

M-625

---

Formerly Utilized Sites Remedial Action Program (FUSRAP)

---

# ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey

---



**US Army Corps  
of Engineers®**

M-625

---

Formerly Utilized Sites Remedial Action Program (FUSRAP)

---

# ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey

---



**US Army Corps  
of Engineers®**

M-625

DOE/OR/21949-390

**REMEDIAL DESIGN/REMEDIAL ACTION IMPLEMENTATION PLAN  
FOR THE MAYWOOD VICINITY PROPERTIES**

**Formerly Utilized Sites Remedial Action Program  
(FUSRAP)**

**AUGUST 1995**



# Table of Contents

---

	Page
<b>SECTION 1--OVERVIEW</b> .....	1 of 7
• Purpose .....	1 of 7
• Action Memorandum .....	1 of 7
• FUSRAP .....	1 of 7
• Federal responsibility .....	1 of 7
• FUSRAP policy .....	1 of 7
• Management and technical direction .....	1 of 7
• Functional responsibility .....	2 of 7
• Assigned to DOE .....	2 of 7
• FUSRAP structure .....	2 of 7
• FUSRAP support .....	3 of 7
• FUSRAP teams .....	4 of 7
• Functional disciplines .....	4 of 7
• New Jersey team .....	5 of 7
• BNI work methods .....	6 of 7
• Task direction .....	6 of 7
• BNI policy .....	6 of 7
• Documents .....	7 of 7
<b>SECTION 2--HISTORY OF THE MAYWOOD VICINITY PROPERTIES</b> .....	1 of 5
• Definition .....	1 of 5
• Maywood site .....	1 of 5
• Site location .....	1 of 5
• Chronology .....	1 of 5
• How properties became contaminated .....	5 of 5
• Waste disposal .....	5 of 5
• Comment .....	5 of 5
<b>SECTION 3--SURVEYS OF THE MAYWOOD VICINITY PROPERTIES</b> .....	1 of 3
• Introduction .....	1 of 3
• ORNL survey .....	1 of 3
• BNI survey .....	1 of 3
• Metals and rare earths .....	2 of 3
• FUSRAP constituents .....	2 of 3
• RCRA constituents .....	2 of 3
• Maximum concentrations .....	3 of 3

*Continued on next page*

# Table of Contents, Continued

---

	<b>Page</b>
<b>SECTION 4--REMEDIAL DESIGN AND REMEDIAL ACTION</b> . . . . .	1 of 13
• Objective . . . . .	1 of 13
• Compliance . . . . .	1 of 13
• Development of designs . . . . .	2 of 13
• Design packages . . . . .	2 of 13
• Fiscal year funding . . . . .	2 of 13
• Property Groups . . . . .	2 of 13
• Process . . . . .	3 of 13
• Technical specifications . . . . .	3 of 13
• Specifications table . . . . .	4 of 13
• Details, plans, and specifications . . . . .	4 of 13
• Excavation plan . . . . .	5 of 13
• Comment . . . . .	5 of 13
• Restoration plan . . . . .	5 of 13
• Summary and explanation table . . . . .	6 of 13
• Structural support . . . . .	6 of 13
• Alternate trench method . . . . .	6 of 13
• Pit underpinning . . . . .	7 of 13
• Implementation . . . . .	7 of 13
• Deep contamination . . . . .	8 of 13
• Pictures of underpinning . . . . .	9 of 13
• Before remediation . . . . .	11 of 13
• During remediation . . . . .	12 of 13
• After remediation . . . . .	13 of 13
 <b>SECTION 5--SUBCONTRACTOR SCOPE OF WORK</b> . . . . .	 1 of 2
• Introduction . . . . .	1 of 2
• Responsibility . . . . .	1 of 2
• Remedial action subcontract . . . . .	1 of 2
• Restoration subcontract . . . . .	2 of 2
• Asbestos . . . . .	2 of 2
• Asbestos management . . . . .	2 of 2
• New Jersey licensing . . . . .	2 of 2

*Continued on next page*

# Table of Contents, Continued

---

	<b>Page</b>
<b>SECTION 6--RD/RAIP CRITERIA</b> . . . . .	1 of 3
• Responsibility . . . . .	1 of 3
• Risk analysis . . . . .	1 of 3
• Average background . . . . .	1 of 3
• Established criteria . . . . .	1 of 3
• ALARA . . . . .	2 of 3
• Example 1 . . . . .	2 of 3
• Example 2 . . . . .	2 of 3
• Supplemental limits . . . . .	2 of 3
• Dose limit . . . . .	2 of 3
• Determination of limits . . . . .	3 of 3
• Supplemental standards . . . . .	3 of 3
• Standard selected . . . . .	3 of 3
<b>SECTION 7--QUALITY ASSURANCE PROGRAM PLAN</b> . . . . .	1 of 2
• Introduction . . . . .	1 of 2
• What the QAPmP does . . . . .	1 of 2
• QA audits . . . . .	1 of 2
• Quality assessment . . . . .	2 of 2
• Mitigation measures . . . . .	2 of 2
<b>SECTION 8--PLANNING, SCHEDULING, AND FUNDING</b> . . . . .	1 of 5
• Funding for activities . . . . .	1 of 5
• Division of funds . . . . .	1 of 5
• Proposed schedule . . . . .	2 of 5
• Budget allocation . . . . .	2 of 5
• Included in schedule . . . . .	2 of 5
• Delay factors . . . . .	2 of 5
• Cost estimates . . . . .	3 of 5
• Factors that affect estimates . . . . .	3 of 5
• Direct and Indirect Costs . . . . .	3 of 5
• Transportation and disposal . . . . .	3 of 5
• Expansion factor . . . . .	3 of 5
• Primary and additional costs . . . . .	4 of 5
• Remediation Estimates . . . . .	5 of 5

*Continued on next page*

# Table of Contents, Continued

---

	Page
<b>SECTION 9--IMPLEMENTATION OF THE RD/RAIP</b> . . . . .	1 of 17
• Procedure . . . . .	1 of 17
• Onsite assessment . . . . .	1 of 17
• Planned actions . . . . .	1 of 17
• Floodplains . . . . .	3 of 17
• Safety and health . . . . .	3 of 17
• Policy . . . . .	3 of 17
• Site safety and health . . . . .	4 of 17
• Definition of DCG . . . . .	4 of 17
• Occupational exposure . . . . .	4 of 17
• Locations of monitors . . . . .	4 of 17
• Air sampling . . . . .	5 of 17
• Lapel air sampler . . . . .	5 of 17
• Community relations . . . . .	5 of 17
• DOE information center . . . . .	5 of 17
• Administrative Record . . . . .	5 of 17
• Public information . . . . .	6 of 17
• Property access . . . . .	6 of 17
• Comment . . . . .	6 of 17
• Relocation of residents . . . . .	6 of 17
• Remedial activities . . . . .	6 of 17
• Requirement . . . . .	6 of 17
• Site preparation . . . . .	6 of 17
• Prior to activities . . . . .	7 of 17
• Additional activities . . . . .	8 of 17
• Trees and plants . . . . .	8 of 17
• Excavation . . . . .	8 of 17
• Excavation limits and depths . . . . .	8 of 17
• Excavation process . . . . .	9 of 17
• Backfill . . . . .	9 of 17
• Shoring . . . . .	9 of 17
• Dust and runoff controls . . . . .	9 of 17
• Water management . . . . .	10 of 17
• Water supply . . . . .	10 of 17
• Measurements and sampling . . . . .	10 of 17
• Portable instruments . . . . .	11 of 17
• After excavation . . . . .	11 of 17
• Post action surveys . . . . .	12 of 17

*Continued on next page*



# Table of Contents, Continued

---

	Page
<b>SECTION 9--IMPLEMENTATION OF THE RD/RAIP (continued)</b>	
• Verification surveys . . . . .	14 of 17
• Purpose . . . . .	15 of 17
• Soils samples for verification . . . . .	15 of 17
• Comparison of surveys and analyses . . . . .	15 of 17
• Site closure . . . . .	15 of 17
• Air monitoring . . . . .	16 of 17
• Restoration . . . . .	16 of 16
• Damage and repair . . . . .	16 of 16
• Examples: reconstruction . . . . .	16 of 16
• Decontamination process . . . . .	17 of 16
• Wrapped and transported . . . . .	17 of 16
• Contaminated equipment and material . . . . .	17 of 16
 <b>SECTION 10--WASTE MANAGEMENT AND TRANSPORTATION . . . . .</b>	 1 of 14
• Introduction . . . . .	1 of 14
• 11e.(2) material . . . . .	1 of 14
• COE contract . . . . .	1 of 14
• Modes of transport . . . . .	1 of 14
• Excavation . . . . .	1 of 14
• Packaging process . . . . .	1 of 14
• Field log . . . . .	2 of 14
• Compliance . . . . .	2 of 14
• DOE tender . . . . .	2 of 14
• Unregulated material . . . . .	2 of 14
• Comment . . . . .	2 of 14
• Acceptance criteria . . . . .	2 of 14
• Acceptance parameters . . . . .	3 of 14
• Disposal agreement . . . . .	3 of 14
• Prior to transport . . . . .	3 of 14
• Nonconforming material . . . . .	4 of 14
• Transportation compliance . . . . .	4 of 14
• Example: bill-of-lading . . . . .	5 of 14
• Gondola cars . . . . .	6 of 14
• Visual inspection . . . . .	6 of 14
• Checklist . . . . .	6 of 14
• Example: checklist . . . . .	7 of 14
• Liner installation . . . . .	8 of 14

*Continued on next page*

# Table of Contents, Continued

---

	<b>Page</b>
<b>SECTION 10--WASTE MANAGEMENT AND TRANSPORTATION (continued)</b>	
• Liner function . . . . .	8 of 14
• Fiberboard . . . . .	8 of 14
• Ready for transport . . . . .	9 of 14
• Transportation summary . . . . .	10 of 14
• Class 9 placard . . . . .	12 of 14
• Example: placard and mark . . . . .	13 of 14
• Arrival at Envirocare . . . . .	13 of 14
• Third-party analysis . . . . .	14 of 14
• After verification . . . . .	14 of 14
• Chain-of-custody . . . . .	14 of 14
<b>SECTION 11--APPENDIXES . . . . .</b>	<b>1 of 1</b>
• Cross reference . . . . .	1 of 1

## Overview

Vicinity Properties  
RD/RAIP  
Section 1  
Page 1 of 7

---

<b>Purpose</b>	The purpose of this Remedial Design/Remedial Action Implementation Plan (RD/RAIP) for the Maywood, New Jersey, vicinity properties is to implement a removal action set forth by the terms and conditions in the Action Memorandum.
<b>Action Memorandum</b>	<p>The Action Memorandum calls for the removal of residual radioactivity from 37 residential properties and public parks.</p> <p>The "vicinity properties" are located in the vicinity of the Department of Energy's (DOE) interim storage site in Maywood, New Jersey.</p>
<b>FUSRAP</b>	<p>In 1974 the Atomic Energy Commission (AEC) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) for the purpose of identifying and decontaminating sites where</p> <ul style="list-style-type: none"><li>• Congress authorized DOE to conduct remedial action, and/or</li><li>• radioactive contamination remained from activities previously carried out under contract to the Manhattan Engineer District and AEC.</li></ul>
<b>Federal responsibility</b>	<p>Remedial action at the vicinity properties will be conducted by DOE under FUSRAP. FUSRAP is administered by</p> <p><b>THE</b> Division of Eastern Area Programs, within <b>THE</b> Office of Environmental Management, DOE Headquarters, Washington, D.C.</p>
<b>FUSRAP policy</b>	Policy relating to conducting remedial action at the vicinity properties is set by the Division of Eastern Area Programs.
<b>Management and technical direction</b>	<p>DOE Operations Office, Oak Ridge, Tennessee, manages and provides technical direction of remedial activities for FUSRAP.</p> <p>Within Oak Ridge Operations, the Former Sites Restoration Division (FSRD) manages all day-to-day and continuing activities for FUSRAP.</p>

---

*Continued on next page*

# Overview, Continued

**Functional responsibility**

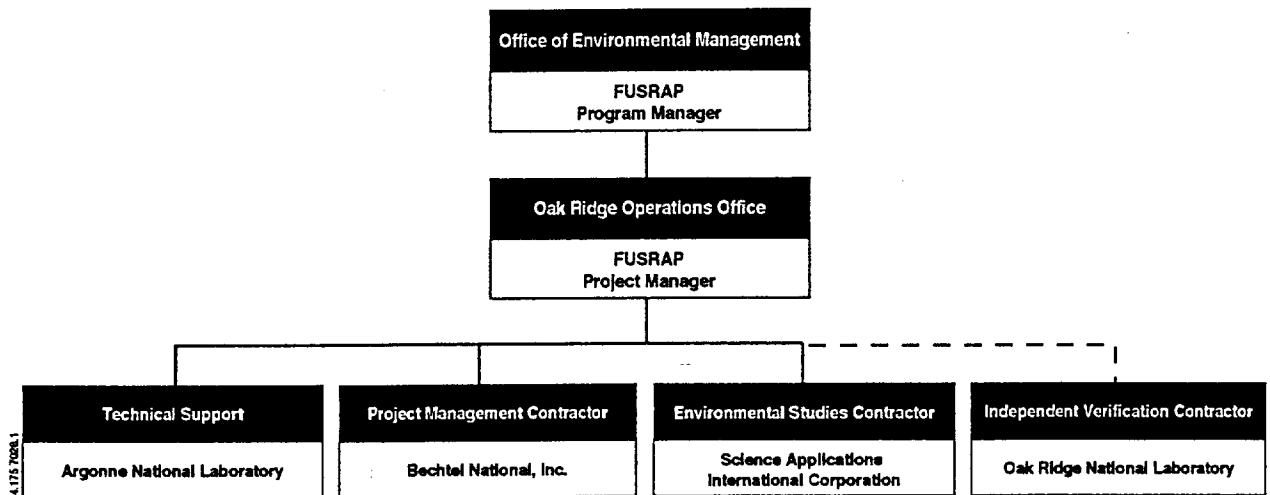
FSRD has functional responsibility for preparation of all environmental compliance documents. Various groups at DOE Headquarters have review and concurrence authority for some documentation (Example: Record of Decision).

