PROPOSED PLAN FOR SOILS AND BUILDINGS AT THE FUSRAP MAYWOOD SUPERFUND SITE

MAYWOOD, NEW JERSEY

August 2002

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

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August 2002

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

with technical assistance from
Stone & Webster, Inc.
Under Contract No. DACW41-99-D-9001

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Errata

Page 34, COMMUNITY ROLE IN THE SELECTION PROCESS, second paragraph: "August 12, 2002" should be "August 14, 2002." Written comments on the Proposed Plan will be accepted for 30 days from August 14, 2002.

ABBREVIATIONS, ACRONYMS, AND SYMBOLS

ARAR	applicable or relevant and appropriate requirement
BNI	Bechtel National, Inc.
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	constituent of concern
DOE	U.S. Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
in.	inch
MCW	Maywood Chemical Works
MISS	Maywood Interim Storage Site
mrem/yr	millirem per year
NCP	National Contingency Plan
NJAC	New Jersy Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
OU	operable unit
pCi	picoCurie
pCi/g	picoCurie per gram
pCi/L	picoCurie per liter
PP	Proposed Plan
RI	Remedial Investigation
ROD	Record of Decision
S&W	Stone & Webster, Inc.
TBC	to-be-considered
USACE	United States Army Corps of Engineers
yd^3	cubic yard(s)
%	percent

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PROPOSED PLAN FOR THE PORTION OF THE SOILS/BUILDINGS OPERABLE UNIT CONTAINING RADIOLOGICALLY CONTAMINATED SOILS AND BUILDINGS AT 24 COMMERCIAL AND GOVERNMENT PROPERTIES (PHASE II) AT THE FUSRAP MAYWOOD SUPERFUND SITE

INTRODUCTION

The Maywood Chemical Company Site in Bergen County, New Jersey, is listed on the U.S. Environmental Protection Agency's (EPA) Superfund National Priorities List (NPL), and is being addressed under three separate Remedial Investigation/Feasibility Studies (RI/FS) overseen by EPA Region 2. The U.S. Army Corps of Engineers (USACE) is responsible for two of these and the Stepan Company is responsible for the remaining RI/FS. USACE addresses, through an RI/FS, buildings and soil at what this plan refers to as the FUSRAP Maywood Superfund Site (note that in order to avoid being overly repetitive, both the acronym and this part of the Site are defined below). USACE is conducting a separate RI/FS on groundwater. Groundwater is considered a separate operable unit (OU). The Stepan Company, in a third RI/FS, is investigating non-radioactive, chemical contamination on Stepan Company property and adjoining properties. Previously completed Removal Actions will be addressed in a future Record of Decision (ROD).

The Remedial Investigation (RI) characterizes the nature and extent of contamination at a Superfund site, and the Feasibility Study (FS) evaluates remedial alternatives for cleanup. The USACE is addressing thorium and other wastes at the site defined as "Formerly Utilized Sites Remedial Action Program (FUSRAP) waste." The 1998 Energy and Water Development Appropriations Act transferred responsibility for execution and management of FUSRAP from the U.S. Department of Energy (DOE) to USACE. USACE's portion of the Maywood Chemical Company Site is referred to as the "FUSRAP Maywood Superfund Site" for the remainder of this Proposed Plan (PP). USACE is the lead Federal agency for the FUSRAP Maywood Superfund Site. In a Federal Facility Agreement (FFA) between the EPA and the DOE (USACE's predecessor on this site) for the FUSRAP portion of the Maywood Chemical Company Site, FUSRAP waste was defined as:

- All contamination, both radiological and chemical, whether mixed together or not, on the Maywood Interim Storage Site (MISS);

- All radiological contamination above cleanup levels related to past thorium processing from the Maywood Chemical Works (MCW) occurring on any of the Vicinity Properties; and

- Any chemical or non-radiological contamination on Vicinity Properties that would satisfy either of the following requirements:

    1. The chemical or non-radiological contaminants which are mixed or commingled with radiological contamination above cleanup levels; or,

2. 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.

The three RI/FSs are being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This PP has been prepared by the USACE to address FUSRAP waste in soils and buildings at the 24 remaining contaminated (by FUSRAP waste) commercial and government properties in the Soils/Buildings OU at the FUSRAP Maywood Superfund Site.

The entire FUSRAP Maywood Superfund Site consists of 88 designated commercial, government, and residential properties, as shown on Figure 1. Sixty-four of these properties (Phase I) have been addressed under interim removal cleanup actions. During cleanup actions on these properties, additional properties were remediated if the contamination extended onto an adjacent undesignated property. Phase I cleanup actions are outlined in the Engineering Evaluation/Cost Analysis (EE/CA) documentation prepared by the DOE in 1995.

This PP identifies the recommendation for cleanup of radiologically contaminated buildings and soil contamination meeting the definition of FUSRAP waste at the remaining 24 properties (Phase II), including the Federal government owned MISS, Stepan Company, and 22 commercial and government properties. Seven of these 24 properties are currently being remediated by a *Removal Action in Support of NJDOT Roadway Improvement Projects at the FUSRAP Maywood Superfund Site.* Groundwater will be addressed in the future after completion of a groundwater RI by the USACE. The Stepan burial pits, licensed and regulated by the Nuclear Regulatory Commission (NRC), are included in the proposed remedy.

This plan also summarizes the reports and studies required by CERCLA for remedial action. These studies include: the RI report (which describes the nature and extent of radioactive materials and chemical contamination at the FUSRAP Maywood Superfund Site); the Baseline Risk Assessment (BRA, which assesses risks to human health and the environment in the absence of cleanup); and the FS (which describes how the cleanup alternatives were developed and evaluated). These reports and other documents are included in the administrative record file for the FUSRAP Maywood Superfund Site and are available for public review at the locations listed at the end of this plan.

Purpose of the PP

The purpose of this PP is to present the recommendation for remediation of soils contaminated with FUSRAP waste at the 24 remaining commercial and government properties in the Soils/Buildings OU at the FUSRAP Maywood Superfund Site and contaminated buildings. Another purpose of this PP is to solicit public comment as specified in CERCLA Section 117 [and section 40 Code of Federal Regulations (CFR) 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)].

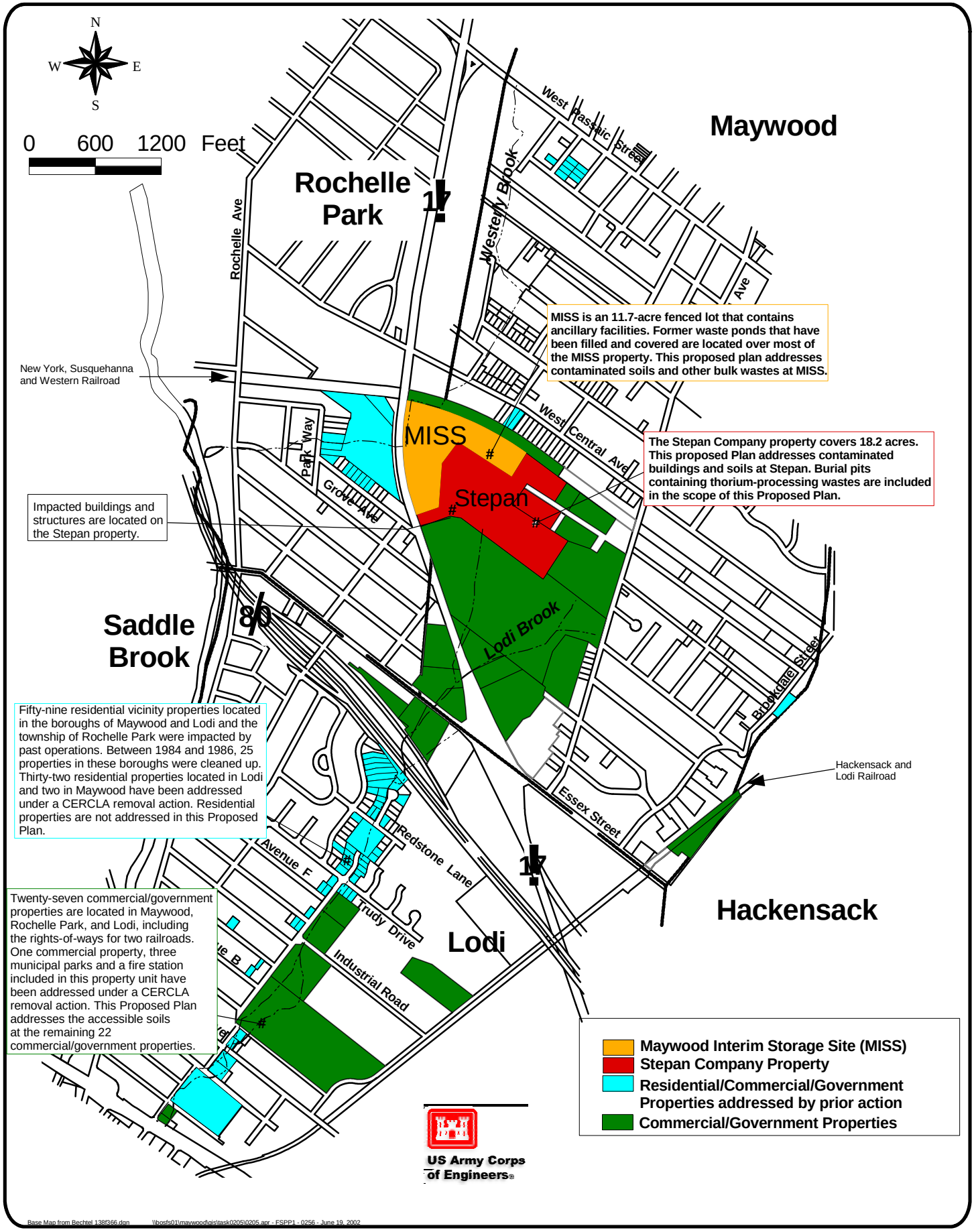

Figure 1. FUSRAP Maywood Superfund Site Properties

The USACE and EPA are requesting input from the public on not only USACE's proposed remedy, but also on the other alternatives presented in the FS and the PP. After public comment period has ended the USACE and EPA, in consultation with the New Jersey Department of Environmental Protection (NJDEP), review and consider the comments and will select a final remedy for the Soils/Buildings OU. The decision will be documented in a ROD. Based on comments received, USACE and EPA, in consultation with NJDEP, may select the preferred alternative, or any of the other alternatives presented in the FS and the PP. Consequently, public comments should not be restricted to the preferred alternative. Additional information on the public comment period is presented at the end of this plan.

