPAN COMPANY PROPERTY BOUNDARY

RECOMMEND REMEDIAL ACTION

NOTES:

1. BUILDING NO. 76 AND THE PUMP HOUSE ARE LOCATED ON THE MISS, NOT ON STEPAN COMPANY PROPERTY.

0 150 300 FEET

1" = 150'-0"

U.S. Army Corps of Engineers
NEW YORK DISTRICT

FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

FIGURE 2
Buildings/Structures on
Stepan Company and the MISS

11 February 2003

[BOSFS01\MAYWOOD]MAYWOOD\TASK0256\DRAWINGS\ESK\B04\bldg-loc.dwg

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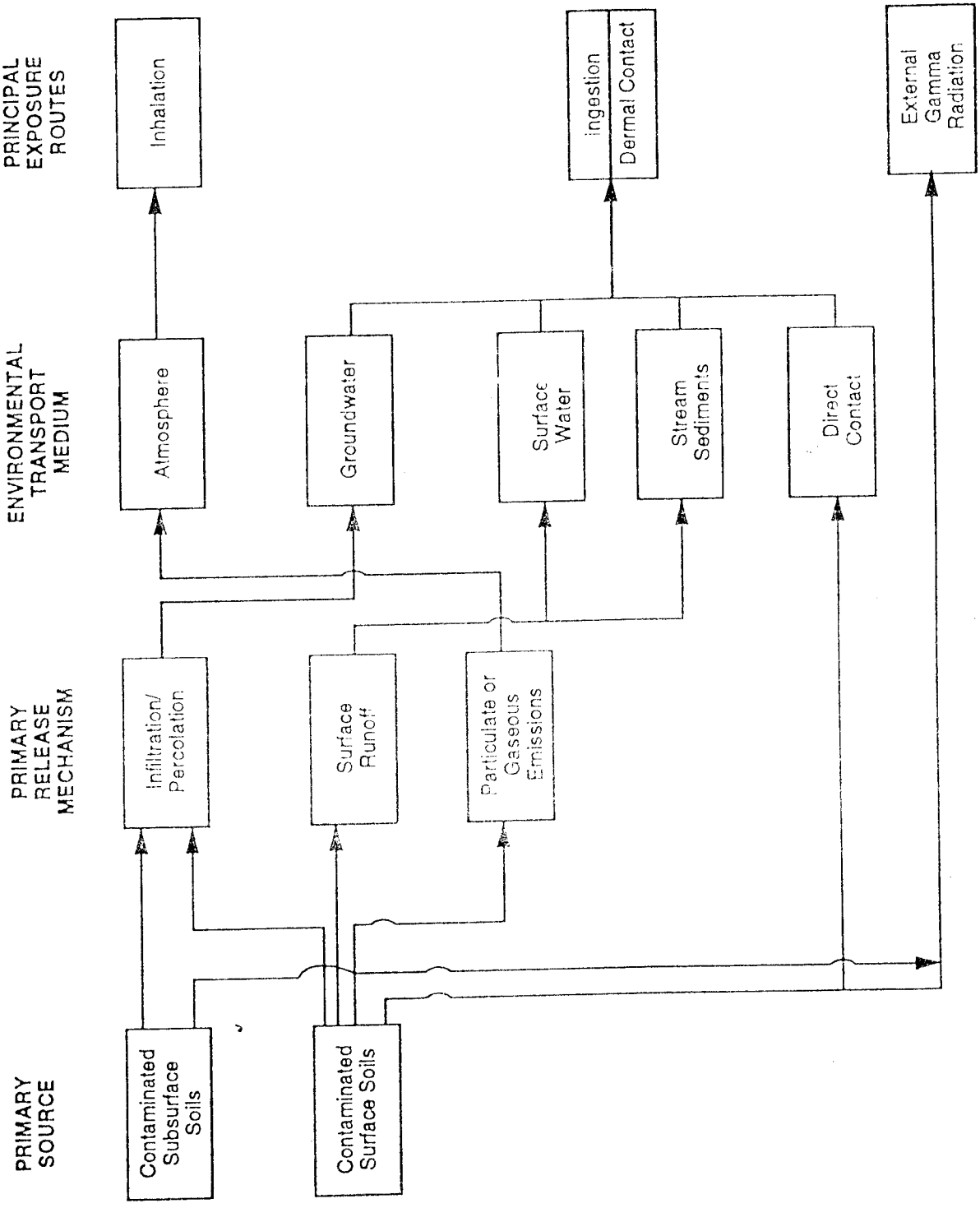