**Assigned to DOE**

Congress assigned responsibility for the Maywood site and vicinity properties to DOE as part of the Decontamination Research and Development Project which was initially authorized by Congress under the 1984 Energy and Water Development Appropriations Act.

**FUSRAP structure**

Several organizations are under contract with DOE to support FUSRAP. The following graph shows how the major organizations are structured.



*Continued on next page*

Overview, Continued

**FUSRAP support**

This table shows the responsibilities of the organizations supporting FUSRAP.

Organization	Responsibility
<p>Bechtel National, Inc. (BNI), with primary subcontractors</p> <ul style="list-style-type: none"> <li>• Thermo Analytical</li> <li>• Roy F. Weston, Inc., and</li> <li>• others, as applicable.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare the RD/RAIP.</li> <li>• Provide cost/schedule control and program planning.</li> <li>• Ensure overall regulatory compliance.</li> <li>• Provide project management support to DOE.</li> <li>• Administer procurement and quality assurance functions.</li> <li>• Conduct all field activities including                             <ul style="list-style-type: none"> <li>• environmental monitoring</li> <li>• remedial investigations, and</li> <li>• remedial actions.</li> </ul> </li> <li>• Administer all environmental safety and health programs.</li> <li>• Direct all engineering activities.</li> <li>• Provide technical input for the preparation of environmental documents.</li> <li>• Perform community relations duties.</li> </ul>
<p>Science Applications International Corporation</p>	<ul style="list-style-type: none"> <li>• Plan and design field investigations.</li> <li>• Analyze and document field data.</li> <li>• Perform site risk assessments.</li> <li>• Analyze remedial alternatives.</li> <li>• Assist DOE in preparation of environmental documentation related to regulatory analysis and compliance.</li> </ul>
<p>Argonne National Laboratory</p>	<p>Provide technical support as needed by DOE.</p>

*Continued on next page*

# Overview, Continued

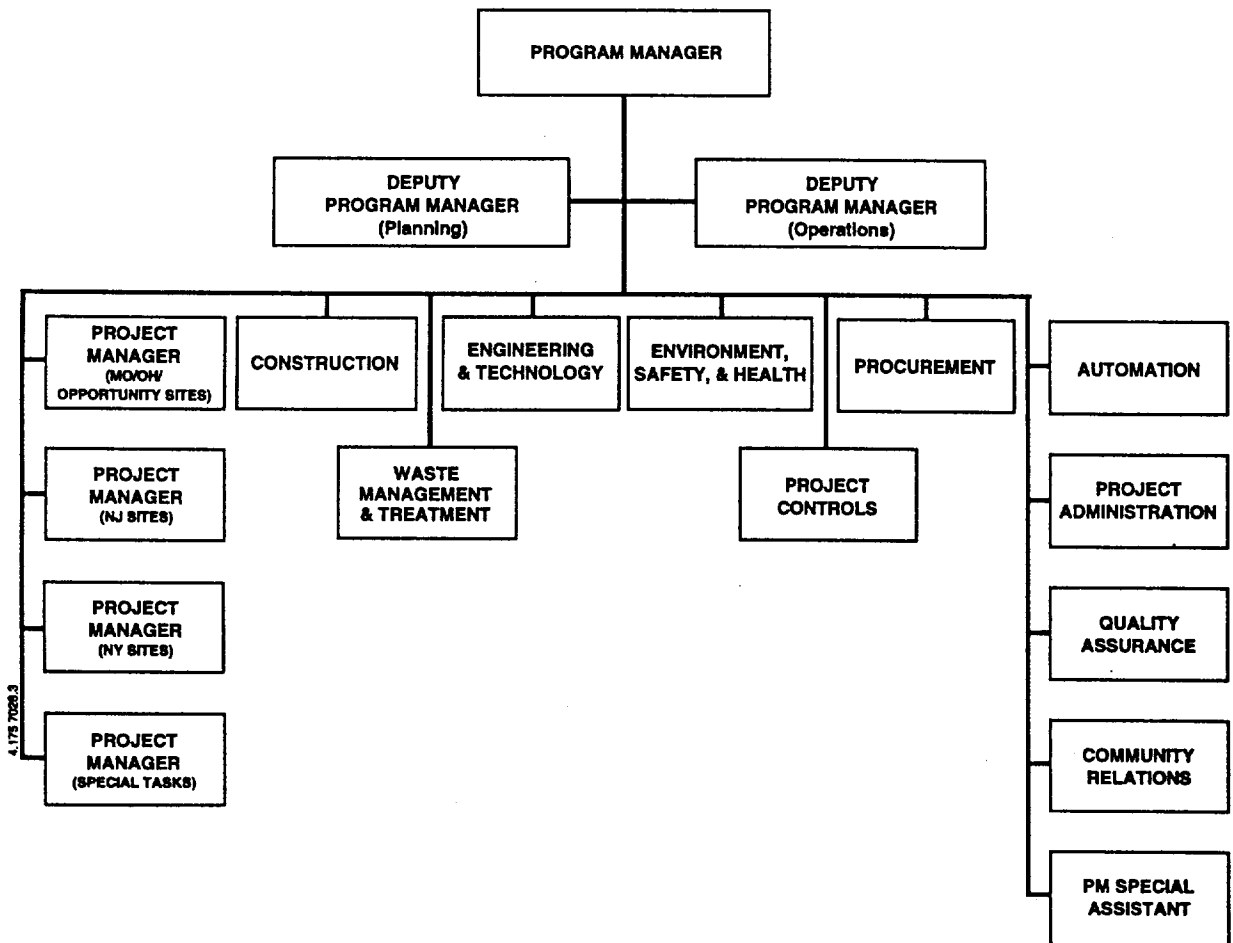
## FUSRAP teams

BNI organizes the FUSRAP project into teams composed of personnel from various BNI functional groups. Each team is given responsibility for a specific geographic area.

(Example: The New Jersey Team is responsible for all FUSRAP activity in New Jersey).

## Functional disciplines

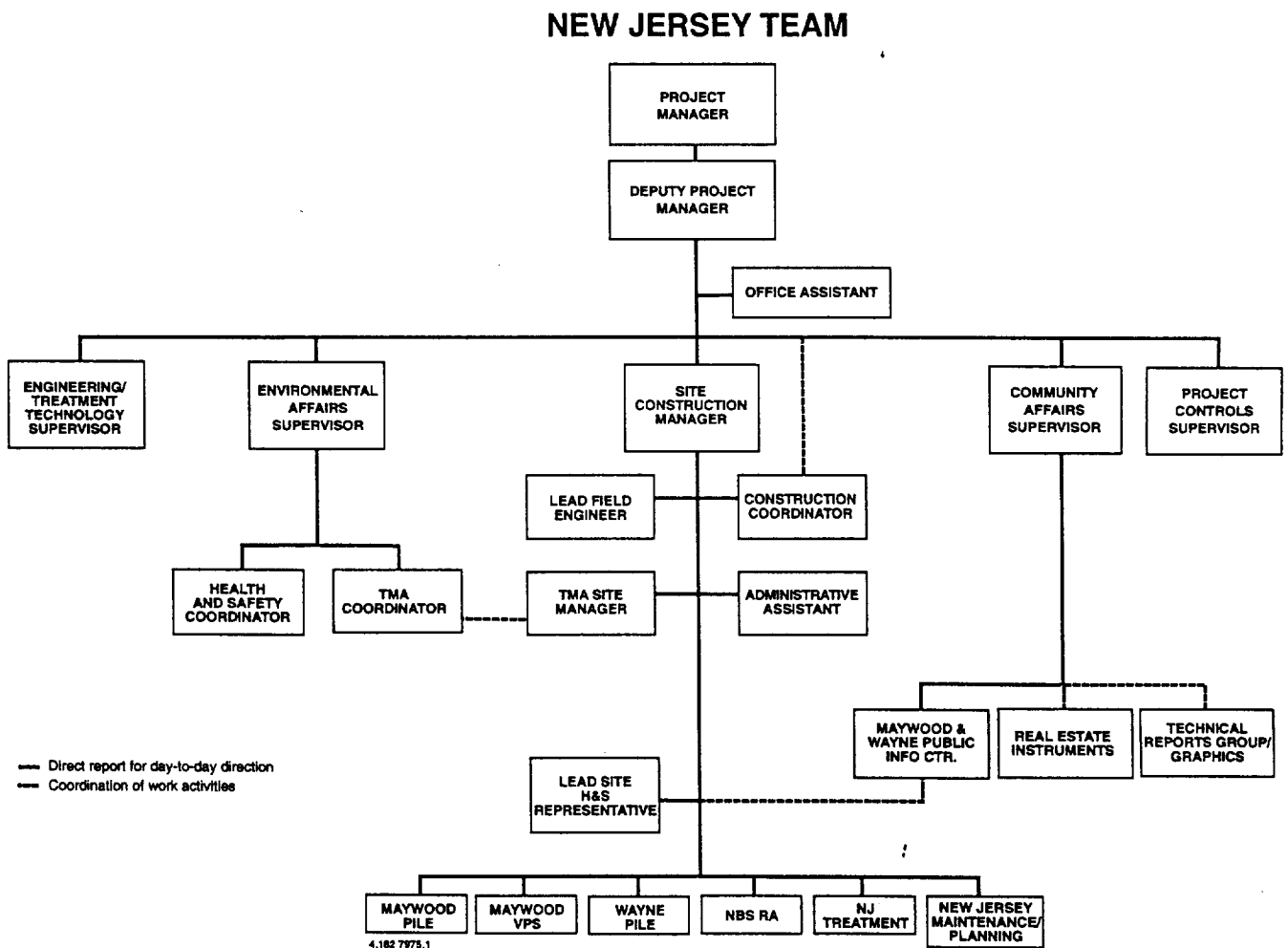
This chart shows functional disciplines within BNI's FUSRAP project.



Continued on next page

New Jersey  
 team

This chart shows the structure of the New Jersey team.



Continued on next page

## Overview, Continued

---

### **BNI work methods**

BNI documents work methods through written details and confirmation of

- objectives
- policies
- plans
- procedures, and
- project instructions.

---

### **Task direction**

BNI written procedures provide work-controlling documents offering task direction that is

- uniform
- efficient
- conscious of human safety and health, and
- environmentally aware.

---

### **BNI policy**

It is BNI policy that personnel learn and apply the course of action set forth in these documents. This policy is implemented through required

- reading of the documents
  - testing of personnel on the required reading, and
  - implementation of the document requirements on the job.
- 

*Continued on next page*



## Overview, Continued

---

### Documents

Here are examples of some work-controlling documents generated by BNI to guide remedial activities.

Subject	Document(s)
Policy	<ul style="list-style-type: none"><li>• <i>Management Requirements and Policies Manual.</i></li><li>• <i>Organization and Process Description Manual.</i></li></ul>
Program	<ul style="list-style-type: none"><li>• <i>Quality Assurance Program Plan.</i></li><li>• <i>FUSRAP Organization and Process Description Manual.</i></li></ul>
Project	<ul style="list-style-type: none"><li>• <i>Site-specific Health and Safety Plan(s).</i></li><li>• <i>Environmental Monitoring Plan(s).</i></li></ul>
Task direction	<ul style="list-style-type: none"><li>• <i>Project Procedures Manual.</i></li><li>• <i>Project Instructions Manual(s).</i></li></ul>
Work direction	<ul style="list-style-type: none"><li>• <i>Instruction Guides.</i></li><li>• <i>Work Instructions.</i></li><li>• <i>Subcontractor Specifications.</i></li></ul>
Reference	<ul style="list-style-type: none"><li>• <i>Organization Charts.</i></li><li>• <i>Environmental Response Manual.</i></li></ul>

---



# History of the Maywood Vicinity Properties

---

## Definition

"Vicinity properties (VPs)" is the term used to refer to contaminated properties located in the vicinity of the Maywood site that are addressed by the Action Memorandum.

Note: Separate actions have been (or will be) prepared for vicinity properties that are not addressed in the Action Memorandum.