Summary of the Preferred Alternative

The preferred alternative to address soil contamination at the 24 properties and building contamination at Stepan is "Excavation, Treatment, and Offsite Disposal". This is Alternative 4 from the FS. Alternative 4 specifies excavation, treatment, and disposal of the accessible contaminated soils, and decontamination and demolition, if necessary, of contaminated buildings on the FUSRAP Maywood Superfund Site. Inaccessible soils (see FS, Figure 1-3, for locations of inaccessible soils) currently located under buildings and roadways would be excavated and disposed offsite as they become accessible in the future (e.g., due to renovation or demolition activities). Treatment would not be used under Alternative 4 for currently inaccessible soils excavated in the future because mobilizing the on-site treatment unit for small volumes would not be cost-effective. Institutional controls to prevent residential development would be applied by USACE as necessary to areas of the FUSRAP Maywood Superfund Site where soils remain at levels higher than determined protective for unrestricted use[1].

The remedial action objectives for the preferred alternative are provided in Table 1.

Treatment

The preferred alternative incorporates treatment to reduce the volume of contaminated soils requiring disposal as radioactive waste. CERCLA mandates consideration of and preference for treatment at Section 121(b)(1), and the NCP 40 CFR Section 300.430(a)(1)(iii)(A) requires consideration of treatment of the principal threat, which for the FUSRAP waste, is radiological contamination in soil. Volume reduction of the excavated radiologically-contaminated soils is possible because the radioactive components are generally concentrated in the finer particles of soil. Additionally, the process of excavation will result in the collection of some uncontaminated soils. If the radioactive portion can be separated from the uncontaminated portion, less soil will require disposal as radioactive waste. Because the effectiveness, implementability and cost-effectiveness of treatment is uncertain for soil at the Site, this alternative included a treatment demonstration. Although the fieldwork for the treatment demonstration is complete, USACE's evaluation of the data collected and the efficacy of

[1] This Plan uses the terms "restricted" and "unrestricted" differently than the NRC, whose requirements are also discussed in this Plan. NRC regulations require provisions for legally enforceable institutional controls that provide reasonable assurance that the total effective dose equivalent from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 25 millirem (mrem) per year.

Table 1. FUSRAP Maywood Superfund Site Remedial Action Objectives

Environmental Media	Remedial Action Objectives
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 criterion. For restricted use, the cleanup criterion is 15 pCi/g of thorium-232 and radium-226 combined above background; institutional controls to prohibit future residential use will be used. For unrestricted use, the cleanup criterion is 5 pCi/g of thorium-232 and radium-226 above background.
	To reduce FUSRAP Maywood Superfund Site concentrations of uranium-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 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.
	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 7:28-12.8(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.

pCi/g = picoCuries per gram
COC = constituent of concern
pCi/L = picoCuries per liter
ARARs = applicable or relevant and appropriate requirements
NJAC = New Jersey Administrative Code

treatment at the Site continues. This evaluation will not delay implementation of the remedy however. While the evaluation continues, the USACE will begin excavation and offsite disposal of contaminated soils.

The demonstration evaluated technologies with the potential for reducing the volume of soils requiring disposal as radioactive waste. If the evaluation by USACE and EPA, in consultation with NJDEP, determines that the demonstration proves a technology is effective, implementable, and cost-effective (considering also the ultimate disposition of any treated soil), the USACE would treat the excavated soils at the MISS; otherwise, the USACE would dispose of the excavated soils offsite without treatment. (Except for the treatment component, Alternative 4 is essentially the same as Alternative 3, Excavation and Offsite Disposal.)

If treatment were used, the contaminated stream from treatment would be disposed offsite at a licensed facility permitted to accept radiological waste. The remaining soil containing lower amounts of radiological materials below criteria (i.e., 15 pCi/g combined radium-226 and thorium-232) would be either backfilled at the MISS or disposed offsite at a suitable landfill.

The decision to utilize the treated material onsite vs. offsite disposal will be made by the USACE and EPA, in consultation with the NJDEP, and will take into consideration the residual condition of the MISS property under each scenario.

The public would be notified of both determinations- i.e., whether to employ treatment at the MISS, and, if so, the disposition of the treated soil. Public notification would occur prior to any physical activity associated with onsite treatment and any disposal of treated soil if treatment is found to be appropriate.

Cleanup Criteria

In a 1994 site-specific agreement (the "Dispute Resolution"), DOE and EPA established Maywood-specific cleanup criteria for the radioactive contamination at the FUSRAP Maywood Superfund Site. Per the terms of this agreement, surface and subsurface soils on residential, or unrestricted use, properties must be remediated to an average of 5 pCi/g combined radium-226 and thorium-232 above background, and clean backfill must be placed in excavated areas. A picoCurie is a unit of specific activity that describes how much radiation is present. For commercial, or restricted use, properties, subsurface soils at the FUSRAP Maywood Superfund Site must be remediated to an average of 15 pCi/g combined radium-226 and thorium-232 above background. Radium-228 will be measured to account for the presence of thorium-232. For the FUSRAP Maywood Superfund Site contaminants, radium-226 plus radium-228 is approximately equal to radium-226 plus thorium-232. See FS Section 3.2.1.1 for further explanation of this substitution. In addition, the USACE and EPA have determined that the criteria of 15 mrem/year above background and indoor radon air concentrations of 3 pCi/L of Rn-222 above background, specified in NJAC 7:28-12.8(a)1 and 2, respectively, are applicable or relevant and appropriate requirements (ARARs) for this operable unit.

Treated soils used for backfill will have a concentration no greater than 15 pCi/g combined radium-226 and thorium-232 above background. If the soil treatment technology proves capable of treating soils to lower concentrations in a cost-effective manner, then a lower concentration will be adopted for reuse of treated soils. The contaminated stream from treatment will be disposed offsite at a facility authorized to accept radioactive wastes. Residual radioactive contamination remaining after backfilling will also meet the criteria of 15 mrem/year above background, per NJAC 7:28-12.8(a)1.

Separate from the EPA/DOE Dispute Resolution, an unrestricted use cleanup level was also generated specifically for the FUSRAP Maywood Superfund Site for uranium. The cleanup level for total uranium (uranium-238 + uranium-235 + uranium-234) is an average of 100 pCi/g above background, which equates to approximately 50 pCi/g of uranium-238 above background. This uranium cleanup level will be applied to all properties addressed by this response action.

The New Jersey regulation at NJAC 7:28-12.8(a)1 and 2 will be used as ARARs for the remediation of contaminated buildings. NJAC 7:28-12.8(a)1 and the NRC regulation at 10 CFR 20.1402 will be used as ARARs for the remediation of the three NRC-licensed burial pits on the Stepan property. NRC regulations establish annual dose limits to the average critical receptor as the cleanup standard in the establishment of the remedial action objectives.

The offsite disposal option uses an existing disposal facility licensed by the NRC to accept "byproduct material" as defined by Section 11(e)(2) of the Atomic Energy Act, as amended. In a letter, addressed to Envirocare of Utah, Inc., dated September 20, 2001 (September 2001 NRC Letter), the NRC changed its position on the status of the radioactively contaminated soils located at the FUSRAP Maywood Superfund Site. 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 NRC-licensed burial pits), and the criteria of 15 mrem/yr specified in NJAC 7:28-12.8(a)1, 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 offsite for disposal will be treated as 11(e)(2) byproduct materials.

The USACE will confirm that the remedial action for the Site complies with these ARARs, or establishes the basis for waiving an ARAR pursuant to the procedures of the NCP at 40 CFR 300.430(f)(1)(ii)(C) for ARAR waivers.