Figure 3. Conceptual Site Model

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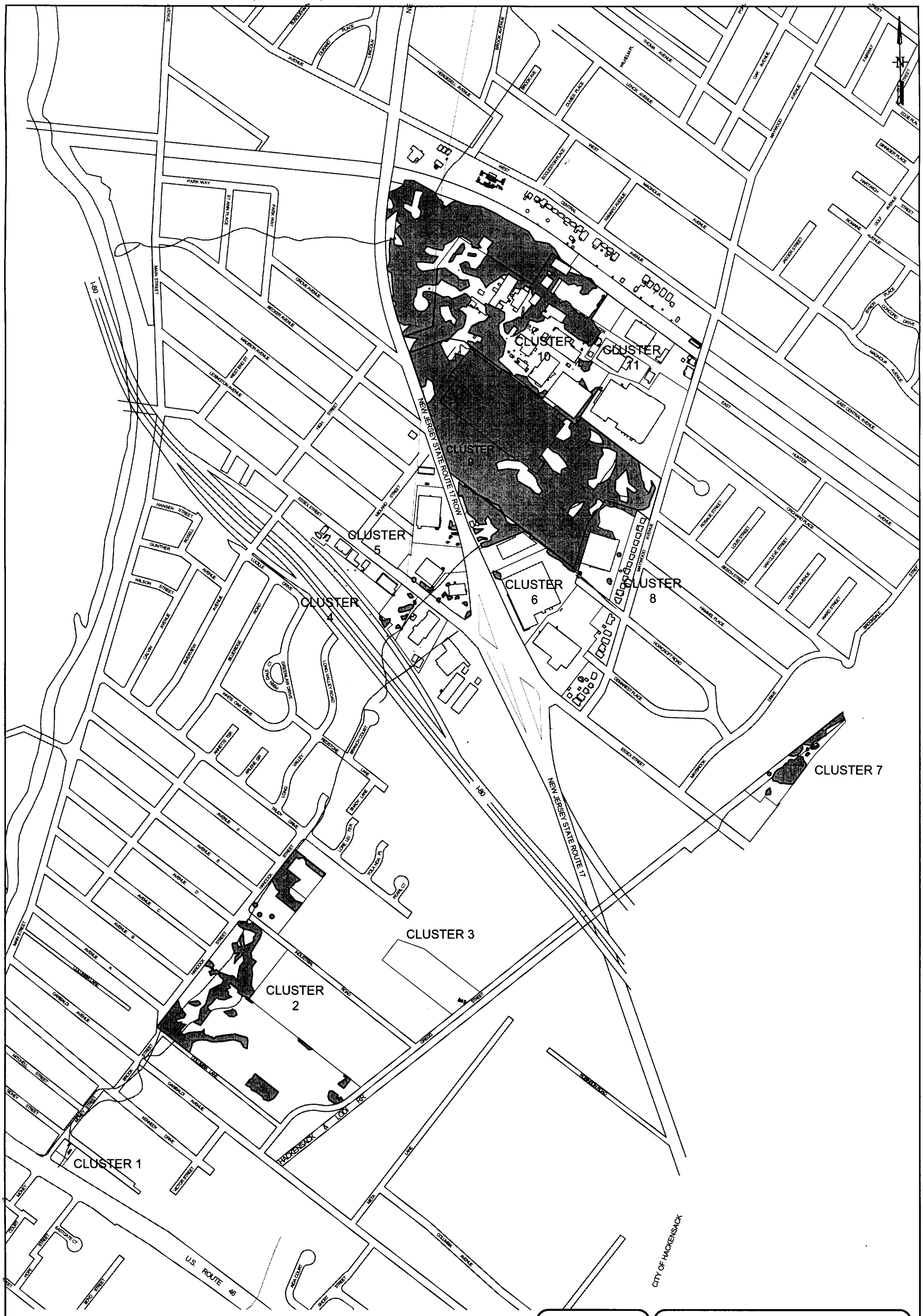