---

## Maywood site

The Maywood site includes

- the Maywood Interim Storage Site (MISS)
- 83 vicinity properties, and
- Stepan Company property.

The 83 vicinity properties are located in the communities of Lodi, Maywood, and Rochelle Park, New Jersey. These VPs comprise

- 56 residential properties
  - 20 commercial properties, and
  - 7 governmental properties.
- 

## Site location

The Maywood site is located in Bergen County, New Jersey, approximately

- 12 miles northwest of New York City, and
  - 13 miles northeast of Newark, New Jersey.
- 

## Chronology

The following table offers a chronology of the Maywood site.

During	Occurrence
1916	Maywood Chemical Works began extracting radioactive thorium and rare earths from monazite sand for use in manufacturing industrial products.
1956	Maywood Chemical Works terminated the extraction process.  <u>Note:</u> Thorium processing from stockpiled material continued until 1959.

---

*Continued on next page*

# History of the Maywood Vicinity Properties, Continued

## Chronology (continued)

During	Occurrence
1959	The Maywood Chemical Works and property were sold to the Stepan Company.
1961	Stepan was issued an AEC radioactive materials license.
1963	<p>Stepan began to take corrective actions and to clean up residual thorium wastes.</p> <p><u>Note:</u> Corrective actions were based upon AEC inspection results.</p>
1966 through 1968	Contaminated material was removed from the property west of Route 17 and buried in three burial pits on the Stepan property.
1968	<ul style="list-style-type: none"> <li>• AEC surveyed the area west of Route 17 and certified it for use without radiological restrictions.</li> <li>• The northeast corner of the Stepan property was sold to a private citizen.</li> </ul>
the 1970s	The private citizen sold the northeast corner to Ballod Associates.
1980	The New Jersey Department of Environmental Protection (NJDEP) discovered radioactive materials in the northeast corner of the Ballod property.
1983	<p>The Energy and Water Appropriations Act authorized DOE to undertake a decontamination research and development project in New Jersey, in the municipalities of</p> <ul style="list-style-type: none"> <li>• Lodi</li> <li>• Maywood, and</li> <li>• Rochelle Park.</li> </ul> <p><u>Note:</u> In September 1983, the vicinity properties were named on the National Priorities list.</p>

*Continued on next page*

**History of the Maywood Vicinity Properties,  
Continued**

**Chronology  
(continued)**

During	Occurrence
1984	<p>Ownership of 11.7 acres of the Stepan property was transferred to DOE for use as an interim storage facility for contaminated materials. With this transaction, a part of the Stepan property</p> <ul style="list-style-type: none"> <li>• became the Maywood Interim Storage Site (MISS), and</li> <li>• MISS was assigned to FUSRAP.</li> </ul>
1984 and 1985	<p>Approximately 35,000 yd<sup>3</sup> of contaminated materials was removed from the Ballod property and 17 VPs. These materials were taken to MISS and stored in a protective enclosure cell.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Properties remediated were located in Maywood and Rochelle Park, New Jersey, on</p> <ul style="list-style-type: none"> <li>• Davison Avenue</li> <li>• Lathan Street</li> <li>• Grove Avenue, and</li> <li>• Park Way.</li> </ul> </div> <p><u>Supplemental information:</u> Additional contaminated properties were being discovered while removal actions were taking place.</p>
1985	<ul style="list-style-type: none"> <li>• DOE implemented programs for removal actions at the VPs and environmental monitoring of MISS.</li> <li>• An additional 500 yd<sup>3</sup> was removed from eight VPs and added to the storage pile at MISS.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>These eight VPs included a portion of the Ballod property in Rochelle Park, and seven properties in Lodi, on</p> <ul style="list-style-type: none"> <li>• Avenue C</li> <li>• Avenue F</li> <li>• Hancock Street, and</li> <li>• Trudy Drive.</li> </ul> </div> <p><u>Additional information:</u> During the mid 1980s, 28 vicinity properties were characterized, and a characterization report was written for each VP.</p>

*Continued on next page*

# History of the Maywood Vicinity Properties, Continued

## Chronology (continued)

During	Occurrence
1986	<p>After the completion of 25 properties, cleanup was suspended pending resolution of concerns expressed by the Maywood Borough Council regarding bringing contaminated material from other communities to MISS.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>BNI continued to</p> <ul style="list-style-type: none"> <li>• identify and survey properties</li> <li>• maintain and monitor the environment of MISS, and</li> <li>• publish annual environmental monitoring reports.</li> </ul> </div>
1990 through 1992	<ul style="list-style-type: none"> <li>• Seven residential and five commercial/government properties were characterized.</li> <li>• The <i>Remedial Investigation Report for the Maywood Site</i> was prepared, submitted to, and approved by EPA.</li> </ul> <p><u>Note:</u> Data obtained from characterization of the VPs is included in the <i>Remedial Investigation Report for the Maywood Site</i>.</p>
1992 through 1993	<ul style="list-style-type: none"> <li>• The <i>Baseline Risk Assessment</i> was prepared, submitted to, and approved by EPA.</li> <li>• The initial draft of the <i>Feasibility Study/Proposed Plan for the Maywood Site</i> (FS/PP) was prepared and released (due to stakeholder concerns).</li> </ul> <p><u>Note:</u> The FS/PP was not finalized.</p>
1993 through 1994	<ul style="list-style-type: none"> <li>• The <i>Engineering Evaluation/Cost Analysis for the Maywood Site</i> was issued by DOE.</li> <li>• DOE initiated pile removal activities under an Action Memorandum.</li> <li>• EPA disputed DOE's proposed cleanup criteria.</li> </ul> <p><u>Note:</u> Resolution of EPA's dispute was to use 5 pCi/g as the standard (see Section 6: Established Criteria).</p>

Continued on next page

# History of the Maywood Vicinity Properties, Continued

---

**How properties became contaminated**

Contamination of the vicinity properties resulted from the waste disposal methods used by Maywood Chemical Works during that company's ore processing years.

---

**Waste disposal**

This table describes the waste disposal methods used by Maywood Chemical Works.

IF the waste was..	THEN the waste .....
slurry (a watery mixture of insoluble material)	was pumped into two earthen diked areas west of the plant.
process waste	was removed by human transport from the property and used on vicinity properties as <ul style="list-style-type: none"><li>• fill</li><li>• mulch, and/or</li><li>• building material.</li></ul>
other (additional) waste	migrated off the property through natural drainage associated with the former Lodi Brook.

---

**Comment**

Mechanical disturbance of the soils (during the construction of streets and underground utilities) may have contributed to the contamination on several vicinity properties.

---





# Surveys of the Maywood Vicinity Properties

Wayne Site  
RD/RAIP  
Section 3  
Page 1 of 3

---

## Introduction

The Action Memorandum designated 37 vicinity properties for remediation. Properties relative to this RD\RAIP include

- three parks
- a fire station
- the I-80 right-of-way
- the Ballod property, and
- 31 residential properties.

---

## ORNL survey

Each of the properties designated for remediation under this RD\RAIP was originally surveyed by Oak Ridge National Laboratory (ORNL). Each radiological survey included

- an exterior gamma scan at the surface of the entire property
- a collection of surface and subsurface soil samples
- an interior gamma exposure rate measurement at the floor surface and at 1 m above the property surface
- the determination of indoor radon and radon daughter concentrations, and
- measurements to determine possible alpha and/or beta-gamma activity on surfaces.

---

## BNI survey

**IF** the results from the ORNL survey indicated the presence of radioactive contamination above DOE guidelines (5 pCi/g surface; 15 pCi/g subsurface)

**THEN** the property was recommended for designation

**THEN** an additional characterization survey was conducted on each designated property (by BNI).

---

*Continued on next page*

# Surveys of the Maywood Vicinity Properties

---

**BNI  
survey  
(continued)**

BNI's characterization survey included

- near-surface gamma radiation measurements and surface soil samples to establish areas of surface contamination
- gamma measurements and soil samples from boreholes to determine the nature and extent of subsurface contamination
- determination of radon and thoron concentrations inside the residences, and
- interior and exterior gamma exposure rate measurements.

---

**Metals and  
rare earths**

BNI surveys identified seven metals and three rare earth elements

ON residential properties

IN soils that are radioactively contaminated.

---

**FUSRAP  
constituents**

The metals and rare earths identified on the designated vicinity properties **did not** exceed regulatory limits. The metals and rare earths are

- constituents of FUSRAP waste
- attributable to the deposition of thorium process residues, and
- listed in the *Remedial Investigation Report for the Maywood Site*.

---

**RCRA  
constituents**

Surveys and analyses of the designated vicinity properties for RCRA constituents indicate that the

- concentrations of TCLP constituents did not exceed regulatory limits, and
- limits for corrosivity and reactivity, as defined in 40 CFR 261, were not exceeded.

---

*Continued on next page*

**Surveys of the Maywood Vicinity Properties,  
Continued**

**Maximum concentrations**

The following table reports maximum concentrations identified in surface and subsurface soils of the designated VPs.

Additional information: The values shown here include background concentrations of approximately 1 pCi/g for both thorium-232 and radium-226, and 3 pCi/g for uranium-238.

- Reference:
- *Remedial Investigation Report for the Maywood Site*
  - *Results of Maywood Vicinity Property Data Gap Characterization*, and
  - characterization reports for vicinity properties.

Analytical results of the soil samples taken at the designated...	Indicated the maximum concentrations at the first 6 in. of surface soils were...	And the maximum concentrations for subsurface soils to be...
residential properties	<ul style="list-style-type: none"> <li>• 111.6 pCi/g for thorium-232</li> <li>• 11.8 pCi/g for radium-226</li> <li>• 50 pCi/g for uranium-238,</li> </ul>	<ul style="list-style-type: none"> <li>• 115 pCi/g for thorium-232</li> <li>• 10.8 pCi/g for radium-226, and</li> <li>• 51.2 pCi/g for uranium-238.</li> </ul> <p><u>Note:</u> Detected at depths as great as 9.5 ft.</p>
parks	<ul style="list-style-type: none"> <li>• 14.7 pCi/g for thorium-232</li> <li>• 3.6 pCi/g for radium-226</li> <li>• 7.7 pCi/g for uranium-238,</li> </ul>	<ul style="list-style-type: none"> <li>• 93.1 pCi/g for thorium-232</li> <li>• 5.3 pCi/g for radium-226, and</li> <li>• 24.0 pCi/g for uranium-238.</li> </ul> <p><u>Note:</u> Detected at depths as great as 7.5 ft.</p>
fire station	<ul style="list-style-type: none"> <li>• 10.9 pCi/g for thorium-232</li> <li>• 1.1 pCi/g for radium-226</li> <li>• 6.0 pCi/g for uranium-238,</li> </ul>	<ul style="list-style-type: none"> <li>• 61.9 pCi/g for thorium-232</li> <li>• 3.6 pCi/g for radium-226, and</li> <li>• 10.5 pCi/g for uranium-238.</li> </ul> <p><u>Note:</u> Detected at depths as great as 10 ft.</p>



## Remedial Design and Remedial Action

---

### Objective

As stated in the Action Memorandum for the Maywood vicinity properties, the objectives of remedial action are to

- prevent or mitigate further release of FUSRAP waste to the surrounding environment, and
- eliminate or minimize the risk to human health and the environment from contaminants.

---

### Compliance

BNI has prepared this RD/RAIP to comply with the requirements of

- the design and implementation elements stated in the Action Memorandum
- Section XIII of the Federal Facilities Agreement (Remedial Action Selection and Implementation)
- the "Generic Design Basis for the Formerly Utilized Sites Remedial Action Program" (Document 14501-191-DB-003)
- the "Design Basis for Remediation of Maywood Vicinity Properties" (Document 14501-138-DB-003)
- Attachment 2, Item 10 (Deliverables, Remedial Design) of the FFA for the Maywood Site (Administration Docket Number: II CERCLA-FFA-00101)
- the applicable state and local laws of New Jersey
- all applicable DOE Orders, and
- the Code of Federal Regulations
  - 44 CFR Part 220
  - 29 CFR Parts 1910 through 1926
  - 49 CFR as applicable, and
  - appropriate parts of 40 CFR.

---

*Continued on next page*

# Remedial Design and Remedial Action, Continued

Vicinity Properties  
RD/RAIP  
Section 4  
Page 2 of 13

---

## Development of designs

BNI has developed three remedial designs offering details for remedial activities. The three outlines offered in these typical designs are

- public parks
- properties requiring excavation only, and
- properties requiring structural underpinning to facilitate excavation.

---

## Design packages

This RD/RAIP includes design packages for

- 20 and 22 Long Valley Road (excavation only)
- 2 and 4 Branca Court (underpinning), and
- Lodi Municipal Park (public park).

Appendix: Design drawings are included as Appendix A.

---

## Fiscal year funding

Remedial action is dependent upon DOE's annual allocation of funds. Therefore, the sequence of remediation will be determined at the beginning of each fiscal year.