Application of Cleanup Criteria to Individual Properties

Even though the EPA/DOE Dispute Resolution determined that the restricted cleanup criteria would be applied to all commercial Phase II properties (Phase I properties included all residential and municipal properties), the evaluation of the reasonably anticipated future land use for a property should also be weighed when determining the cleanup level for a property. USACE's recommendation to use either the restricted or unrestricted cleanup criteria for an individual property is based on an evaluation of the following factors:

- 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 residential, commercial/industrial, and recreational areas
- Federal/State/local land use designation
- Historical development patterns

Based on this evaluation, USACE recommends remediation of 17 of the Soils/Buildings OU properties to the unrestricted use criterion because of their proximity to adjacent residential neighborhoods and parks, and a less defined commercial/industrial zoning footprint. The properties recommended for application of the unrestricted use criterion and their associated volumes are listed in Table 2. Remediating to an unrestricted use criterion on 17 properties will improve the long-term effectiveness of the proposed remedy because it would release these properties for unrestricted use in the future.

Table 2. Inaccessible and Accessible Soil Volumes for Site-wide Alternatives

Property	In Situ Inaccessible Soil Volume (yd^3)(c)	In Situ Accessible Soil Volume (yd^3)(a)
Restricted Use Criteria		
Maywood Interim Storage Site (100 West Hunter Avenue)	0	73,233
Stepan (100 West Hunter Avenue) (b)	974	44,125
149-151 Maywood Avenue	20,485	74,741
I-80 (west right-of-way and underneath roadway)	3,000	107
NJ State Route 17 (all inaccessible)	20,000	0
Lodi Industrial RR	185	1,317
New York, Susquehanna &Western Railway	3,100	2,900
Total Restricted Use Criteria	**47,744**	**196,423**
Unrestricted Use Criteria		
167 NJ State Route 17	400	8,001
170 Gregg Street	0	14
160 &174 Essex Street	254	1,845
99 Essex Street	0	423
113 Essex Street	0	514
200 NJ State Route 17	0	375
72 Sidney Street (a.k.a. 88 Money Street)	0	58
85, 87, 99–101 NJ State Route 17	0	2,066
137 NJ State Route 17	0	965
205 Maywood Avenue, 50 and 61 West Hunter Avenue	0	59
239 NJ State Route 17	156	3,393
111 Essex Street	0	3,617
23 Howcroft Road	338	4,552
8 Mill Street	0	2,357
80 Industrial Road	916	690
80 Hancock Street	3,440	868
100 Hancock Street	866	954
Total Unrestricted Use Criteria	**6,370**	**30,751**
Total Restricted and Unrestricted Use Phase II	**54,114**	**227,174**

yd^3 = cubic yard

a 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 for the FUSRAP Maywood Superfund Site includes waste volume from the properties that are addressed by the FS. Volumes associated with other past or ongoing cleanup actions are not included in this total.

b Stepan volume includes contaminated material in Burial Pits 1, 2, and 3. Source: BNI 1997. Volume Register, Revision 11; S&W 2001. Volume Register, Rev. 0.

c Phase I inaccessible soils volume is estimated at 12,500 yd^3, which will be addressed with the inaccessible soils at the commercial/government properties.

Seven of the Soils/Buildings OU properties are currently recommended for cleanup to the restricted use criterion. The properties recommended for application of the restricted use criterion and their associated volumes are listed in Table 2. These properties are currently not residential, and unlikely to become residential in the future, although institutional controls will be implemented in the future for these properties. The USACE anticipates that the impact to the community and the individual businesses would be significantly, although temporarily, increased in the short-term if the unrestricted use criterion were applied at these properties.

USACE plans to implement the restricted use criterion on the MISS, Stepan, and 149-151 Maywood Avenue properties because of the prohibitive cost to clean up the additional radioactive contamination. In addition, chemical contamination unrelated to the thorium processing activities at the MCW, would require additional remediation (by the parties responsible for this contamination) to restore these properties to an unrestricted use.

For the cleanup on Interstate 80, NJ State Route 17, the Lodi Industrial Railroad, and the New York, Susquehanna & Western Railway property, the recommendation for cleanup to the restricted use criterion is due to their use as transportation corridors, which would preclude future residential development.

Institutional Controls

USACE will implement institutional controls as a component of the preferred alternative. Institutional controls in the form of community notification requests are required by the terms of the EPA/DOE Dispute Resolution (see Appendix C of the FS). The USACE has determined that additional institutional controls (e.g., deed notices) will be warranted to ensure long-term effectiveness. The performance goals for the proposed institutional controls at the seven properties recommended for cleanup to the restricted use criteria are as follows:

- To prevent residential development in areas of the FUSRAP Maywood Superfund Site where soils remain at levels higher than the unrestricted use criteria.
- To notify present and future land owners and users that contaminated soils are present onsite that have been determined to restrict the use of the property.
- To prevent disturbance of contaminated soils, without appropriate land use controls.
- To notify appropriate government authorities if land is disturbed.

To meet the goals established for the restricted use properties, various institutional control tools (i.e., proprietary controls, governmental controls, and non-enforceable informational tools) were evaluated to determine if effective implementation could reasonably be expected. Several types of institutional controls could potentially be used by USACE, in coordination with state and local authorities, at the FUSRAP Maywood Superfund Site to meet the established goals. In order to ensure long-term effectiveness of the controls, more than one control may be used at each property. Other government controls, such as deed notices, land use ordinances or zoning requirements, have been considered and may be implemented by state and local authorities. In coordination with property owners, municipalities, occupants, utility companies, EPA, NJDEP, and other interested parties, USACE will develop an Institutional Controls

Implementation Plan which will establish a tiered approached to implementing institutional controls as determined necessary by USACE. Institutional controls would be tailored to meet the needs of each individual property in order to restrict land use to commercial usage. Monitoring of the FUSRAP Maywood Superfund Site would be a component of this plan in order to determine when the next level of institutional controls (or next tier) should be implemented.

When contaminants remain on a property at levels above those allowed for unrestricted residential use, institutional controls and land use controls can be effectively used to render the property suitable for the intended use. Long-term monitoring of the institutional controls can be conducted by the government every 5 years (or more frequently) for properties not remediated to levels allowing for unlimited use and unrestricted exposure. The purpose of the long-term monitoring will be to verify that the institutional controls are operating and being maintained as recommended. Institutional controls that are not operating effectively would be supplemented or replaced.

NJAC 7:26-6.4(e), (g), and (h) describe NJDEP's required deed notification process. These regulations describe procedures for recording deed notices, documenting monitoring activities, and notification requirements for use when a person relinquishes their obligation for maintaining and inspecting the institutional controls. USACE will use these regulations as procedural guidelines in the deed notification process.

Costs and Time to Implement

In estimating the cost of this alternative, the USACE has assumed that the restricted use criterion would be applied to seven of the Soils/Buildings OU properties as previously described, and that all other commercial/government properties would be cleaned to the unrestricted use criterion. Costs are based on excavation, treatment, transportation, and disposal of accessible soil contamination (including the NRC-licensed burial pits on Stepan property); costs are also included for future excavation and disposal of inaccessible soils under operating buildings and transportation corridors. Costs have been estimated for these inaccessible soils based on the current understanding of existing volumes.

The total volume of contaminated accessible soil on the respective properties, including the NRC-licensed burial pits, is 227,174 cubic yards (yd^3), in situ. To be conservative, it was assumed that contaminated material in the retention ponds on MISS and the NRC-licensed burial pits on Stepan and additional waste located at 149-151 Maywood Avenue would not be amenable to treatment, in part because of the physical characteristics of the buried material. For the purpose of the cost estimate, these materials (approximately 143,946 yd^3) are assumed to be disposed directly offsite without treatment. Oversized materials (approximately 16,645 yd^3), such as rocks and boulders, would also be separated out prior to treatment. Inaccessible materials would not be treated unless they become accessible during the remedial action. The estimate assumes that treatment is applied to the remaining excavated *in situ* soils (approximately 66,583 yd^3). Based on limited treatment testing, treatment is assumed to be effective at achieving a 60 percent volume reduction in the amount of soil requiring offsite disposal as

radioactive contaminated material. The actual effectiveness of treatment will not be known until the evaluation of the data collected in the treatment demonstration at MISS is complete. The cost to implement Alternative 4 is approximately $244 million. The time to implement the proposed action is estimated at approximately five years (if sufficient funding is received from Congress). If additional properties were cleaned to the restricted use criterion, the expected cost of remediation and time to implement would be less. The volume of inaccessible soils is estimated to be approximately 66,614 yd^3 (includes Phase I inaccessible soil volume). The time to implement the proposed action for inaccessible soils is unknown because the action is dependent on landowners providing access to the inaccessible soils through demolition of structures or abandonment of transportation corridors.

FUSRAP MAYWOOD SUPERFUND SITE HISTORY & REMEDIAL INVESTIGATION SUMMARY

As listed in Table 3, the FUSRAP Maywood Superfund Site consists of 88 designated properties: The Stepan property, which includes contaminated buildings (as discussed in Section 2.4.6 of the FS), and the three NRC-licensed burial pits; 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. These undesignated property cleanups are also listed in Table 3 and are identified with an asterisk (*).