U.S. Army Corps of Engineers
NEW YORK DISTRICT

FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

FIGURE 4
Areas of FMSS Exceeding
Restricted Use Criteria

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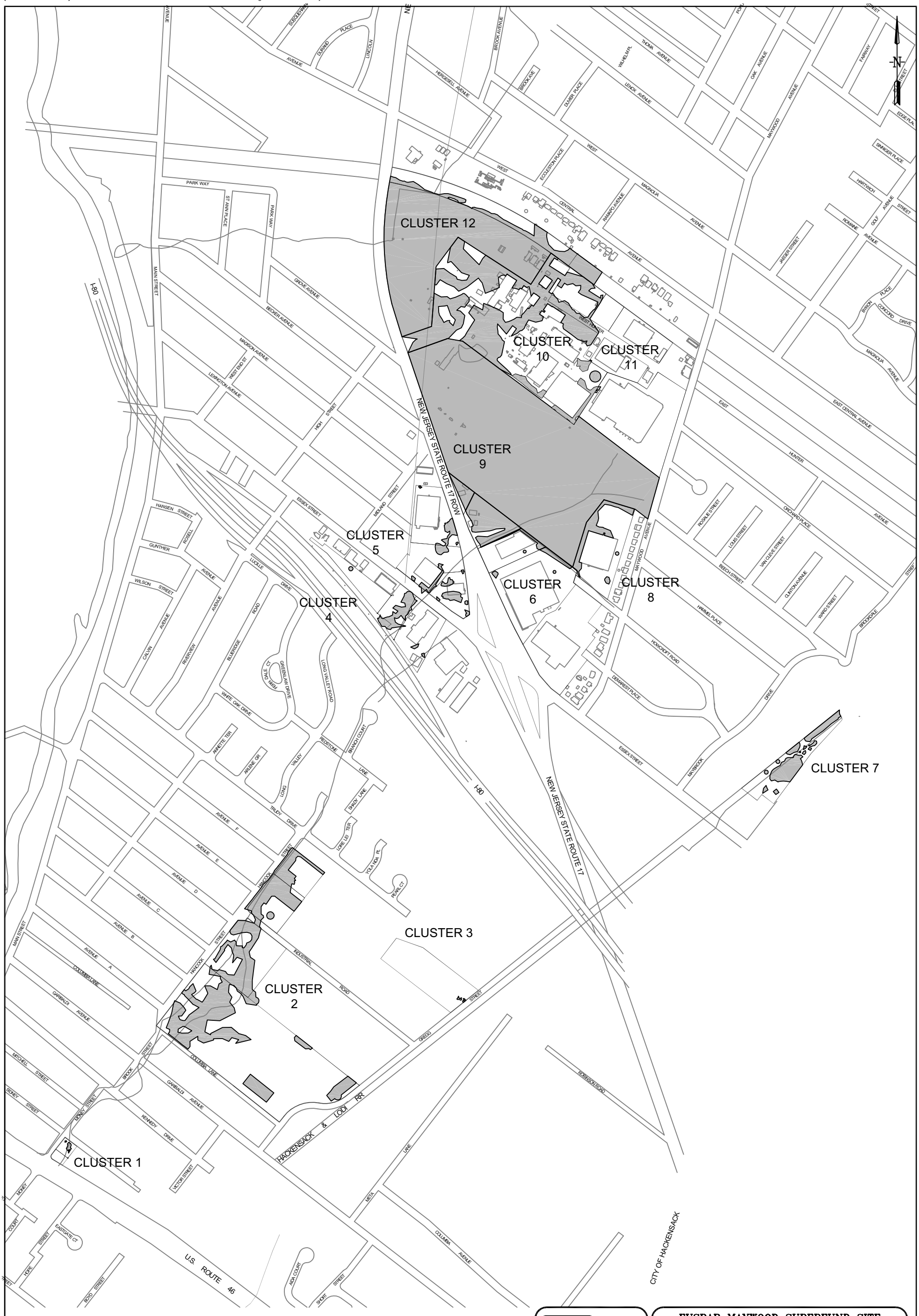

LEGEND:

- ASPHALT ROADS
- RAILROAD TRACKS
- STREAM OR TRIBUTARY
- RIVER OR CHANNEL
- AREA EXCEEDING UNRESTRICTED USE CRITERIA

0 600 1200 FEET

1" = 600'-0"