---

## Property groups

BNI approaches remedial activities by using proximity and topographic features as a common base for categorizing vicinity properties. After each property has been categorized

**THEN** each property is placed into a group

**THEN** remedial activities (based on the designs) are implemented.

Design Drawing: Design Drawing 138-DD505-C01 (included as Appendix A) offers the four groups into which BNI has categorized the 37 designated Maywood VPs.

---

*Continued on next page*

**Remedial Design and Remedial Action,  
Continued**

**Process**

This table explains the design process that will be followed for each vicinity property.

Stage	Action
1	Obtain a signed real estate instrument from the property owner.
2	Gather civil survey information necessary to identify each property's topographic and physical features.  <u>Examples:</u> elevations, grades, and the locations of structures, trees, and driveways.
3	Perform a preliminary property assessment including a <ul style="list-style-type: none"> <li>• mechanical equipment inventory, and</li> <li>• visual inspection.</li> </ul> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;">             Using information gathered during the visual inspection             <ul style="list-style-type: none"> <li>• document the property's existing condition</li> <li>• determine whether asbestos-containing materials and/or asbestos-containing building materials are present, and</li> <li>• record information regarding the interior construction of the structure.</li> </ul> </div>
4	Prepare remedial design.

**Technical specifications**

Technical specifications have been developed for remedial activities.

BNI developed the specifications while taking into consideration all applicable federal, state, and local codes and standards. Standards will be met for

- materials
- inspections, and
- test methods, as applicable.

Appendix: Technical specifications are included as Appendix B.

*Continued on next page*

**Remedial Design and Remedial Action,  
Continued**

**Specifications  
table**

This table offers the title and number of technical specifications prepared by BNI.

<b>THE title of the specification is...</b>	<b>AND the number is 138-SP505-...</b>
Earthwork	003.
Shoring, Sheeting, and Structural Timber	004.
Concrete Forming and Reinforcement	005.
Masonry	006.
Structural Steel	007. <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>AN additional specification prepared by BNI</p> <p>IS titled "Grass Establishment and Landscaping"</p> <p>AND the number of this specification is 138-SP513-001.</p> </div>

**Details,  
plans, and  
specifications**

The remedial design for each designated vicinity property will consist of

- an excavation plan
- a restoration plan
- specific details, and
- references to technical specifications, as applicable.

*Continued on next page*



**Remedial Design and Remedial Action,  
Continued**

---

**Excavation  
plan**

The excavation plan will

- delineate the limits of excavation on a given property, and
- provide references to any applicable technical specifications for activities such as
  - erosion control
  - sediment control
  - shoring of excavations
  - masonry
  - concrete work, and
  - structural steel.

---

**Comment**

Based on the results of continuing sampling efforts, BNI may modify the limits of excavation in the field.

---

**Restoration  
plan**

The restoration plan will provide

- guidance for restoring a given property to its pre-remedial action condition, and
- references to any applicable technical specification for
  - earthwork
  - concrete work
  - masonry, and
  - grass establishment and landscaping.

---

*Continued on next page*

**Remedial Design and Remedial Action,  
Continued**

**Summary and  
explanation table**

Here is a summary of plans included in the basic designs.

<b>WHEN the property being restored needs to be...</b>	<b>THEN that activity will be implemented according to the ...</b>	<b>WHICH ...</b>
revegetated	<ul style="list-style-type: none"> <li>• restoration plan, and</li> <li>• technical specifications</li> </ul>	<ul style="list-style-type: none"> <li>• is prepared for each property, and</li> <li>• provides guidance for restoration of a property to its pre-remedial action condition.</li> </ul> <p><u>Note:</u> A revegetation schedule is shown on each restoration drawing.</p>
backfilled	technical specifications	state that the only acceptable fill material is uncontaminated material that has been previously tested and approved.
reconstructed	<ul style="list-style-type: none"> <li>• design drawing, and</li> <li>• appropriate technical specification</li> </ul>	<p>offers guidance for repairs, and/or reconstructions, as appropriate.</p> <p><u>Appendix:</u> Design drawings are included as Appendix A.</p>

**Structural support**

Some vicinity properties have structures requiring temporary structural support (underpinning) to facilitate the removal of contaminated materials.

**Alternate trench method**

To allow for remediation of contaminants under the foundation of a structure, BNI plans to use the alternate trench method.

*Continued on next page*

**Remedial Design and Remedial Action,  
Continued**

**Pit  
underpinning**

The alternate trench method is often referred to as "pit underpinning."

Pit underpinning provides for the removal of small sections of soil

**FROM** under a footing

**IN** a manner that does not adversely affect the structure.

**Implementation**

Here are the steps that will be followed to implement pit underpinning when contamination is less than 3 ft deep.

Appendix: Refer to Design Drawing 138-DD505-C04 in Appendix A.

Step	Action
1	Excavate to the top of the foundation.
2	Mark the footing in 3-ft segments.
3	Label each segment <ul style="list-style-type: none"> <li>• "A"</li> <li>• "B", or</li> <li>• "C".</li> </ul> <p><u>Note</u>: Repeat the lettering sequence all around the footing perimeter.</p>
4	Begin excavation with segments labeled "A" and remove the soil from <p><b>UNDER</b> the footing (do not undercut the footing at the sides)</p> <p><b>TO</b> the back edge down</p> <p><b>TO</b> the bottom of contamination.</p> <p><u>Note</u>: Shore side walls as required.</p>

*Continued on next page*

**Remedial Design and Remedial Action,  
Continued**

(Continued)

Step	Action
5	<p>Place reinforcement, as applicable</p> <p><b>THEN</b> provide form along the front of excavation in accordance with the applicable design drawing.</p> <p><b>THEN</b> place concrete in form and work completely under footing.</p> <div data-bbox="483 772 1300 1115" style="border: 1px solid black; padding: 10px;"><p><b>WHEN</b> segment labeled "A" is completed <b>*STOP*</b></p><p><b>THEN</b> proceed to segment labeled "B" and repeat steps 1 through 5 <b>*STOP*</b></p><p><b>THEN</b> proceed to segment labeled "C" and repeat steps 1 through 5 <b>*STOP*</b></p><p><b>THEN</b> place and compact backfill. <b>*END*</b></p></div> <p><u>Additional information:</u> To reduce curing time, the type of concrete should be high early strength.</p>

**Deep  
contamination**

**IF** contamination is deeper than 3 ft.

**THEN** the details in Design Drawing 138-DD505-C05 (included in appendix A) will be followed.

*Continued on next page*

Remedial Design and Remedial Action,  
Continued

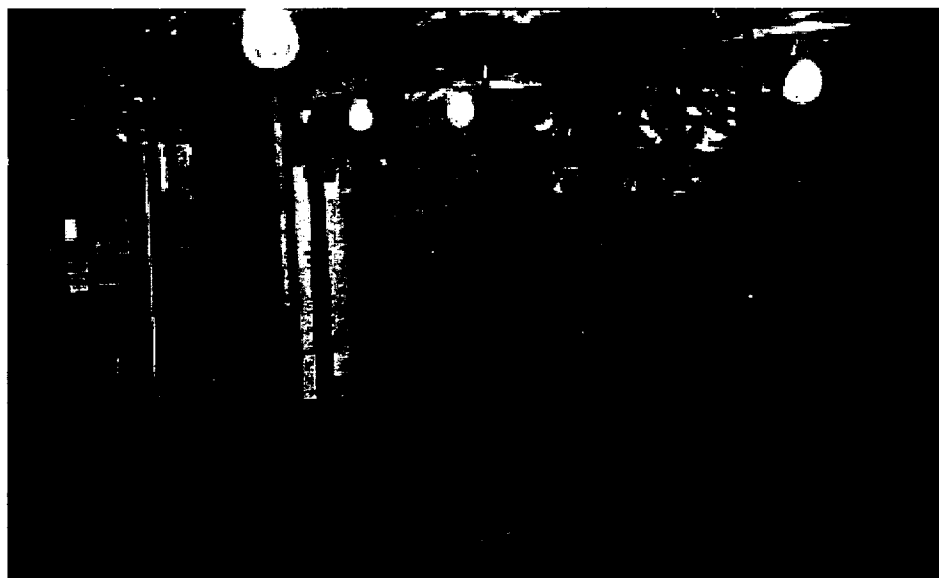
Vicinity Properties  
RD/RAIP  
Section 4  
Page 10 of 13

Remedial Design and Remedial Action,  
Continued

Vicinity Properties  
RD/RAIP  
Section 4  
Page 9 of 13

Pictures of  
underpinning

These pictures show structures with pit underpinning during remedial activities.



**Remedial Design and Remedial Action,  
Continued**

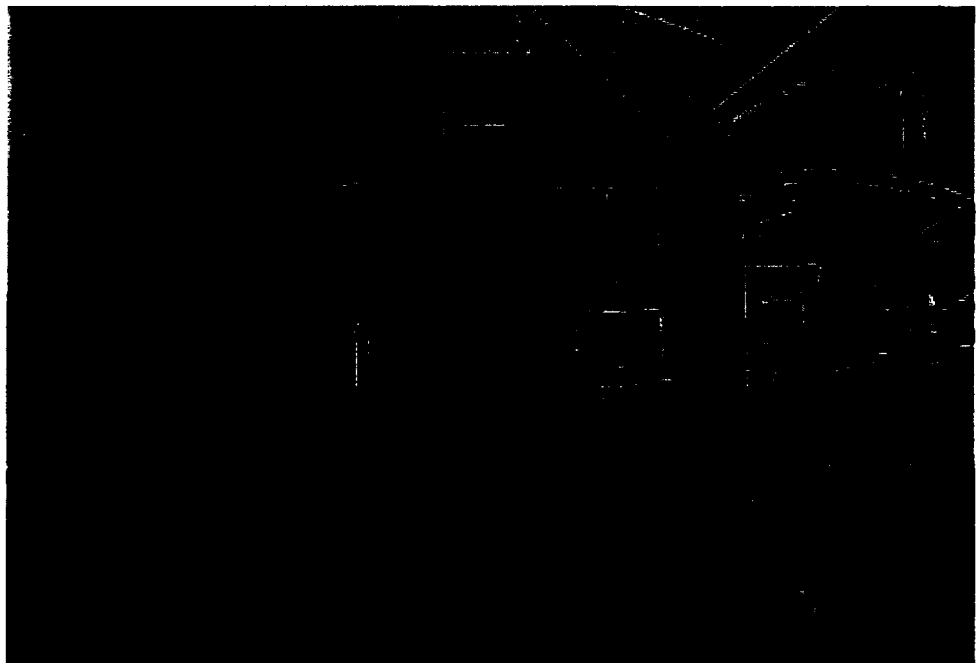
**Before  
remediation**

The pictures on this page show two properties before remediation.

Property 1



Property 2



*Continued on next page*

**Remedial Design and Remedial Action,  
Continued**

**During  
remediation**

Here are the two properties **during** remediation.

Property 1



Property 2



*Continued on next page*

**Remedial Design and Remedial Action,  
Continued**

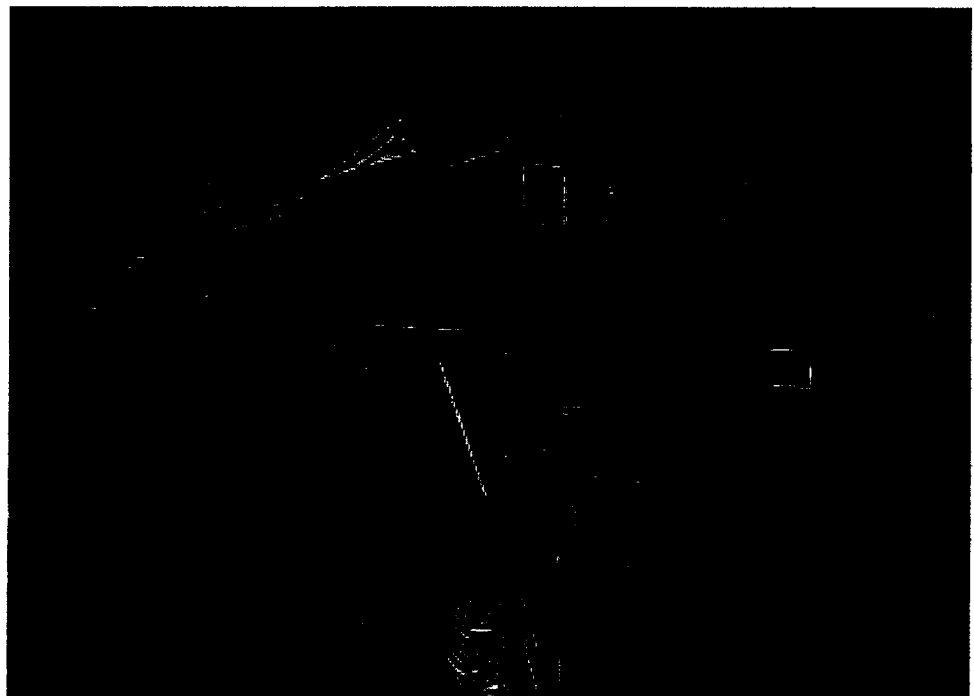
**After  
remediation**

Here are the two properties after remediation.