Radioactive contamination at the FUSRAP Maywood Superfund Site 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[2]. Some of these process wastes and residues were stored, treated, or disposed on the original processing site where MISS and Stepan 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 1930's over and through the MCW's thorium waste lagoons.). Stepan'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

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

Table 3. Status of the FUSRAP Maywood Superfund Site Properties - Grouped by Property Unit

Property Unit	Property Address	Type of Property	Status
MISS	100 W. Hunter Avenue, Maywood and Rochelle Park	Federal	A
Stepan	100 W. Hunter Avenue, Maywood	Commercial	A
Commercial/Government	149-151 Maywood Avenue, Maywood	Commercial	A
	Interstate 80, Lodi: (1) east right-of-way and (2) beneath road west right-of-way	State	B A
	NJ State Route 17, Maywood and Rochelle Park	State	A
	167 NJ State Route 17, Maywood	Commercial	A
	239 NJ State Route 17, Maywood	Commercial	A
	111 Essex Street, Maywood	Commercial	A
	Lodi Industrial Railroad operated by NY S&W Railway	Commercial	A
	72 Sidney Street (a.k.a. 88 Money Street), Lodi	Commercial	A
	8 Mill Street, Lodi	State	A
	80 Industrial Road, Lodi	Commercial	A
	80 Hancock Street, Lodi	Commercial	A
	100 Hancock Street, Lodi	Commercial	A
	170 Gregg Street, Lodi	Commercial	A
	160/174 Essex Street, Lodi	Commercial	A
	99 Essex Street, Maywood	Commercial	A
	113 Essex Street, Maywood	Commercial	A
	200 NJ State Route 17, Maywood	Commercial	A
	New York Susquehanna & Western Railway, Maywood	Commercial	A
	85, 87, 99–101 NJ State Route 17, Maywood	Commercial	A
	137 NJ State Route 17, Maywood	Commercial	A
	23 West Howcroft Road, Maywood	Commercial	A
	205 Maywood Avenue, Maywood	Commercial	A
	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 W. Central Avenue, Maywood	Residential	B
	200 Brookdale Street, Maywood	Residential	B
	454, 459, 460, 464, 468 Davison Avenue, Maywood	Residential	B
	459, 461, 467 Latham Street, Maywood	Residential	B
	10, 22, 26, 30, 34, 38, 42 Grove Avenue, Rochelle Park	Residential	B
	86, 90 Park Way, Rochelle Park	Residential	B
	59 Avenue C, Lodi	Residential	B
	58, 59, 61, 64 Trudy Drive, Lodi	Residential	B
	60, 62 Trudy Drive, Lodi	Residential	B
	121, 123 Avenue F, Lodi	Residential	B
	3, 4, 5, 6, 7, 8, 9*, 10 Hancock Street, Lodi	Residential	B
	2, 4, 6, 7, 11 Branca Court, Lodi	Residential	B
	14, 28*, 46* Long Valley Road, Lodi	Residential	B
	16, 18, 20, 22, 24, 26, 34 Long Valley Road, Lodi	Residential	B
	11 Redstone Lane, Lodi	Residential	B

Table 3. Status of the FUSRAP Maywood Superfund Site Properties – Grouped by Property Unit (continued)

Property Unit	Property Address	Type of Property	Status
Residential (continued)	17, 19* Redstone Lane, Lodi	Residential	B
	106 Columbia Lane, Lodi	Residential	B
	99 Garibaldi Avenue, Lodi	Residential	B
	90 Avenue C, Lodi	Residential	B
	108, 112, 113 Avenue E, Lodi	Residential	B
	79 Avenue B, Lodi	Residential	B
	5, 7 Shady Lane, Lodi	Residential	B

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

currently owned by Stepan Company. Stepan sold the portion of the original plant property located west of NJ Route 17, now known as 96 Parkway, after relocation of the waste materials. Stepan currently holds an NRC license for the storage of thorium-bearing materials in Burial Pits 1, 2, and 3.

EPA listed the Maywood Chemical Company on the Superfund NPL in 1983. In late 1983, Congress assigned DOE a research and development project to clean up the radioactive wastes at the Maywood Chemical Company 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 FUSRAP Maywood Superfund Site's 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 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 RI/FS and is coordinating that RI/FS and cleanup, with USACE's FS and PP and other USACE actions related to environmental cleanup at the Site.

DOE began investigating the FUSRAP Maywood Superfund Site and surrounding area in 1983 and, during 1984-1985, 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 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 EE/CA under CERCLA. These interim cleanup actions were completed in 2000 by the USACE.

The RI report (December 1992) was prepared to evaluate the nature and extent of radioactive constituents and related chemical contaminants at the FUSRAP Maywood Superfund Site. Eighty-eight properties have been designated for cleanup based on radiological surveys and soil sampling. The primary radioactive constituents of concern (COCs) have been identified as thorium-232, radium-226, uranium-238, and their radioactive decay products present in soils, buildings and wastes at the FUSRAP Maywood Superfund Site.

Metals and organic chemicals are also present in soils at MISS, Stepan, and nearby vicinity properties above site-specific background levels. Some of these metals and organic chemicals are not associated with specific thorium processing activities at MCW, nor have they been shown to originate from the MISS. No chemical COCs were identified for soil based on a risk analysis in the BRA.

Groundwater

Due to continuing investigations at the FUSRAP Maywood Superfund Site by the USACE and the Stepan Company, groundwater contamination is not directly addressed in the FS or this PP. The USACE has prepared a RI work plan to investigate groundwater contamination and determine the impacts of FUSRAP waste on groundwater and is implementing that investigation.

Inaccessible Soils

Inaccessible soils are defined as contaminated soils under permanent structures, such as buildings and roadways. Soils under parking lots, sidewalks, 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, or utility corridor. Utility corridors will be assessed on a case-by-case basis to determine if contaminated soil is accessible or not. Inaccessible soils are not recommended for cleanup until such time in the future as they become accessible. The inaccessible soils will be addressed when the property owners make the soils accessible. If property owners choose to make these soils accessible at the time of initial cleanup, the USACE would address the soils at that time.

The assumption that a property contains contaminated inaccessible soils is based on limited data. To determine the presence and extent of inaccessible soils, additional sampling may be done during remediation of the accessible soils or when property owners make these soils accessible. The FS provides more information regarding the locations and estimated volumes of inaccessible soils at the FUSRAP Maywood Superfund Site.

These inaccessible soils do not pose a current risk because they are isolated by their location under building foundations, utility corridors, roadways, railroad tracks, and other similar structures or surfaces. Radon monitoring and walkover gamma surveys have been performed at the affected properties to evaluate potential exposures; in all cases, measurements were well within acceptable limits. Removal of these soils is not warranted at this time because of:

- limited current risk;
- the potential for disruption to property owners, occupants, and the community during excavation of these soils (i.e., temporary closure of businesses and roads); and,
- the increased construction risks associated with excavation (e.g., underpinning and demolition activities)

Potential exposure to the inaccessible soils would be prevented or controlled as necessary through institutional controls until they are addressed in the future. Institutional controls may include prevention tools such as notification to property owners, posting of signs, cooperative agreements with utility companies who may need to take emergency repair actions, and periodic radon monitoring by the USACE to verify that building structures continue to provide adequate protection from contaminated soils beneath them. Institutional controls may also include proprietary and state and local governmental controls (e.g., deed notices, easements, covenants, zoning controls, etc.) to prevent residential development. Per the terms of EPA/DOE Dispute Resolution, local municipalities would be requested to notify the USACE and EPA of any land use changes that would affect those properties where radioactive contamination is left above the average of 5 pCi/g combined radium-226 and thorium-232 (or radium-228) above background concentrations.

SCOPE OF THE PROPOSED PLAN

This PP addresses the Soils/Buildings OU that includes the remediation of soils and buildings contaminated with FUSRAP wastes at the FUSRAP Maywood Superfund Site. This PP does not address the groundwater contamination, the chemical contamination at and emanating from the Stepan Property and 149-151 Maywood Avenue, or the previously completed remedial and removal actions on the residential properties and parks. These issues will be addressed in a future ROD. Table 4 provides the volumes of contaminated accessible and inaccessible soil associated with each of the Soils/Buildings OU properties.

SUMMARY OF FUSRAP MAYWOOD SUPERFUND SITE RISKS

The BRA report was prepared to evaluate the risk to human health and the environment from the radioactive materials and chemicals at the FUSRAP Maywood Superfund Site if no remedial actions are taken. The risk of developing cancer from FUSRAP Maywood Superfund Site contaminants was compared to the CERCLA risk range of 10^{-4} to 10^{-6} for Superfund sites. This means an increased risk of developing cancer of one in ten thousand to one in one million.