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NEW YORK DISTRICT

FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

FIGURE 5
Areas of FMSS Exceeding Unrestricted Use Criteria

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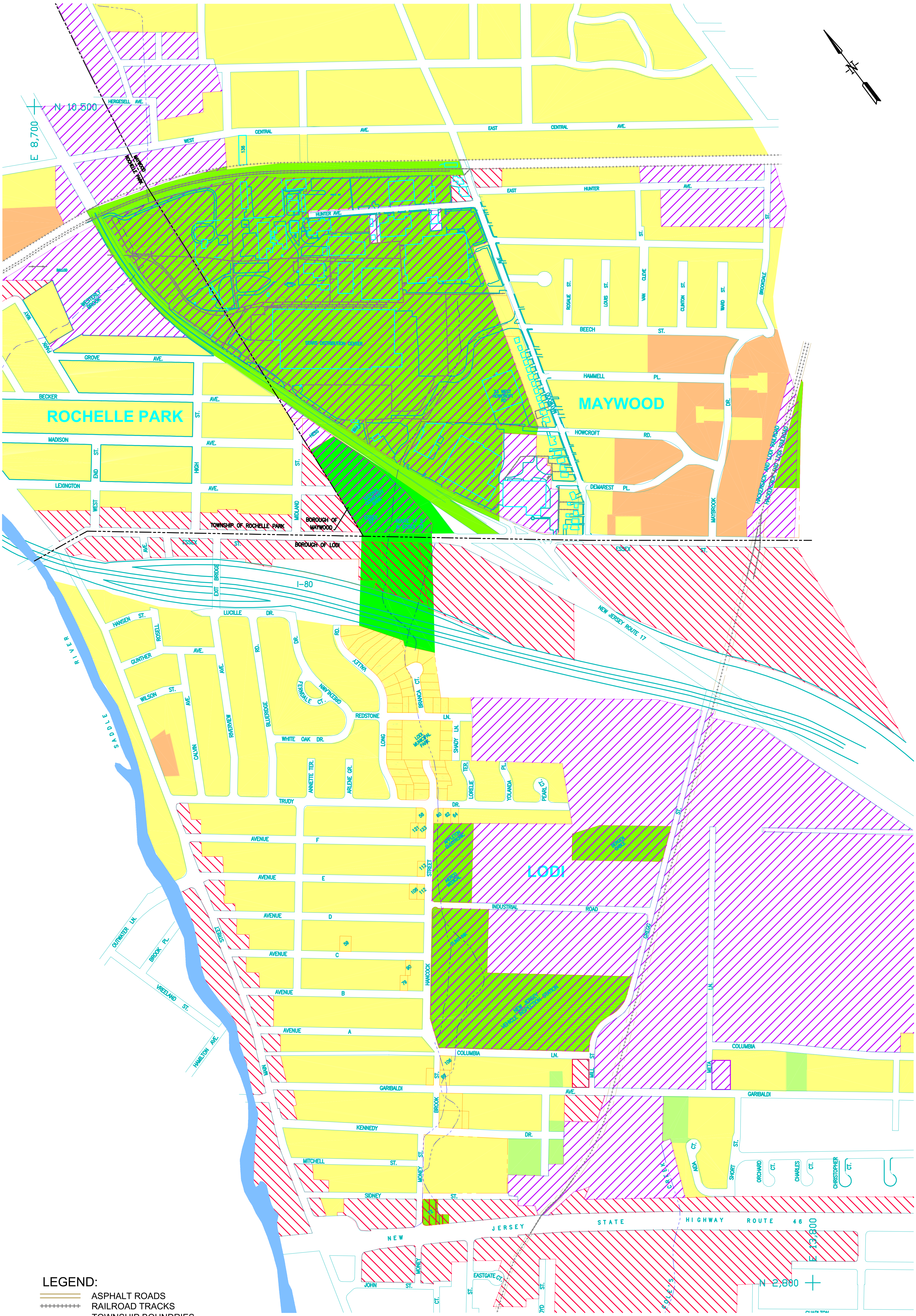

LEGEND:

- ASPHALT ROADS
- RAILROAD TRACKS
- TOWNSHIP BOUNDRIES
- STREAM OR TRIBUTARY
- RIVER OR CHANNEL
- PROPERTY TO BE ADDRESSED BY ROD
- RESIDENTIAL - ONE- AND TWO-FAMILY
- RESIDENTIAL - APARTMENTS/LOW RISE
- RESIDENTIAL - MEDIUM RISE
- COMMERCIAL
- INDUSTRIAL

0 600 1200 FEET

1" = 600'-0"

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FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

FIGURE 6
Zoning Boundaries for the FMSS Properties

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