Property 1



Property 2





# Subcontractor Scope of Work

---

## Introduction

BNI will implement two subcontracts for remediation of the vicinity properties.

**ONE** subcontract will be used to remediate the vicinity properties, and a

**Second** subcontract will be used for restoration of the properties.

---

## Responsibility

**WHEN** remedial activities for residential properties are outside the definition of the New Jersey Uniform Construction Code for

- ordinary repairs
- minor repairs, or
- emergency work

**THEN** the subcontractor will be responsible for

- obtaining all necessary construction permits, and
  - submitting permit documentation to the Bechtel site superintendent prior to the start of activities.
- 

## Remedial action subcontract

The scope of the remedial action subcontract will include

- removing or relocating, as applicable, trees, plants, and shrubs
  - installing sediment controls and excavation shoring
  - removing and restoring, as applicable, exterior property features (Examples: Pools, decks, and patios).
  - removing, disconnecting and (or) relocating and restoring mechanical and electrical equipment and utilities, as applicable
  - underpinning residential structures
  - excavating contaminated material
  - restoration of interior property features
  - restoration of structural elements
  - backfilling excavations with uncontaminated, imported fill
- 

*Continued on next page*

## Subcontractor Scope of Work

---

**Remedial action  
subcontract  
(continued)**

- controlling groundwater and surface water runoff
- transporting contaminated materials to MISS, and
- loading contaminated material into rail cars.

Appendix: An example of the scope of work for the remedial action subcontract is included in Appendix D.

---

**Restoration  
subcontract**

The scope of the restoration subcontract will include

- reconstruction of exterior property features (Examples: Driveways, sidewalks, and curbs), and
- replacing landscaping, trees, shrubs, plants, and lawns.

Appendix: An example of the scope of work for the restoration subcontract is included in Appendix D.

---

**Asbestos**

**IF** asbestos abatement is required

**THEN** abatement will be completed under a separate subcontract.

---

**Asbestos  
management**

A subcontract for asbestos abatement will be awarded to a subcontractor who is certified in asbestos management.

---

**New Jersey  
licensing**

**IF** asbestos in volumes (or situations) not exempted by regulation should be encountered

**THEN** the appropriate subcontractor must comply with New Jersey Asbestos Control and Licensing provisions.

---

# RD/RAIP Criteria

---

## Responsibility

**IF** the chemical contamination on any vicinity property originated at DOE-owned MISS

**OR** is mixed or commingled with radioactive contamination exceeding DOE action levels

**OR** is the result of association with specific thorium manufacturing or processing activities at Maywood Chemical Works

**THEN** the contamination is the responsibility of DOE.

Note: In accordance with the Code of Federal Regulations 40 CFR Part 261, the results of analyses conducted on samples collected at three VPs showed no chemicals above hazardous levels.

---

## Risk analysis

An agreement between EPA and DOE calls for cleanup criteria to be determined on site-specific risk analyses for different land uses.

---

## Average background

Average background concentrations found in the Maywood/Lodi/Rochelle Park areas are

- 1 pCi/g for thorium-232
  - 1 pCi/g for radium-226, and
  - 3 pCi/g for uranium-238
- 

## Established criteria

An agreement between EPA, DOE, and the NJDEP established criteria for remediation of the Phase I vicinity properties at

- 5 pCi/g above background (regardless of depth) as stated in the dispute resolution with EPA, for combined thorium-232 and radium-226, and
- 50 pCi/g above background for uranium-238.

Additional information: The criterion for total uranium is 100 pCi/g above background, yielding a uranium-238 guideline of 50 pCi/g.

Note: When underpinning is required, surface contamination criteria will apply to walls, slabs, and foundations.

---

*Continued on next page*

## RD/RAIP Criteria, Continued

Vicinity Properties

RD/RAIP

Section 6

Page 2 of 3

---

### ALARA

DOE requires that radiation exposures be kept as low as reasonably achievable (ALARA) during all remedial activities.

BNI will implement the scope of ALARA throughout remediation of the designated vicinity properties.

---

### Example 1

Here is an example of how ALARA will be implemented.

**IF** a small amount of additional soil removal is required to reduce contaminant levels to background levels and

- safety is not compromised, and
- minimal analysis is required to determine that additional cleanup should be conducted

**THEN** the additional risk reduction is worth the cost increase.

---

### Example 2

Here is another example of how DOE will implement ALARA.

**IF** potential exposure from remaining contamination levels approach regulatory limits, and the complexity or cost of additional soil removal is high

**THEN** detailed dose, cost, and safety analyses will be performed, and the decision regarding additional remediation will be based on the results of these analyses.

---

### Supplemental limits

**IF** circumstances indicate that cleanup criteria established for specific designated vicinity properties are not appropriate

**AND** that an alternative action will provide adequate protection to the public, giving due consideration to health and safety, the environment, costs, and public policy considerations for both current and potential unrestricted uses of a property

**THEN** DOE may apply supplemental limits.

---

### Dose limit

Any supplemental limits for the designated vicinity properties shall achieve the basic dose limit to the general public of 100 mrem/yr, as set forth in DOE Order 5400.5.

---

*Continued on next page*

## RD/RAIP Criteria, Continued

Vicinity Properties

RD/RAIP

Section 6

Page 3 of 3

---

### Determination of limits

The need for supplemental limits will be determined on a case-by-case basis using specific property data.

---

### Supplemental standards

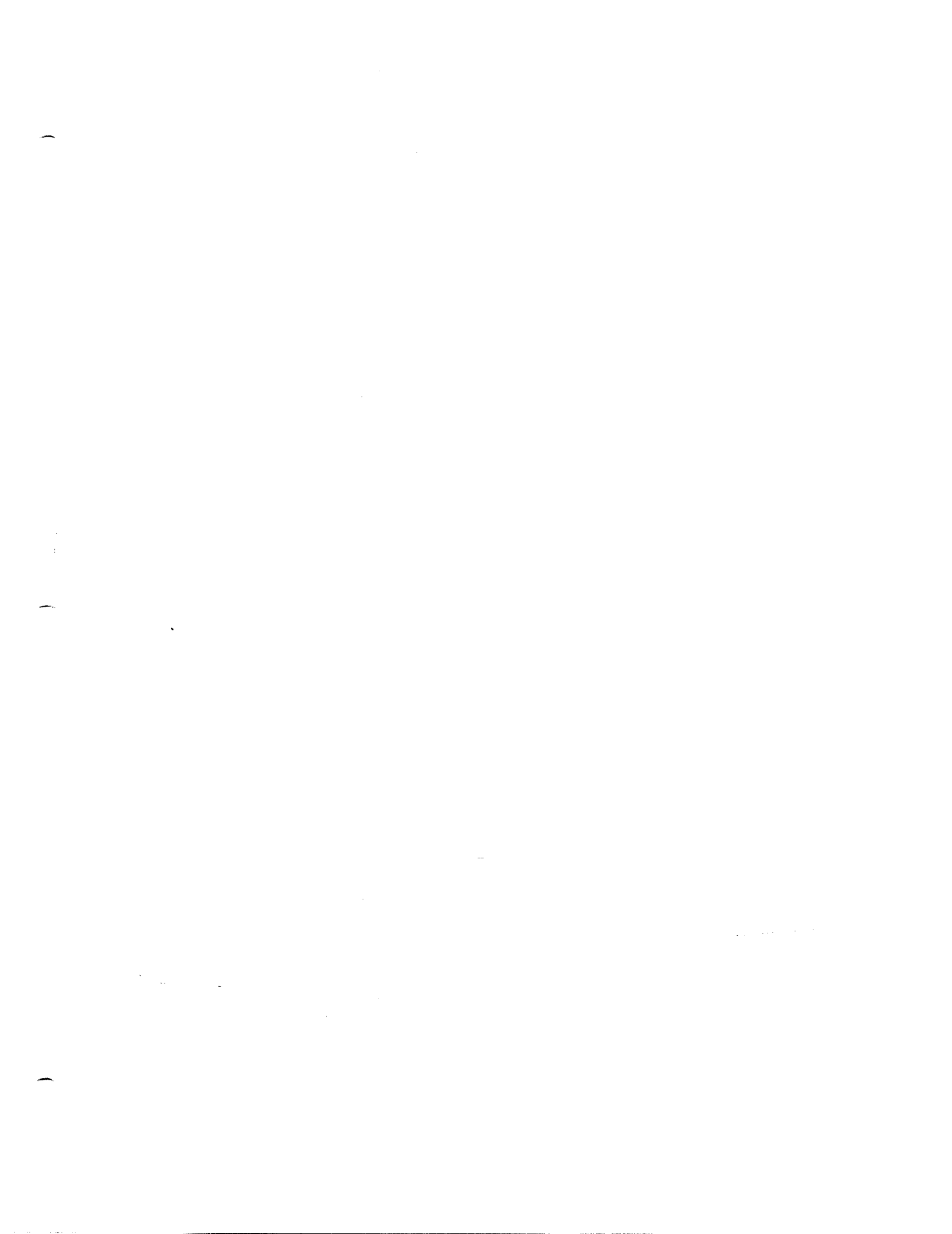
The use of supplemental standards would be warranted when

- minor quantities of residual radioactive materials are involved
  - residual radioactive material occurs in an inaccessible location and property factors limit the hazard, and/or
  - the cost to remove residual radioactive material is disproportionately high when compared to health and safety standards.
- 

### Standard selected

The use of supplemental standards will be coordinated with EPA and the State of New Jersey. The standard selected by DOE will give consideration to costs and public policy while providing

- protection for the general public
  - personnel health and safety, and
  - environmental protection.
-



# Quality Assurance Program Plan

---

## Introduction

The FUSRAP Quality Assurance Program Plan (QAPmP) is a multi-disciplinary system of management controls backed by

- quality control
- verification, and
- an overview of activities.

---

## What the QAPmP does

The QAPmP describes management controls, objectives, and scope. It is applicable to all BNI FUSRAP personnel and activities and

- addresses the requirements of DOE's *Management Requirements and Policies Manual for FUSRAP*
- outlines general policies and identifies responsibilities
- is binding to all FUSRAP subcontractors that do not have a quality assurance program
- complies with ASME NQA-1, DOE Order 5700.6C, and 10 CFR 830.120 (overall program guidance is provided by these documents)
- calls for surveillances and audits to
  - review, evaluate, and report the effectiveness and status of the quality assurance (QA) program, and
  - verify that QA is in compliance with the specifications called out in the QAPmP.

Availability: The QAPmP is available from BNI upon request.

---

## QA audits

QA surveillance and audits will be performed in accordance with

- written checklists, and
- BNI Quality Assurance Department Project Instructions.

---

*Continued on next page*

## Quality Assurance Program Plan, Continued

---

### Quality assessment

A quality assurance assessment (QAA) will be implemented during remedial activities at the Maywood vicinity properties. The purpose of the QAA is to identify

- areas of potential failure, and
- mitigation measures.

---

### Mitigation measures

The QAA includes mitigation measures for

- the excavation of material
  - waste management
  - permits and notifications
  - safety and health, and
  - field testing and analysis.
-



# Planning, Scheduling, and Funding

---

**Funding for activities**

The schedule for completion of remedial activities for Maywood vicinity properties is dependent upon

- annual Congressional funding
- allocation of funds by DOE , and
- competition for funding among FUSRAP state groupings.

---

**Division of funds**

FUSRAP competes with other projects for annual funding. State funding is broken down by FUSRAP into funding for major state groupings.

The funding for major state groupings is divided among individual sites.

---

*Continued on next page*

## Planning, Scheduling, and Funding, Continued

---

### Proposed schedule

Proposed removal of contaminated materials from the Maywood vicinity properties is scheduled to begin in FY 1996 and, depending on availability of funding, is estimated to require three to four years for completion.

Note: Activities in support of the proposed removal action may begin prior to FY 1996 (Examples: Site preparation, survey, and mobilization).

Supplemental information: It is anticipated that activity will be suspended during the winter months because of inclement weather conditions.

---

### Budget allocation

**IF** sufficient budgetary resources are not allocated to DOE during the above time period

**THEN** the period for completion of the action could be extended.

---

### Included in schedule

The schedule includes the

- development of detailed work and health and safety plans
  - development of appropriate decontamination facilities
  - removal of the contaminated materials from each affected property
  - transportation of the contaminated materials for offsite disposal
  - backfilling of excavated areas with clean soil, and
  - restoration of the disturbed areas.
- 

### Delay factors

Factors that could delay the schedule include unanticipated difficulties in

- waste transportation, or
- the availability of disposal capacity.

**IF** temporary relocation of residents from affected properties is required

**THEN** relocation activities could cause a delay in schedule.

---

*Continued on next page*

## Planning, Scheduling, and Funding, Continued

---

### Cost estimates

The estimates presented in this document are rough order of magnitude. After detailed design packages have been developed, more definitive estimates will be prepared.