Table 4. FUSRAP Maywood Superfund Site Contaminated Soil Volume Estimates

Property	In Situ Soil Volume Restricted Use Criteria[1] (yd^3)		In Situ Soil Volume Unrestricted Use Criteria [2] (yd^3)		Comments
	Accessible	Inaccessible	Accessible	Inaccessible	
Lodi Properties					
8 Mill Street	N/A	0	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 3/29/96 letter from the DOE PM, to the EPA RPM.
160 &174 Essex Street	N/A	N/A	1,845	254	Inaccessible soil volume estimated.
170 Gregg Street	N/A	N/A	14	0	
80 Industrial Road	N/A	N/A	690	916	Inaccessible soil volume estimated.
80 Hancock Street	N/A	N/A	868	3,440	Inaccessible soil volume estimated.
100 Hancock Street	N/A	N/A	954	866	Inaccessible soil volume estimated.
72 Sidney Street (a.k.a. 88 Money Street)	N/A	N/A	58	0	
Maywood Properties					
N.J. State Route 17	0	20,000	N/A	N/A	Inaccessible soil volume estimated.
23 Howcroft Road	N/A	N/A	4,552	338	Inaccessible soil volume estimated.
149–151 Maywood Avenue	74,741	20,485	N/A	N/A	Inaccessible soil volume estimated.
205 Maywood Avenue, 50 and 61 West Hunter Avenue	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	Inaccessible soil volume estimated.
200 NJ State Route 17	N/A	N/A	375	0	
239 NJ State Route 17	N/A	N/A	3,393	156	Inaccessible soil volume estimated.
85, 87, 99–101 Route 17	N/A	N/A	2,066	0	
99 Essex Street	N/A	N/A	423	0	
111 Essex Street	N/A	N/A	3,617	0	Contaminated soil beneath railroad tracks considered inaccessible.
113 Essex Street	N/A	N/A	514	0	
New York, Susquehanna & Western Railway	2,900	3,100	N/A	N/A	Contaminated soil beneath railroad tracks considered inaccessible.
Stepan					
100 West Hunter Avenue[3]	44,125	974	N/A	N/A	
MISS					
Maywood Interim Storage Site (100 West Hunter Avenue)	73,233	0	N/A	0	
Subtotal [4]	196,423	47,744	30,751	6,370	
Subtotal [4]	244,167		37,121		
Total [4]	281,288				

yd^3 = cubic yard

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

1) Restricted Use Criteria: <15 picoCuries per gram (pCi/g) of radium-226 and thorium-232 combined.
2) Unrestricted Use Criteria: <5 pCi/g of radium-226 and thorium-232 combined.
3) Stepan accessible soil volume includes contaminated material in NRC-licensed Burial Pits 1, 2, and 3 (approximately 19,100 yd^3).
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 for the FUSRAP Maywood Superfund Site includes waste volume from the properties that are addressed by the FS. Volumes associated with other past or ongoing cleanup actions are not included in

this total. An additional 12,500 yd3 of inaccessible soils are estimated to be present under streets adjacent to residential properties. These soils will be addressed with the inaccessible soils at the commercial/government properties.
Source: BNI 1997. Volume Register, Revision 11; S&W 2001. Volume Register, Revision 0.

The BRA also evaluated the non-cancer toxic effects of chemicals at the FUSRAP Maywood Superfund Site. The non-cancer effects of chemicals are evaluated based on toxicity and are expressed as a Hazard Index. A Hazard Index of greater than 1 indicates the potential for adverse toxic effects from exposure to chemicals. For this radiologically contaminated site, the cancer risks associated with the radionuclides will generally be far greater than the toxic effects of associated chemicals.

In order to streamline the risk assessment, several similar properties were grouped together to represent a single property group for exposure evaluation. The property groups used in the BRA report are listed in Table 5. It should be noted that the overall baseline risks were determined for all the property groups prior to any cleanup actions being taken. Risks have been reduced at many of these properties by prior and ongoing removal actions.

The BRA report presents the results of estimated risk from exposure to the principal radiological constituents identified by the RI report [thorium-232 (as measured by radium-228), radium-226, and uranium-238] and chemicals associated with the FUSRAP Maywood Superfund Site if no remedial actions are taken. Risks were calculated using both average exposure conditions and reasonable maximum exposure conditions (which represent the highest reasonably expected exposures). Although risks were estimated for the residential properties in the risk assessment, only risks for the remaining industrial and commercial properties are summarized here. The assessment looks at ways people could be exposed for current and possible future land uses at the FUSRAP Maywood Superfund Site. The assessment considers exposure to contaminants over a 70-year lifetime.

The BRA evaluated the potential risks that could develop without cleanup and assumed there were no protective controls in place. (Protective controls currently at the FUSRAP Maywood Superfund Site include fencing to control access and cover materials such as grass to control erosion.) The assessment also used conservative assumptions concerning exposure levels and duration that approximate reasonable maximum exposure conditions. For future land use, the potential conditions at the FUSRAP Maywood Superfund Site are assumed to worsen allowing for additional exposure. These assumptions for future land use tend to over-estimate exposure since measures are currently in place to protect workers, the public, and the environment, and actual exposures tend to vary depending on location and contamination levels.

For average exposure conditions at the Soils/Buildings OU properties, the results predicted radiological cancer risks below the CERCLA risk range, except for employees exposed to radionuclides located at certain areas of the MISS. For reasonable maximum exposure conditions at the Soils/Buildings OU properties, the results predict radiological cancer risks above the CERCLA risk range at certain locations on MISS and portions of several Soils/Buildings OU properties near MISS (see FS, Section 2.6, and Figures 2-15 through 2-18).

Table 5. Property Groups used in the Baseline Risk Assessment(1)

Property Unit	
Property Group Number	**Name**
1 (Residential Properties)	Long Valley Road (14, 24) Interstate 80 (East Bound Right-of-Way) Branca Court Hancock Street Columbia Lane Avenue E West Central Avenue Redstone Lane (18, 19) Trudy Drive West Hunter Avenue, Avenue B Avenue C Garibaldi Avenue
2 (Residential Properties)	Redstone Lane (11) Long Valley Road (16, 18, 20, 22, 26)
3	100 West Hunter Avenue (Stepan Property)
3H	Elevated Contamination Area (Stepan Property)
4 (Municipal Parks)	Lodi Municipal Park Lodi Fire Station J. F. Kennedy Park Fireman's Memorial Park
5 (Commercial/Government Properties)	160 & 174 Essex Street I-80 North (Westbound Right-of-Way) 72 Sidney Street (a.k.a. 88 Money Street) 80 Hancock Street 100 Hancock Street 99 Essex Street 80 Industrial Road 8 Mill Street 170 Gregg Street 200 NJ State Route 17
6	100 West Hunter Avenue (MISS Property) NJ State Route 17 New York, Susquehanna, & Western Railway 100 West Hunter Avenue (MISS Pile)
6B	96 Park Way
6H	100 West Hunter Avenue (Elevated Contamination Area on MISS)
7 (Commercial/Government Properties)	149–151 Maywood Avenue 23 Howcroft Road 239 NJ State Route 17 85, 87, 99–101 NJ State Route 17 167 NJ State Route 17
7H (Commercial/Government Properties)	Elevated Contamination Area associated with Group 7 properties
8 (Commercial/Government Properties)	111 Essex Street

(1) The location of the property groups are shown in the FS, Figures 2-15 through 2-18.

For both average and reasonable maximum exposure conditions at the Soils/Buildings OU properties, the results predicted chemical cancer risks to be within or below the CERCLA risk range and Hazard Indices below 1.

For the existing uses of the Soils/Buildings OU properties at the FUSRAP Maywood Superfund Site, the largest contributors to the calculated risk were direct gamma radiation and radon from the contaminated soils. However, actual measured results of ongoing environmental monitoring of gamma radiation and radon indicate that exposures above the CERCLA risk range are not occurring. Protective measures at the MISS, such as access restrictions due to a fenced and guarded facility, and cover material, are currently in place to reduce the exposure of employees and contractors to the contaminants.

For land use in the future, a number of additional assumptions were made for the risk evaluation. For example, it was assumed that surface soils are removed, exposing the higher concentration subsurface materials. For a worker in the future who would spend most of the work day directly exposed to the higher concentration soils, the increased risk of developing cancer is estimated as high as 7 in 1,000 (7×10^{-3}). This means that 7 out of every 1,000 people exposed to these higher concentration soils, for the duration assumed in the risk assessment, would be expected to develop cancer. The majority of the estimated risk for the future worker was from exposure to gamma radiation and radon from the soils. As with the current risk estimates, no unacceptable risks or hazards were identified for exposure to chemicals in soil. Therefore, no chemical COCs were identified during the BRA that would require remediation.

In summary, the BRA calculated cancer risk and non-cancer hazards for average exposure conditions and reasonable maximum exposure conditions for both current and future use scenarios. The estimated radiological cancer risks were above the CERCLA risk range of 10^{-4} to 10^{-6} identified as protective by EPA in the NCP. These results indicate a need for remedial action at the FUSRAP Maywood Superfund Site properties to address contamination. The 1993 BRA and Section 2.6 of the FS provide a detailed description of the assumptions and methods used in making these estimates.

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, and 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. To be considered (TBC) criteria, which are non-promulgated advisories or guidance issued by Federal or state governments, are not legally binding and do not have the status of a potential ARAR, but are also considered. TBCs may be used in the absence of ARARs at the discretion of the lead agency if they are reliable and useful to the development of remedial alternatives for the site. More information on ARARs is provided in the FS, Section 3 and Appendix A.

Radionuclides in soil on the FUSRAP Maywood Superfund Site 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 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 (September 2001 NRC Letter), the NRC changed its position on the status of the radioactively contaminated soils located at the FUSRAP Maywood Superfund Site. 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 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 offsite for disposal will be treated as 11(e)(2) byproduct materials.

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 radon-222 exceeding 3 pCi/L above background, appropriate remediation will be undertaken. Radon at the FUSRAP Maywood Superfund Site 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 the remediated buildings and also those buildings with inaccessible soils remaining beneath them. If radon-222 levels exceeded the 3 pCi/L above background level at some point in the future in buildings that had inaccessible soils remaining beneath them, radon mitigation actions (e.g. sealing foundation cracks, supplementing existing ventilation systems, etc.) would be implemented to return radon-222 levels to below 3 pCi/L above background.

CLEANUP CRITERIA

After initially disputing the matter, DOE and EPA established site-specific cleanup criteria for the radioactive contamination at the Site in 1994. These criteria were originally proposed by EPA and will meet the criteria of 15 mrem/yr above background in compliance with NJAC 7:28-12.8(a)1. For unrestricted use properties, surface and subsurface soils must be remediated to an average of 5 pCi/g radium-226 and radium-228 combined above background concentrations, and clean backfill must be placed in excavated areas. For restricted use properties, soils at the FUSRAP Maywood Superfund Site must be remediated to an average of 15 pCi/g radium-226 and radium-228 combined above background concentrations with a goal of achieving 5 pCi/g where it is reasonably achievable. Per the terms of the Dispute Resolution, 5-year reviews and community notification requirements must be put in place at all properties where cleanup does not achieve the unrestricted standard to assure that residential land use is prohibited. For uranium at the FUSRAP Maywood Superfund Site, DOE performed a site-specific risk assessment to establish the guidelines of 50 pCi/g uranium-238 and 100 pCi/g total uranium (U-238 + U-235 + U-234). The USACE has found these site-specific standards for implementation of the cleanup at the FUSRAP Maywood Superfund Site to be protective for the respective uses.

Even though the EPA/DOE Dispute Resolution determined that the restricted use cleanup criteria would be applied to all commercial Phase II properties, USACE has determined that the evaluation of the reasonably anticipated future land use for a property should also be weighed when determining the cleanup level for a property. USACE's recommendation to use either the restricted or unrestricted cleanup criteria for an individual property is based on an evaluation of the following factors:

- 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 residential, commercial/industrial, and recreational areas
- Federal/State/local land use designation
- Historical development patterns

Based on this evaluation, USACE recommends 17 of the Soils/Buildings OU properties should be remediated to the unrestricted use criterion because of their proximity of adjacent residential neighborhoods and parks, and a less defined commercial/industrial zoning footprint. For those property owners who intend to retain future commercial use of their properties, implementation of the restricted criterion is likely to provide benefits by reducing impacts such as the potential for loss of business during remediation.

Seven of the Soils/Buildings OU properties would be cleaned to the restricted use criterion (i.e., to an average of 15 pCi/g of radium-226 and thorium-232 combined above background), as listed in Table 2. The other 17 Soils/Buildings OU properties would be cleaned up to the unrestricted use criterion (i.e., to an average of 5 pCi/g of radium-226 and thorium-232 combined above background). Inaccessible soils would be remediated in the future as they become accessible by action of the property owner (e.g., through demolition or renovation). The restricted cleanup criterion would be used on all inaccessible soils unless the remainder of the property had already been remediated to the unrestricted cleanup criterion.

Substitution of Thorium-232 for Radium-228 in the Cleanup Criteria

Post-remediation surveys will require the measurement of both radium-226 and radium-228 to determine compliance with the cleanup criteria established by DOE and EPA for the FUSRAP Maywood Superfund Site. However, the current FUSRAP Maywood Superfund Site database contains data for radium-226, uranium-238, and thorium-232; these radionuclides were quantified at the FUSRAP Maywood Superfund Site by using gamma spectrometry analysis. Because thorium-232 cannot be directly measured using gamma spectrometry, the thorium-232 values were obtained by measuring radium-228, which is a radionuclide in the decay chain of thorium-232. Equilibrium (when a long-lived radionuclide decays into a short-lived daughter, and the activity of the daughter radionuclide approaches that of the parent, reaching equilibrium) between thorium-232 and radium-228 is assumed, because sufficient time has elapsed since thorium-processing activities occurred at the site to allow for decay of over 99% of the radium-

228 in the original waste. Total radium (radium-226 and radium-228) may be calculated by summing the radium-226 and thorium-232 values in the FUSRAP Maywood Superfund Site database. Additional information regarding this substitution is provided in the FS, Section 3.2.1.1.

SUMMARY OF FEASIBILITY STUDY ALTERNATIVES

The FS was prepared to develop and evaluate remedial alternatives (cleanup options) for the Soils/Buildings 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). Table 2 provides a listing of the properties addressed by this PP, including the estimated volumes of material at each property and which will be cleaned to an unrestricted or restricted use criteria. Four remedial alternatives were developed in the FS. Per EPA's FS guidance, the cost estimates assume a 30-year performance period for ongoing actions such as monitoring and maintenance.

Alternative 1: ***No Action*** was developed and evaluated to provide a baseline for comparison, and to provide an appropriate alternative in the event that no significant health or environmental risk was found to exist at the FUSRAP Maywood Superfund Site. Under this alternative, there would be no further action taken at the FUSRAP Maywood Superfund Site, and existing access restrictions, maintenance, and monitoring activities would be discontinued. Five-year reviews in accordance with the NCP at 40 CFR 300.430(f)(4)(ii) would be performed. These reviews are required by CERCLA whenever a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the FUSRAP Maywood Superfund Site above levels that allow for unlimited use and unrestricted exposure [NCP, 40 CFR 300.430(f)(4)(ii)]. The purpose of the 5-year review is to ensure that human health and the environment are being protected by the remedial action. The cost associated with this activity for 30 years is approximately $439,000.

Alternative 2: ***Monitoring and Institutional Controls*** would involve maintaining or reducing the current status of some of the properties at the Site, including periodic monitoring to detect any changes in the nature or extent of contamination at the FUSRAP Maywood Superfund Site. Institutional controls would include continuing the existing access restrictions at MISS and Stepan; maintaining existing cover materials including grass, building foundations, and asphalt; periodic inspection of all the properties to determine any changes in land use; and institutional controls (e.g., deed notices) as necessary to prohibit changes in land use or construction in contaminated soils. These institutional controls would effectively limit unacceptable exposure to the contaminants by removing or limiting the exposure pathways of concern (direct gamma, inhalation, and ingestion). The cost of this alternative is approximately $20 million for a 30-year period.

Alternative 3: ***Excavation and Offsite Disposal*** would involve removing contaminated soils above the appropriate cleanup criteria. 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, or utility corridor. Utility corridors would be addressed on a case-by-case basis to determine their accessibility. Soils above the identified cleanup criteria would be excavated for offsite disposal at a facility authorized to accept radioactive wastes. Clean soil would be used for backfill to grade as necessary.

Physical separation of a portion of the excavated material would be done at 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 onsite as backfill or shipped offsite to an appropriate disposal facility.

Inaccessible soils currently located under buildings and roadways would be excavated and disposed offsite as they become accessible in the future (e.g., due to renovation or demolition activities). Radon would be monitored in buildings with inaccesible soils remaining beneath them to ensure compliance with the radon limit of 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.

USACE and EPA would request notification by local municipalities of any land use changes that would affect those properties where radioactivity remains above an average of 5 pCi/g of thorium-232 and radium-226 combined above background concentrations. Five-year reviews would be conducted in accordance with CERCLA 121(c) and 300.430(f)(4)(ii).

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 will be remediated in compliance with NJAC 7:28(a)1 and 10 CFR 20.1402.

The offsite disposal option that was evaluated for Alternative 3 uses a disposal facility permitted or licensed to receive the specific materials being shipped, although the details of the offsite disposal will be evaluated and finalized during the implementation phase of this alternative. Per the September 2001 NRC Letter, USACE will dispose of radiologically contaminated soil offsite as 11(e)(2) byproduct materials. The contaminated soils would be shipped by rail from MISS to the disposal facility.

The cost to implement Alternative 3 is estimated to be $254 million. Costs are based on excavation and disposal of accessible soil contamination; these costs also include the future excavation and disposal of inaccessible soils under operating buildings and transportation corridors. These inaccessible soils are assumed to be made accessible by the landowner prior to USACE excavation. Inaccessible soil costs have been estimated; however, uncertainties related to existing volumes and future costs related to the excavation, transportation and disposal of contaminated soil could result in significantly higher (or lower) costs. This cost estimate

assumes that seven properties are cleaned to the restricted use criterion, and the remaining 17 properties are cleaned to the unrestricted use criterion. The remedial action is estimated to require five years to complete (assuming required funds are appropriated from Congress each year). The time to complete the inaccessible portion of the remedy is unknown because landowners must make these soils accessible prior to USACE action.

Alternative 4: ***Excavation, Treatment, and Offsite Disposal*** is similar to Alternative 3 regarding contaminated buildings and the NRC-licensed burial pits on Stepan, cleanup levels, radon monitoring/mitigation, and excavation of soils on the various properties. However, this alternative also incorporates treatment to reduce the volume of contaminated materials requiring disposal as radioactive waste. Because the effectiveness, implementability and cost-effectiveness of treatment is uncertain, this alternative included a treatment demonstration at the MISS. This demonstration is intended to evaluate technology with the potential for reducing the volume of soils requiring disposal as radioactive waste. This evaluation will not delay implementation of the remedy however. While the evaluation continues, the USACE will begin excavation and offsite disposal of contaminated soils. If the evaluation of the demonstration by USACE and EPA, in consultation with the NJDEP, proves a technology is effective, implementable, and cost-effective, the USACE will treat the excavated soils at the MISS; otherwise, the USACE will dispose of the excavated soils without treatment (Alternative 3). This evaluation will include the ultimate disposition of the treated soils as an additional factor. The public will also be informed of the determination regarding the disposition of the treated soil if treatment is employed.