---

### Factors that affect estimates

Factors that may affect annual estimates and schedules are the differences between the

- rough order of magnitude and detailed estimates
  - estimates and actual field conditions, and
  - estimates and actual field costs.
- 

### Direct and indirect costs

Total cost is estimated to be approximately \$45,000,000. This estimate includes all direct and indirect costs, including

- subcontracts
  - engineering
  - procurement
  - overhead
  - contingencies, and
  - health and safety support.
- 

### Transportation and disposal

The estimated costs for waste

- transportation is \$135/yd<sup>3</sup>, and
- disposal is \$206/yd<sup>3</sup>.

Important information: These estimates are based on current cost estimates specific to the Envirocare facility in Clive, Utah.

---

### Expansion factor

The volume of contaminated soil and debris to be excavated from the affected vicinity properties is estimated to be 28,613 yd<sup>3</sup>.

Assuming an expansion factor of 30 percent, approximately 37,197 yd<sup>3</sup> of contaminated material would be transported offsite for disposal.

---

*Continued on next page*

## Planning, Scheduling, and Funding, Continued

---

### Primary and additional costs

Costs for excavation, loading, transportation, and disposal of the contaminated materials from the vicinity properties are primary cost elements. Additional cost elements include

- training
- engineering
- contingencies
- program costs
- medical monitoring
- health and safety support
- site preparation activities
- mobilization and demobilization expenses
- restoration of disturbed areas, and
- subcontract costs (Example: Analytical laboratory and civil survey costs).

---

*Continued on next page*

# Planning, Scheduling, and Funding, Continued

## Remediation estimates

This table offers cost estimates for remediation of the Maywood vicinity properties.

Activity	Excavation and Commercial Disposal
Monitoring, Sampling and Analysis <sup>a</sup>	\$ 969,411
Site Development <sup>b</sup>	1,422,283
Building and Services <sup>c</sup>	1,329
Excavation and Backfill <sup>d</sup>	4,879,044
Disposal <sup>d</sup>	7,657,354
Transportation <sup>d</sup>	5,029,875
Site Inst. Controls, Surv. and Maint. <sup>e</sup>	53,726
Other Remedial Action Costs <sup>f</sup>	2,979,924
<b>Subtotal Remedial Action</b>	<b>23,002,946</b>
Remedial Design <sup>g</sup>	2,300,295
Other <sup>h</sup>	5,900,806
<b>Subtotal Project</b>	<b>31,204,047</b>
Contingency (25 %)	7,801,012
Program Support (15%)	5,850,759
<b>TOTAL COSTS</b>	<b>\$44,855,817</b>

<sup>a</sup>Includes all monitoring, sampling, analysis, and verification testing.

<sup>b</sup>Includes mobilization, demobilization, and site preparation/development.

<sup>c</sup>Includes utilities, etc.

<sup>d</sup>Assumes excavation volume of 28,613 yd<sup>3</sup> and a 30% expansion factor for excavated materials.

<sup>e</sup>Includes institutional controls, surveillance, and maintenance activities for the removal action and O&M periods.

<sup>f</sup>Includes all field support required for the removal action, such as site management, engineering, technical support, and environmental compliance.

<sup>g</sup>Includes all design engineering and support activities (10% of remedial action cost [excluding monitoring] assumed).

<sup>h</sup>Includes all home office support required for the removal action, such as program management, engineering, technical support, and environmental compliance.



# Implementation of the RD/RAIP

**Procedure**

Remedial action at the vicinity properties will follow all applicable procedures. Requirements will be met for

- all community relations activities
- safety and health
- the administrative record, and
- all waste transportation activities.

**Onsite assessment**

To ensure compliance with all applicable federal, state, and local laws, BNI will conduct

- an onsite assessment to identify and correct any existing and (or) potential noncompliance, and
- periodic investigations throughout remedial activities.

**Planned actions**

The following table offers BNI planned actions to meet requirements of applicable federal, state, and local laws.

WHEN regulation is...	THEN the planned action is to...
Federal and State Air Emissions Standards	<ul style="list-style-type: none"> <li>• estimate and evaluate projected particulate emissions from remedial activities</li> <li>• submit the results of air modeling calculations to EPA before the start of remediation</li> <li>• monitor ambient air emissions throughout activities</li> <li>• institute dust control procedures (as necessary) to ensure that applicable emissions standards are not exceeded, and</li> <li>• ensure that emissions from fuel-powered equipment comply with standards.</li> </ul>
New Jersey Soil Erosion and Sediment Controls	<ul style="list-style-type: none"> <li>• incorporate into BNI work controlling documents all applicable provisions of Bergen County soil erosion and sediment control regulations</li> <li>• revegetate disturbed land surfaces</li> <li>• cover the sources of pollutants to prevent contact with rainwater</li> </ul>

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

(continued)

WHEN regulation is...	THEN the planned action is to...
New Jersey Soil Erosion and Sediment Controls (continued)	<ul style="list-style-type: none"> <li>• place barriers strategically to prevent sediment and water transport</li> <li>• secure open excavations at the end of each work day, and</li> <li>• employ dust suppressant measures (<u>Examples</u>: Placement of gravel on temporary roadways and spraying water on excavations).</li> </ul>
New Jersey Stormwater Regulations	<p>comply with the terms of the New Jersey General Permit for Construction Activities.</p> <p><u>Responsibility</u>: The Bergen County Soil Conservation District is responsible for administration of this permit.</p>
New Jersey Water Supply and Pollutant Discharge Regulations	<ul style="list-style-type: none"> <li>• implement controls to prevent discharges of contaminated stormwater, and</li> <li>• use sheeting and other covering devices to control the exposure of source material to rainwater.</li> </ul> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><b>THE</b> diversion of surface water may be required <b>TO</b> prevent the overflow of rainwater <b>FROM</b> the local storm sewer system <b>FROM</b> flooding local work areas.</p> <p>This issue will be resolved by consultation among BNI and the</p> <ul style="list-style-type: none"> <li>• Lodi municipal engineer</li> <li>• New Jersey Bureau of Water Supply, and</li> <li>• Bergen County Soil Conservation District.</li> </ul> </div> <p><u>Notes</u>:</p> <ul style="list-style-type: none"> <li>• Dewatering operations associated with cleanup activities are anticipated to be well below the permitting requirements of the New Jersey Bureau of Water Supply.</li> <li>• No planned discharges of pollutants to groundwater or surface water will occur.</li> </ul>

Continued on next page



**Implementation of the RD/RAIP,  
Continued**

(continued)

WHEN regulation is...	THEN the planned action is to...
New Jersey Noise Control	<ul style="list-style-type: none"> <li>• conduct remedial activities between the hours of 8:00 a.m. and 6:00 p.m., Monday through Friday, and</li> <li>• take into account the scheduling needs of affected residents.</li> </ul>
Borough of Lodi Soil Removal Ordinance	(To be determined)

**Floodplains**

An assessment previously conducted to meet the requirements of DOE Floodplain Regulations, 10 CFR Part 1022, revealed that within the scope of cleanup activities there are

NO floodplains, and

OR wetlands.

**Safety and health**

Remediation of the Maywood vicinity properties will be performed with a conscious emphasis on and a commitment to personnel safety and health.

**Policy**

It is the policy of BNI for all activities within the scope of work to be performed in a manner to meet the requirements and/or standards

- of DOE orders, as applicable
- set forth in BNI's "Zero Accident Tolerance" concept
- identified in the FUSRAP *Project Safety and Health Manual*, Volumes 1 and 2
- issued in the *Health and Safety Plan for the Maywood Interim Storage Site and Vicinity Properties*
- of FUSRAP Radiological Control Manual
- set forth in 10 CFR 835

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Policy  
(continued)**

- of the FUSRAP Emergency Response Manual
- issued in BNI Safety and Health Manual, Volumes 1 and 2, and
- set forth in 29 CFR 1910/1926, as applicable.

---

**Site safety  
and health**

All site activities will occur under the direct surveillance/supervision of a site safety and health representative, who will assume the responsibility of

- addressing site-specific safety issues
- administering safety-related training
- conducting weekly safety meetings, and
- reporting/communicating daily with the health and safety coordinator (to ensure absolute safety and health compliance during all remedial activities).

---

**Definition  
of DCG**

A derived concentration guide (DCG) is the concentration of a particular radionuclide that is capable of providing an effective dose equivalent of 100 mrem/yr to an individual who is continuously exposed to the radionuclide by one pathway for an entire year.

---

**Occupational  
exposure**

To derive the concentrations of thorium-232 in the air, daily samples will be collected from the lapel air samplers.

These derived air concentrations will be compared to the applicable guideline for occupational exposures of airborne thorium-232 offered in DOE Order 5480.11 ( $1.0 \times 10^{-12} \mu\text{Ci/ml}$ ).

---

**Locations of  
monitors**

Locations for air perimeter monitors will be presented in a Work Instruction to be prepared prior to any remedial action on any vicinity property.

---

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

Vicinity Properties  
RD/RAIP  
Section 9  
Page 5 of 17

---

**Air  
sampling**

During remedial activities, area air particulate sampling will be performed

- adjacent to the area being remediated, and
- at any temporary loading zone.

---

**Lapel air  
samplers**

To monitor air particulates during remediation, lapel air samplers will be worn by personnel performing the activity.

---

**Community  
relations**

The community relations plan (CRP) is comprised of the applicable sections described in DOE/OR/20722-193.2 of the Administrative Record.

Note: The CRP is available from DOE upon request.

---

**DOE information  
center**

DOE maintains a staffed public information center in the community. At the DOE center, an information coordinator is available to answer questions and maintain and distribute fact sheets, photographs, project plans, videos, news clips, and other information to aid community members in keeping abreast of project activities.

The DOE information center is open during normal business hours three days a week and provides space and resources regarding the project for public use.

---

**Administrative  
Record**

Specific sections of the Administrative Record that will guide community relations activities during remediation of the vicinity properties are

- 4.0, "Highlights of Community Activities"
- 5.1, "Description and Timing of Activities," and
- 5.2, "Staffing."

The Administrative Record also contains

- the Action Memorandum
  - the *Engineering Evaluation/Cost Analysis for the Maywood Vicinity Properties*, and
  - information on the resolution of cleanup criteria.
- 

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Public  
information**

The Administrative Record is available for public information and is on file at the

- DOE Public Information Center, 55 West Pleasant Avenue, Maywood, New Jersey 07470
- Maywood Public Library, 459 Maywood Avenue, Maywood, New Jersey 07607.

---

**Property  
access**

A real estate instrument (REI) is required for the Maywood vicinity properties. To gain property access, BNI presents a justification to DOE Real Estate. DOE reviews the justification for

- accuracy of the project name
- project identification
- designation of the project into FUSRAP
- property description
- type and duration of the REI, and
- description of scope of activities.

---

**Comment**

BNI's real estate coordinator places a copy of the executed REI on file in FUSRAP's Project Document Control Center.

---

**Relocation  
of residents**

**IF** remedial work at a residential vicinity property requires relocation of the resident(s)

**THEN** project team activities involving community relations, a dedicated relocation coordinator, and other project personnel will be conducted by BNI pursuant to

- a plan constructed, reviewed, and approved by FSRD and Oak Ridge Operations Real Estate
- established federal rules and regulations regarding temporary relocation, and
- a plan based on the requirements of CERCLA, 44 CFR part 220, Temporary Relocation Assistance, as amended, 42 U.S.C. Section 9601, et seq; Executive Order 12580.

---

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Remedial  
activities**

Remedial action at each of the vicinity properties will consist of

- site preparation
- excavation of contaminated material
- air monitoring
- transport of contaminated material to MISS for loading into gondola rail cars
- verification sampling
- backfilling the excavated area
- reconstruction and (or) repair of any affected structures, and
- site restoration.

---

**Requirement**

Remedial action on any Maywood vicinity property will be conducted in accordance with the substantive requirements of all remediation and construction permitting requirements, as appropriate.

---

**Site  
preparation**

Site preparation activities will be completed in accordance with the applicable design drawings and technical specifications.

Appendix: Design drawings are included in Appendix A. Technical specification are included in Appendix B.

---

**Prior to  
activities**

Activities that will be completed before the commencement of any remedial activities at a vicinity property include the installation of

- temporary construction or exclusion zone barriers
  - erosion and sediment control
  - runoff and groundwater intrusion controls, and
  - temporary access or haul roads.
- 

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Additional activities**

Additional activities that must be completed before remedial action begins on any vicinity property include

- any fence removal and (or) relocation
- all clearing and grubbing activities
- the establishment of laydown areas, and
- the construction of decontamination facilities.

---

**Trees and plants**

Trees, plants, or shrubs not designated for removal will be protected. Supplemental standards or hot spot averaging may be used on trees or shrubs present in contaminated areas.

---

**Excavation**

Excavation activities will be performed

- using conventional excavation equipment, and
- in accordance with applicable sections of Technical Specification 138-SP505-003.

Appendix: Technical specifications are included in Appendix B.

---

**Excavation limits and depths**

Excavation limits are delineated on design drawings. The limits and depths of excavation will be adjusted in the field. Adjustments will be based on the results of ongoing sampling, using a portable in-situ gamma spec system.

Appendix: Design drawings are included in Appendix A.