The following constraints would apply to treated soils:

Contaminated Stream – Soils greater than an average of 15 pCi/g combined radium-226 and thorium-232 above background from the treatment process would be disposed at an offsite disposal facility authorized to accept radioactive wastes.

Residual Stream – Soils less than an average of 15 pCi/g combined radium-226 and thorium-232 above background will either be backfilled at the MISS or disposed offsite at an appropriate landfill. If the treated soil is backfilled at the MISS, all backfilled areas would then be covered by at least one foot of clean backfill material to meet the criteria of 15 mrem/yr above background.

A full-scale treatment demonstration was conducted on the FUSRAP Maywood Superfund Site soils to determine if treatment could be accomplished. If the demonstration proves a technology is effective, implementable, and cost-effective, the USACE will treat the excavated soils to reduce the volume requiring disposal.

The effectiveness of the systems demonstrated at the MISS are being evaluated based on the following:

- Ability of the processes to separate non-contaminated site materials from materials that have been contaminated with radiological residuals from the thorium extraction process.

- Ability of the gravel separation system to extract coarse material (+3/8 in., -6 in.) from the soil mass and demonstrate by sampling and laboratory analyses that the separated gravel meets the cleanup levels.

- Quantification of the influence of excavation and material handling on the mixing of radioactively contaminated and non-contaminated excavated material by tracking the material mass and activity from in situ to the output processed stockpiles.

- Ability of the radiological sorting system to assay the material and accurately sort it into "above criteria" and "below criteria" stockpiles. It must be demonstrated through rigorous sampling and laboratory analysis that "below criteria" material meets the cleanup levels.

- Demonstration, by means of monitoring and observing dust and noise levels during the demonstration that the processing units do not create a public nuisance or public health hazard.

- Time required to process material and any impacts to remediation schedule.

- Cost effectiveness of system operation compared to full disposal option.

At the property subject to backfilling with cleaned soils (MISS), subsurface soil concentrations would be expected to range anywhere from naturally-occurring background levels to an average of 15 pCi/g of radium-226 and thorium-232 combined above background concentrations.

Cleanup criteria for the various properties and subsequent long-term management of soils remaining above an average of 5 pCi/g of radium-226 and thorium-232 combined above background concentrations would be the same as Alternative 3.

The offsite disposal option that was evaluated for Alternative 4 uses a disposal facility permitted or licensed to receive the specific materials being shipped, although the details of the offsite disposal will be evaluated and finalized during the implementation phase of this alternative. Per the September 2001 NRC Letter, USACE will dispose of radiologically contaminated soil offsite as 11(e)(2) byproduct materials. The contaminated soils would be shipped from MISS to the disposal facility. If treatment proves to be effective, and is implemented, the remaining soil containing lower amounts of radiological materials below criteria (i.e., 15 pCi/g combined radium-226 and thorium-232) would be either backfilled at the MISS or disposed offsite at a suitable landfill. The decision to utilize the treated material onsite vs. offsite disposal will be made by the USACE and EPA, in consultation with the NJDEP, and will take into consideration the residual condition of the MISS property under each scenario.

The public would be notified of both determinations- i.e., whether to employ treatment at the MISS, and, if so, the disposition of the treated soil. Public notification would occur prior to

any physical activity associated with onsite treatment and any disposal of treated soil if treatment is found to be appropriate.

Inaccessible soils currently located under buildings and roadways would be excavated and disposed offsite as they become accessible in the future (e.g., due to renovation or demolition activities). Radon would be monitored in buildings with inaccesible soils remaining beneath them to ensure compliance with the radon limit of 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.

In estimating the cost of this alternative, the USACE has assumed that the unrestricted and restricted use criteria would be applied to the same subsets of properties discussed under Alternative 3. To be conservative, it was assumed that contaminated material in the retention ponds on MISS, the NRC-licensed burial pits on Stepan property, and inaccessible areas would not be amenable to treatment; these materials are assumed to be disposed directly offsite without treatment. Twenty percent of the remaining material is estimated to be oversized materials such as concrete, debris, rocks and boulders; these would also be screened out prior to treatment. The estimate assumes that treatment is applied to the remaining excavated soils (approximately 66,583 yd^3). Currently, treatment that achieves a 60 percent volume reduction in amount of treated soil requiring off-site disposal as radioactive contaminated material is assumed. The actual effectiveness of treatment will not be known until after the treatment demonstration data are evaluated. The volume of inaccessible soils excavated and disposed offsite is estimated to be 66,614 yd^3. These soils will be made accessible in the future by the landowners.

The cost to implement Alternative 4 is estimated at $244 million based on the assumptions outlined above. Costs are based on excavation, treatment, and disposal of accessible soil contamination; costs are included for future excavation and disposal of inaccessible soils under operating buildings and transportation corridors. Inaccessible soil costs have been estimated based on the current understanding of inaccessible soil volumes; however, uncertainties related to existing volumes and future costs related to the excavation, transportation and disposal of contaminated soil could result in significantly higher (or lower) costs. The time to implement the proposed action is estimated at approximately five years (assuming sufficient funding is appropriated from Congress). The time to complete the inaccessible portion of the remedy is unknown because landowners must make these soils accessible prior to USACE action.

ANALYSIS OF ALTERNATIVES

The USACE and EPA, in consultation with the NJDEP, recommended the preferred alternative by evaluating each of the alternatives against nine criteria established by EPA. These criteria are described below.

CERCLA Evaluation Criteria

Threshold Criteria (must be met)

Overall Protection of Human Health and the Environment – addresses whether an alternative provides adequate protection and describes how exposure to the COCs is eliminated, reduced, or controlled through treatment, land use controls, or institutional controls.

Compliance with Applicable or Relevant and Appropriate Requirements – 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 FUSRAP Maywood Superfund Site cleanup.

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

Long-Term Effectiveness and Permanence – addresses the remaining risk and the ability of an alternative to protect human health and the environment over time, once cleanup levels have been met.

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.

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.

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

Cost – compares the differences in cost, including capital, operation, and maintenance costs of each FS alternative.

Modifying Criteria (formally evaluated after the comment period)

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 PP are reviewed.

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 PP are reviewed.

ALTERNATIVE COMPARISON SUMMARY

The advantages and disadvantages of each of the alternatives were compared using the nine evaluation criteria established by EPA in Section 300.430(e)(9)(iii) of the NCP. Some of these comparisons are summarized below. The detailed comparative analysis of all the alternatives is in the FS, Section 5.8.

Except for Alternative 1, No Action, all of the alternatives are protective of human health. Alternative 1 is not considered protective. Additionally, Alternative 2 may not be protective of the environment because contaminated soils would be left in place along the Lodi Brook. Additional analyses would be required to determine if Alternative 2 was protective of the environment if it were to be chosen as the selected remedy. The excavation and offsite disposal alternatives rank highest in overall protection of human health and the environment, because materials above acceptable levels are excavated from the FUSRAP Maywood Superfund Site and shipped for offsite disposal to facilities authorized to accept radioactive wastes. For those properties where residual concentrations are below the unrestricted use cleanup criterion, institutional controls would not be necessary to restrict future land use unless those properties have inaccessible soil. Institutional controls will be implemented at properties where contamination remains above these criteria to prevent residential development.

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, 3, and 4 may require institutional controls (to control land uses or construction in contaminated soils). Alternative 2 will require these restrictions on all properties at the Site addressed by the FS and this PP. For Alternatives 3 and 4, the USACE has elected to implement these restrictions on properties where there are inaccessible soils or where soils above the criterion for residential use remain in place. Alternatives 3 and 4 would achieve compliance with contaminant-specific ARARs by the removal and offsite disposal of contaminated materials greater than the cleanup criteria established for the Soils/Buildings OU.

For the excavation alternatives (Alternatives 3 and 4), DOE and EPA developed site-specific cleanup criteria for radium-226 and thorium-232 combined in accordance with EPA guidance. If residual concentrations at any of these properties are above an average of 5 pCi/g combined radium-226 and radium-228 above background, institutional controls in the form of 5-year reviews, 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 uranium-238 (50 pCi/g) and total uranium (100 pCi/g). Residual concentrations of uranium expected after cleanup are much lower than these guidelines. Existing disposal facilities will be used and are considered to be protective of human health as well as meet pertinent environmental requirements.

The excavation alternatives (Alternatives 3 and 4) provide long-term effectiveness because they would remove for permanent disposal all soil above cleanup criteria for either safe restricted or unrestricted residential use from the FUSRAP Maywood Superfund Site. Alternative 2 has questionable long-term effectiveness when compared to Alternatives 3 or 4,

because it relies exclusively on institutional controls. The long-term effectiveness of Alternative 4, based on the reuse of the treated soil on the MISS, would be ensured by the continued industrial/commercial (i.e., non-residential) land use and by the placement of clean material above the treated soils to the criteria of 15 mrem/yr above background. Overall effectiveness is further ensured by requesting municipalities to 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 radium-226 and thorium-232 combined above background concentrations.

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 will be evaluated.

Only Alternative 4 (assuming the treatment option proves effective) meets the CERCLA preference for remedies that utilize treatment to reduce the toxicity, mobility, or volume of the principal threat (radioactive contaminated soil). Both Alternatives 3 and 4 would include decontamination of contaminated building surfaces. The community and the regulatory agencies have raised technical and administrative issues concerning the use of soil treatment on this Site. The issues raised are a result of the fact that full-scale treatment performance information is limited, and must be more completely evaluated. The community and regulatory agencies have also raised concerns regarding the use of materials from the treatment process as treated backfill. A treatment demonstration was conducted to address these technical and administrative issues concerning treatment, and the data collected are being evaluated.

Alternatives 2, 3, and 4 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. Alternative 3 would be easier to implement than Alternative 4, which includes a treatment option. Note that actions taken under Alternative 4, if the treatment option were not implemented, are the same as Alternative 3.

The costs to implement the different alternatives have been calculated in terms of the cost in 2001 dollars (FY01$) without escalation or discounting. Capital, operation, and maintenance costs are included in Table 6.

Table 6. Estimated Cost of Cleanup Alternatives

Alternative	Description	Estimated Costs (FY01$)
1	No Action	$439,000
2	Monitoring and Institutional Controls	$20,000,000
3	Excavation and Disposal	$254,000,000
4	Excavation, Treatment, and Disposal	$244,000,000

State and community acceptance will be evaluated formally after the public comment period on the FS and PP. A community relations program and a community relations plan for the FUSRAP Maywood Superfund Site have been established and are maintained for the Site.

PREFERRED ALTERNATIVE FOR THE SOILS/BUILDINGS OU

The USACE and EPA recommend Alternative 4, *Excavation, Treatment, and Offsite Disposal*, with cleanup of MISS, Stepan, and five other industrial properties to the restricted use criterion and the 17 remaining properties to the unrestricted use criterion. This remedy will allow unrestricted residential use where appropriate at the FUSRAP Maywood Superfund Site. This alternative includes:

- 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 to demonstrate compliance with the criteria (See Table 2);

- remediation of the Stepan 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 of a portion of the excavated material would be done at MISS to sort boulders and rocks, material potentially requiring disposal as mixed waste (radioactive and hazardous materials) and bulk waste such as building rubble;

- evaluation of the treatment demonstration at MISS to evaluate technologies with the potential for reducing the volume of soils requiring disposal as radioactive waste. This evaluation will not delay implementation of the remedy however. While the evaluation continues, the USACE will begin excavation and offsite disposal of contaminated soils. If the evaluation of the demonstration by USACE and EPA, in consultation with NJDEP, proves a technology is effective, implementable, and cost-effective, the USACE will treat the excavated soils at the MISS. This evaluation will include the ultimate disposition of any treated soils as an additional factor in determining the effectiveness, implementability, and cost effectiveness of treatment. Otherwise, the USACE will dispose of the excavated soils without treatment (Alternative 3). The public will be informed of the results of the treatment demonstration as well as the determination of the disposition of the treated soils prior to implementation of the treatment portion of Alternative 4. Soils after treatment would be managed as follows:

    - sorted materials that are below an average of 15 pCi/g of radium-226 and thorium-232 combined above background would either be backfilled at the MISS or disposed offsite at a suitable landfill. The decision to utilize the treated material as backfill onsite vs. offsite disposal will be made by the USACE and EPA, in consultation with NJDEP, taking into account the residual condition of the MISS property under each scenario. If the material is backfilled onsite, all affected areas would be covered by at least one foot of clean soil from a commercial supplier over all excavated areas to meet the criteria of 15 mrem/yr above background.

    - Institutional controls to ensure the effectiveness and protectiveness of the remedy.

- remediation of contaminated buildings/structures (or demolition and disposal as deemed appropriate at the time of work) 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 radon-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 offsite as they become accessible in the future (e.g., due to renovation or demolition activities);

- demolition and disposal of structures on MISS to access contaminated soils;

- offsite disposal of all materials above the cleanup criteria at facilities authorized to accept radioactive wastes. Per the September 2001 NRC Letter, USACE will dispose of radiologically contaminated soil offsite as 11(e)(2) byproduct materials. The selection of the disposal facility(s) will be made after the ROD is signed selecting the remedial action during "remedial design" and 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);

- request 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 thorium-232 and radium-226 combined above background concentrations;

- periodic radon-222 monitoring of structures over inaccessible soils to assure the structure continues to provide adequate protection from these soils; mitigation of radon-222 (e.g., sealing foundation cracks, supplementing existing ventilation systems, etc.) would be performed if indoor air levels exceed 3 pCi/L above background, and;

- institutional controls (e.g., deed notices, easements, covenants, zoning controls, etc.) implemented as necessary for those properties where radioactivity remains above an average of 5 pCi/g of radium-226 and thorium-232 combined above background concentrations and/or due to the presence of inaccessible soil. An Institutional Controls Implementation Plan would be developed in coordination with owners, occupants, EPA, NJDEP, municipalities, utility companies, and other interested parties to establish a tiered program (with monitoring to trigger appropriate subsequent stages) to restrict future land use.

The preferred alternative, Alternative 4, meets the threshold criteria and provides the best balance among the alternatives. It is protective of human health and the environment, complies with all pertinent environmental regulations, and addresses state and community concerns by removing radioactive materials from the FUSRAP Maywood Superfund Site, and is more cost-effective than the other excavation and disposal alternative (Alternative 3). The Site's historical commercial/industrial use, the proximity of heavily used transportation corridors (NJ Route 17, U.S. Route 46, Interstate 80), and the well defined commercial/industrial districts justifies 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.

Total costs for the preferred alternative, Alternative 4, are estimated at $244 million, versus $254 million for Alternative 3 (which does not include treatment). Costs are based on excavation and disposal of accessible soil contamination (including the Stepan burial pits); costs are also included for future excavation and disposal of inaccessible soils under operating buildings and transportation corridors. Inaccessible soil costs have been estimated based on the current understanding of existing volumes and future costs related to the excavation, transportation and disposal of contaminated soil.

The time to implement the preferred alternative is dependent on USACE funding, which is appropriated annually from Congress. Provided sufficient funding is available, it will take approximately 5 years to remediate the accessible soils, not including the time to remediate the inaccessible soils since it is unknown when the property owners may make the soils accessible.

Should no treatment option be found to meet the above requirements, then the soils will be disposed at an appropriate disposal facility, making Alternative 4 the same as Alternative 3.

COMMUNITY ROLE IN THE SELECTION PROCESS

Public input is encouraged by the USACE, EPA, and the NJDEP to ensure that the remedy selected for the FUSRAP Maywood Superfund Site meets the needs of the local community in addition to being an effective solution to the problem. Although this PP makes a recommendation for a remedial action, the remedial action will not be selected until USACE and EPA, in consultation with NJDEP, have signed the ROD.

Written comments on the PP will be accepted for 30 days from August 12, 2002. Upon timely request (i.e., before the end of the comment period), the comment period will be extended by an additional 30 days. A public meeting will be held on August 28, 2002 from 6 to 9 p.m. in the Maywood Borough Hall, Trinka Hall (lower level), 459 Maywood Avenue, Maywood, to receive any verbal or written comments regarding the preferred alternative or any other alternatives developed and evaluated in the FS.

Written comments will be accepted any time during the comment period. All written comments should be addressed to:

Mr. Allen Roos
U.S. Army Corps of Engineers
New York District
26 Federal Plaza, Room 2108
New York, NY 10278

The USACE will evaluate comments submitted during the comment period. Responses to significant public comments will be formally documented in a Responsiveness Summary that will be an attachment to the ROD. After considering these comments, the USACE and EPA, in consultation with the NJDEP, will make a final decision on the cleanup remedy for the Soils/Buildings OU at the FUSRAP Maywood Superfund Site, which will be outlined in the ROD. The ROD, including the Responsiveness Summary will then be incorporated in the Administrative Record for the Site. The documents in the Administrative Record are available for review on the internet at www.fusrapmaywood.com or at the following location:

U.S. Army Corps of Engineers
FUSRAP Public Information Center
75A West Pleasant Avenue
Maywood, NJ 07607
(201) 843-7466

REFERENCES

BNI (Bechtel National, Inc.) 1992. *Remedial Investigation Report for the Maywood Site, Maywood, New Jersey*, DOE/OR/21949-337, prepared for U.S. Department of Energy, Oak Ridge Operations Office, under Contract No. DE-AC05-91OR21949, December.

BNI 1997. *Volume Register for FUSRAP and SFMP Sites*, VR-001, Revision 11, February.

DOE 1993. *Baseline Risk Assessment for the Maywood Site*, DOE/OR/21950-003, April.

EPA 1986. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 40 CFR 300*, December 11, 1980, as amended 1982 and 1986.

EPA 1990. *National Oil and Hazardous Substances Contingency Plan*, *Federal Register*, Volume 55, No. 46, March 8.

NJAC 2000. New Jersey Administrative Code, NJAC 7:28, Radiation Protection Programs, Subchapter 12, Remediation Standards for Radioactive Materials, August.

NRC 2001. Letter from Martin Virgilio (Director Office of Nuclear Materials Safety and Safeguards) to Jonathan P. Carter, Esq. (Envirocare of Utah, Inc.), Subject: *Disposal of FUSRAP Waste*, September 20.

S&W 2001. *Volume Register*, Revision 0, March.

USACE 2002. *Feasibility Study*, prepared by Stone & Webster, Inc. for U.S. Army Corps of Engineers, July.