---

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Excavation  
process**

Excavation calls for a repetitive process of soil removal

**THEN** radiation scanning and soil sampling in the excavated area until field measurements indicate that remedial criteria have been met

**THEN** verification by an independent verification contractor that each excavated area meets criteria

**THEN** backfilling the excavated area with material that is

- uncontaminated
- uniformly graded, and
- free of deleterious substances and noncompactible material.

---

**Backfill**

Clean backfill material will be placed and compacted

- in successive horizontal layers not to exceed 6 in. in depth before compaction, and
- to comply with the applicable technical specification(s) and design drawing(s), and

---

**Shoring**

**IF** any excavation requires shoring

**THEN** shoring or sheet piling will be used in accordance with specific requirements included on the applicable design drawings.

---

**Dust and  
runoff  
controls**

Dust generated during excavation will be controlled by an approved method (Example: spraying water).

During all remedial activities, runoff will be controlled by

- berms
- applicable sediment controls, and
- keeping water usage to a minimum.

---

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Water  
management**

Excavation activities will be sequenced to minimize any potential groundwater impacts.

Properties with high water tables will be excavated in the summer months when the water table is lower.

**IF** water collects in an excavation

**THEN** the water will be allowed to infiltrate into the ground

**OR** the

- wet soil will be excavated and moisture conditioned at the MISS
- excess water will be pumped to a tanker truck for transportation to the MISS where it will be pumped into the decontamination pad or broadcast in a contaminated area.

---

**Water  
supply**

During remedial activities water will be supplied by

- fire hydrants, or
- water trucks, as applicable.

---

**Measurements  
and sampling**

During remedial action, health physics technicians will perform gamma radiation measurements and soil sampling at each excavation.

Note: To facilitate rapid soil analysis, a field gamma spectroscopy laboratory will be set up near the remedial activities.

---

*Continued on next page*



**Implementation of the RD/RAIP,  
Continued**

**Portable  
instruments**

This table describes portable instruments that will be used during remedial action, and tells the function of each instrument.

<b>During remedial actions health physics personnel will use...</b>	<b>To measure...</b>
<p>scintillation detectors equipped with either a count-rate meter or a scaler</p> <p><u>Additional information:</u> The gamma scintillation detector used by FUSRAP is a sodium iodide crystal coupled to a photomultiplier tube that amplifies the response of the detector.</p>	<p>surface and subsurface contamination.</p> <p><u>Note:</u> This instrument detects gamma radiation and records gamma measurements in counts per minute.</p> <p><u>Explanation:</u> To measure gamma radiation, the detector may be held over the surface of the excavation or lowered into the excavation, as applicable.</p>
<p>a pressurized ionization chamber (PIC)</p> <p><u>Definition:</u> A PIC is a spherical detector containing pressurized argon gas. This instrument</p> <ul style="list-style-type: none"> <li>• has an output proportional to the incident radiation, and</li> <li>• records instrument response in microrentgen per hour.</li> </ul>	<p>surface contamination.</p>

**After  
excavation**

**AFTER** site excavation is complete and measurements from field instruments indicate that remedial action guidelines have been met

**THEN** post remedial action surveys will begin.

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

**Post action surveys**

This table identifies and defines activities that will be included in the post remedial action survey.

The post remedial action survey will include...	How it will be done
a walkover gamma scan.	<p>A grid system with a maximum area of 100 m<sup>2</sup> will be established</p> <p><b>THEN</b> an area walkover using a scintillation detector is performed (within the grid system) to identify any area that may exceed remedial guidelines</p> <p><b>IF</b> any area is identified as exceeding criteria</p> <p><b>THEN</b> excavation is repeated</p> <p><b>THEN</b> another walkover gamma scan is performed.</p>
<p>isotopic analyses.</p> <p><u>Note:</u> During remedial activities this system will be used to prevent the presence of naturally occurring gamma emitters (such as potassium-40) from causing over excavation.</p>	<p>An in-situ gamma spectroscopy system and a field gamma spectroscopy laboratory will provide data.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;"> <p>To establish that the primary radionuclides and their daughters are in equilibrium, ten percent of the samples analyzed by the field laboratory will be sent offsite for alpha spectroscopy analysis.</p> </div>
the taking of measurements using a PIC.	Measurements will be taken at a height of 1 m (in each remediated area).

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

(continued)

<b>The post remedial action survey will include...</b>	<b>How it will be done</b>
<p>surface averaging.</p> <p><u>Appendix:</u> Appendix C offers the allowable surface residual contamination levels for any structure, equipment, or building rubble.</p>	<p>Five readings per 1 m<sup>2</sup> of surface area will be taken to obtain an average surface contamination level.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p><b>ONE</b> reading will be taken from each corner of the 1 m<sup>2</sup></p> <p><b>AND</b></p> <p><b>ONE</b> reading will be taken from the middle of the 1 m<sup>2</sup>.</p> </div>
<p>the collection of soil samples.</p>	<p><b>WHEN</b> post remedial action surveys and analyses meet remedial criteria</p> <p><b>THEN</b> soil samples will be collected to verify that criteria are met.</p>

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

(continued)

<b>The post remedial action survey will include...</b>	<b>How it will be done</b>
<p>averaging soil sample concentrations</p> <p><u>Additional information:</u> During remediation, the specified concentrations represent an average contaminant concentration over any 100 m<sup>2</sup> area and any depth interval of 15 cm</p> <p><b>THEREFORE</b> individual soil samples within a 100 m<sup>2</sup> area <i>may</i> exceed remedial criteria</p> <p><b>HOWEVER</b> when samples from the surrounding soil are considered, the average concentration <i>may</i> be within criteria.</p>	<p>The concentration of soil samples collected from within the remediated area will be averaged with the concentration of samples taken from surrounding soil.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><b>WHEN</b> the effort is to demonstrate that a 100 m<sup>2</sup> area meets averaging criteria</p> <p><b>THEN</b> soil samples will be collected from that area at</p> <ul style="list-style-type: none"> <li>• evenly spaced locations</li> <li>• a density of 25 locations per 100 m<sup>2</sup></li> </ul> <p><b>THEN</b> the samples will be thoroughly mixed, and a minimum of one composite (mixed) sample per grid will be sent to a laboratory for analysis.</p> </div> <p><u>Note:</u> DOE Order 5400.5 identifies special criteria for localized "hot spots" of elevated radioactivity.</p>

**Verification surveys**

After the post remedial action survey is completed, the independent verification contractor (IVC) begins the verification surveys.

These surveys are performed according to the site characterization and remedial action survey grids, and consist of

- onsite visits
- surveys with direct measurements
- sampling
- split sample analyses, and
- a review of plans, data, and procedures.

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Purpose**

The purpose of verification surveys is

**TO** confirm the adequacy of procedures and methods used by remedial action contractors

**AND**

**TO** verify the results of remedial activities.

---

**Soil samples  
for  
verification**

A minimum of five verification soil samples will be collected, on a systematic pattern, from a site area (this number will change according to the size of the area and the nature and extent of contamination).

Note: In addition to the five verification samples, the IVC may acquire samples from the archives of the remedial action contractor.

---

**Comparison of  
surveys and  
analyses**

Results of surveys and sample analyses obtained by the IVC will be compared with survey results and sample analyses obtained by the remedial action contractor.

**IF** there are any discrepancies between the analyses and survey results obtained by the IVC and those obtained by the remedial action contractor

**THEN** corrective action, as applicable, will be taken by the remedial action contractor.

---

**Site closure**

After an area is verified by the IVC

**THEN** clean fill will be used to backfill the excavation

**THEN**, to facilitate closure of the site, the IVC will prepare a report and letter of verification.

---

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Air monitoring**

During remedial action at the vicinity properties, air monitoring will be conducted

**TO** ensure that no member of the general public is exposed

**TO** radioactivity above the DCGs offered in DOE Order 5400.5.

Additional information: Air monitoring results will be compared to the thorium-232 DCG presented in DOE Order 5480.11 ( $1.0 \times 10^{-14} \mu\text{Ci/ml}$ ).

---

**Restoration**

Each vicinity property will be restored to its pre-remedial action condition to the maximum extent practicable. Restoration will be guided by criteria that

- have DOE approval
  - are offered in design drawings, as applicable, and
  - were established in individual real estate instruments.
- 

**Damage and repair**

**IF**, during the course of remedial action, any structural or mechanical feature is

- damaged, or
- disconnected

**THEN** that structural or mechanical feature will be

- replaced
  - repaired, and/or
  - reconnected (Example: Utilities, such as water, gas, and electricity).
- 

**Examples:  
reconstruction**

Examples of reconstruction after remedial activities have taken place include the repair and/or replacement of

- patios, decks, driveways, and curbs
  - fences, lawns, trees, and shrubs
  - concrete slabs and foundations
  - heating and air conditioning systems, piping, and duct work, and
  - floors, walls, and structural supports.
- 

*Continued on next page*

**Implementation of the RD/RAIP,  
Continued**

---

**Decontamination  
process**

The process for decontamination requires that

**BEFORE** leaving a vicinity property, all equipment and tools used for remedial activities be placed in a designated decontamination area

**WHERE** a dry method (such as a wire brush) will be used to remove any gross contamination.

---

**Wrapped and  
transported**

Equipment and/or tools that cannot be decontaminated using a dry method will be wrapped in a manner that provides protection to human health and the environment and then transported to the decontamination area at MISS.

---

**Contaminated  
equipment and  
material**

**ALL** brushes used for the decontamination process, and all material removed from equipment and/or tools

**WILL** be considered to be contaminated material and will be managed in compliance with

**ALL** applicable federal, state, and local laws.

---





# Waste Management and Transportation

Vicinity Properties

RD/RAIP

Section 10

Page 1 of 14

---

## Introduction

Criteria for waste management and transportation call for the transportation of contaminated material (excavated from vicinity properties during remediation) to a remote site for disposal.

---

## 11e.(2) material

The contaminated material has been

- classified under the Atomic Energy Act of 1954, and
  - is considered to be 11e.(2) byproduct material.
- 

## COE contract

Envirocare of Utah, Inc., Clive, Utah, agrees to accept FUSRAP 11e.(2) material for disposal through a contract signed by

- DOE
  - the U.S. Army Corps of Engineers (COE), and
  - Envirocare of Utah, Inc.
- 

## Modes of transport

Dump trucks will be used to transport the material from each vicinity property to the MISS.

Rail gondola cars will be used to transport the material from the MISS to Envirocare for disposal.

---

## Excavation

At each vicinity property, a front-end loader or backhoe will be used to excavate the material and load it into dump trucks.

Note: Hand excavation may be required in some areas.

---

## Packaging process

**WHEN** each dump truck contains a load of excavated material

**THEN** a cover (Example: A tarpaulin) will be placed securely over the material in a way that converts the truck into a sift-proof container

**THEN** the dump truck driver will deliver the covered material to MISS

**WHERE** the material will be unloaded and contained in a pile

**UNTIL** it is packaged in rail gondola cars and transported to Envirocare for disposal.

---

*Continued on next page*

**Waste Management and Transportation,  
Continued**

Vicinity Properties  
RD/RAIP  
Section 10  
Page 2 of 14

---

**Field log**

Movement of the contaminated material will be tracked through entries made in field logbooks. A record will be kept of

- the excavation and loading of material into dump trucks, and
- each dump truck's delivery of material to MISS.

---

**Compliance**

The 11e.(2) material will be excavated, packaged, and transported in compliance with all

- federal
- state
- county, and
- city (township) requirements, as applicable.

---

**DOE tender**

The 11e.(2) material will be transported to Envirocare under the terms and conditions of the applicable DOE tender.

---

**Unregulated material**

Total activity of each truck used to transport the 11e.(2) material from the vicinity properties to MISS will be less than a reportable quantity (RQ). Therefore, the package of material is not regulated by DOT, and does not require

- marking
- labeling, or
- placarding.

---

**Comment**

49 CFR Part 173.403(y) states that to be defined as a radioactive material for transportation purposes material must be greater than 0.002  $\mu\text{Ci/gm}$ .

---

**Acceptance criteria**

Before material excavated from the vicinity properties can be shipped for disposal, Envirocare waste acceptance criteria must be met. BNI begins this process by sending to Envirocare the

- laboratory analysis of the 11e.(2) material
- completed waste profile forms for the material, and
- required number of pre-shipment samples.

---

*Continued on next page*

**Waste Management and Transportation,  
Continued**

---

**Acceptance  
parameters**

**WHEN** the written information and pre-shipment samples are received by Envirocare

**THEN**, concurrently, Envirocare specialists

- review the written material
  - analyze the pre-shipment samples, and
  - set acceptance parameters.
- 

**Disposal  
agreement**

**IF** Envirocare determines that the 11e.(2) material meets Envirocare acceptance criteria, BNI will be notified.

**THEN** Envirocare and BNI will complete a disposal agreement which outlines the

- total amount of material for disposal
  - delivery schedule
  - cost of disposal, and
  - physical, chemical, and (or) radioactive attributes of the material, as appropriate.
- 

**Prior to  
transport**

Prior to release of the vicinity properties material for transport, Envirocare must have received (and approved) from BNI a

- waste history and description
  - Generator's Waste Material Delivery Schedule form
  - 3-day shipping notice
  - Certification of 11e.(2) Material
  - Pre-shipment Sample Profile Record
- 

*Continued on next page*

## Waste Management and Transportation, Continued

Vicinity Properties  
RD/RAIP  
Section 10  
Page 4 of 14

---

### Prior to transport (continued)

- completed "sample" 11e.(2) EC-3100 form
- Transportation Plan
- 11e.(2) Waste Profile Record
- Physical Properties Record, and
- Radiological Evaluation.

---

### Transportation compliance

The transportation plan directs that the 11e.(2) material be

- transported for disposal in compliance with 49 CFR
- managed in compliance with all city (township), state, and local codes, as applicable
- classified on a bill-of-lading, and
- shipped in exclusive-use vehicles (to maximize the safety of human health and the environment).

---

*Continued on next page*

Waste Management and Transportation,  
Continued

Vicinity Properties  
RD/RAIP  
Section 10  
Page 5 of 14

Example:  
bill-of-lading

Here is an example of a completed bill-of-lading.

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: Norfolk Southern Railway Company

Shipper No: 2029-01-001

Carrier No.: \_\_\_\_\_ SCAC No: NS

Date: 3/8/95

Purchase / Customer Order No: \_\_\_\_\_

Received, subject to the classifications and tariffs in effect on the date of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked consigned, and delivered as released hereon which said carrier agrees to carry to the usual place of delivery. If on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment.  
Shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: Envirocare of Utah, Inc  
Tooele County  
USI-80, Exit 49  
Clive, Utah 84029

Shipper: Bechtel National, Inc  
P.O. Box 350  
Oak Ridge, TN 37831-0350  
For U.S. Department of Energy

Route: \_\_\_\_\_

Vehicle or Car Initial and Number: NW 188 749

No. Packages	HM	Description of Material	Weight	Class or Rate	Charges	Subject to Section 7 of Conditions of Applicable Bill of Lading. If the shipment is to be delivered to the consignee without recourse on the carrier, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and other lawful charges.  Signature of Consignor  If freight charges are to be prepaid, write or stamp here: "TO BE PREPAID".  Note: Where the rate is dependent on value, shipper are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically listed by the shipper to be not exceeding \$ _____ per _____  *SS741 Reference  *Job order, reference account, or work order number.  14501-137  *Label(s) applied  3077  *Placard(s)  Class 9
1 Gondola car	RQ	Environmentally Hazardous Substance, Solid, n.o.s., 9, UN3077, III, (Th-232)  The material consists of soil with a small amount of debris.  The material contains specific activity less than 0.002 uCi/g and does not meet the 49 CFR 173.403(y) definition of a radioactive material.  For additional information regarding this shipment, contact Jo Meredith at (615) 576-9469, or Robert Vallem at (615) 576-3516.  EMERGENCY CONTACT: 1-800-424-9300  Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor are to be reimbursed by the Government, pursuant to the contract tender NS. This can be confirmed by contacting Rebecca Whitehead at (615) 241-2161.	95 tons			

**IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:**

Emergency Response CHEMTREC 1-800-424-9300 (Radioactive Shipments) DEPT. OF ENERGY: \_\_\_\_\_ If Delayed in Transit - Notify: \_\_\_\_\_

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. \*This shipment is for U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by, the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.  YES, I DO.

Shipper: Bechtel National, Inc. (for the Dept. of Energy) \*Shippers imprint in lieu of stamp. Not a part of Bill of Lading approved by Interstate Commerce Commission

Acting under contract DB-A605-910R21945

with U.S. Department of Energy

For Jo Meredith Date 3/08/95 \*The address on the face hereof and to the terms and conditions are hereby noted

TRAFFIC DEPT. Permanent Address of Shipper

Carrier: Norfolk Southern

Date: 3/08/95

Continued on next page

**Waste Management and Transportation,  
Continued**

Vicinity Properties  
RD/RAIP  
Section 10  
Page 6 of 14

---

**Gondola  
cars**

The decision to transport the 11e.(2) material in gondola cars is based upon

- experience
- the logistics of MISS
- easily enforced safety regulations
- waste minimization efforts, and
- the estimated cost comparisons between transport modes.

---

**Visual  
inspection**

Prior to loading the 11e.(2) material, each gondola car must pass a BNI visual inspection.

---

**Checklist**

During the visual inspection a checklist will be completed to verify that the gondolas are structurally sound and free of

- dirt and debris
- sharp edges
- large penetrations
- heavily rusted areas, and
- improper markings.

---

*Continued on next page*

Waste Management and Transportation,  
Continued

Example:  
checklist

Here is an example checklist for gondola cars.

Page 1 of 1

ON-SITE INSPECTION CHECKLIST FOR GONDOLA CAR - MAYWOOD SITE

GONDOLA IDENTIFICATION NUMBER: \_\_\_\_\_

	YES	NO
<b>1. RECEIVING GONDOLAS:</b>		
Gondola Appropriate for Waste	_____	_____
Gondola Free From Major Rust	_____	_____
Gondola Free From Major Dents	_____	_____
Gondola Free from "Sharp Points" or Edger Which Could Damage Liner	_____	_____
<b>2. GONDOLA MEETS BNI REQUIREMENTS:</b>		
Sharp Objects Have Been Padded	_____	_____
Liner Meets Specifications	_____	_____
Gondola Lined (20 Mil Plastic)	_____	_____
Fiberboard Bottom Installed	_____	_____
<b>3. PACKAGING WASTE</b>		
Weight Limits Not Exceeded	_____	_____
Intermittent Ropes Tied Through Receive Holes	_____	_____
Final End Ropes Tied to Four Crosslin Ropes Near Each End of Gondola	_____	_____
Sections of Bungees Attached to the 15 Continuous Cross Ropes	_____	_____
Proper Shipping Name Provided	_____	_____
Placards Provided	_____	_____
ID Number on Orange Panel Provided	_____	_____

Signature: \_\_\_\_\_

WM\_0145

Continued on next page

**Waste Management and Transportation,  
Continued**

Vicinity Properties  
RD/RAIP  
Section 10  
Page 8 of 14

**Liner  
installation**

---

**IF** the gondola(s) passes visual inspection

**THEN** packaging will begin by installing a 20-mil polyethylene liner inside each clean gondola car

**THEN** placing double-sided fiberboard

**ON** top of the liner

**ON** the floor of the gondola.

---

**Liner  
function**

The function of the 20-mil polyethylene liner is to

- minimize contamination of the gondola
  - ease the unloading process
  - seal the material from the environment during transit
  - make the process of decontamination at the disposal facility more efficient, and
  - transform the gondola into a strong, tight, and sift-proof container (in accordance with 49 CFR Part 173.24).
- 

**Fiberboard**

The purpose of placing fiberboard on top of the liner is to protect the liner from rips and (or) tears during the loading process.

---

*Continued on next page*

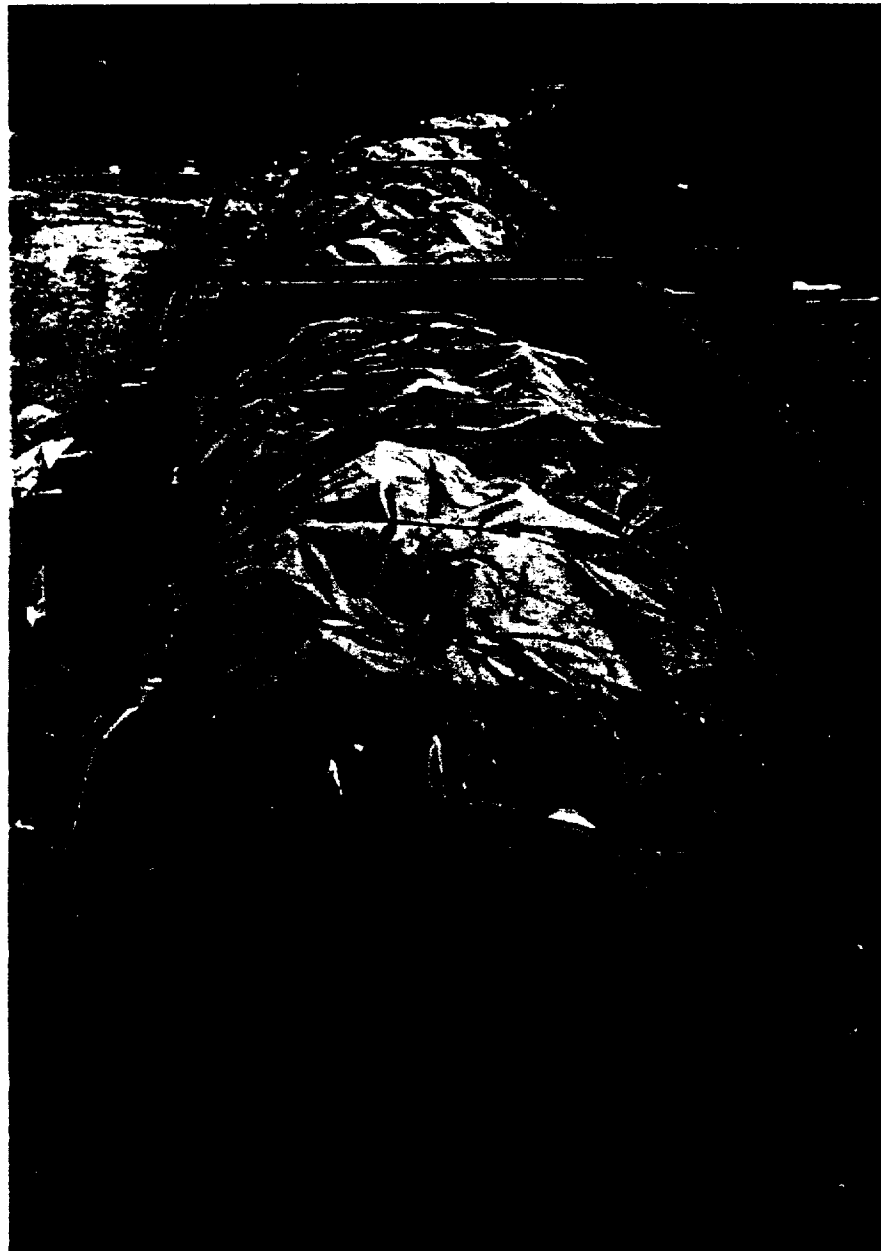


**Waste Management and Transportation,  
Continued**

Vicinity Properties  
RD/RAIP  
Section 10  
Page 9 of 14

**Ready for  
transport**

This is a picture of contaminated material packaged in a gondola car. A 20-mil liner was used as packaging. The package is strong, tight, sift-proof, and ready for transport.



*Continued on next page*

**Waste Management and Transportation,  
Continued**

**Transportation  
summary**

This table offers a summary of the transportation plan for the vicinity properties material.

Stage	Activity						
1	<p>Inspect gondola cars and complete checklist.</p> <table border="1" data-bbox="435 699 1339 989"> <thead> <tr> <th data-bbox="440 699 902 758">IF the gondola...</th> <th data-bbox="902 699 1339 758">THEN...</th> </tr> </thead> <tbody> <tr> <td data-bbox="440 758 902 852">passes inspection</td> <td data-bbox="902 758 1339 852">prepare the gondola for loading.</td> </tr> <tr> <td data-bbox="440 852 902 989">fails inspection</td> <td data-bbox="902 852 1339 989">immediately inform the railroad of the rejected gondola.</td> </tr> </tbody> </table>	IF the gondola...	THEN...	passes inspection	prepare the gondola for loading.	fails inspection	immediately inform the railroad of the rejected gondola.
IF the gondola...	THEN...						
passes inspection	prepare the gondola for loading.						
fails inspection	immediately inform the railroad of the rejected gondola.						
2	<p>Prepare the gondola for loading by placing a</p> <ul style="list-style-type: none"> <li>• 20-mil liner in the gondola, and</li> <li>• piece of double-sided fiberboard on the bottom of the gondola (on top of the liner).</li> </ul>						
3	<p>Use a front-end loader equipped with a scale to</p> <ul style="list-style-type: none"> <li>• weigh each scoop of material before it is placed into a gondola, and</li> <li>• load 95 tons of material into each prepared gondola car.</li> </ul> <table border="1" data-bbox="440 1535 906 1850"> <tr> <td data-bbox="440 1535 906 1850"> <p>Upon arrival at Envirocare, the</p> <ul style="list-style-type: none"> <li>• material must not generate dust when being handled, and</li> <li>• package must not contain free-standing water.</li> </ul> </td> </tr> </table>	<p>Upon arrival at Envirocare, the</p> <ul style="list-style-type: none"> <li>• material must not generate dust when being handled, and</li> <li>• package must not contain free-standing water.</li> </ul>					
<p>Upon arrival at Envirocare, the</p> <ul style="list-style-type: none"> <li>• material must not generate dust when being handled, and</li> <li>• package must not contain free-standing water.</li> </ul>							

*Continued on next page*

**Waste Management and Transportation,**  
Continued

(continued)

Stage	Activity
4	<p>Pull the liner up from the sides and ends of the gondola</p> <p><b>THEN</b> wrap the liner around the material "burrito style"</p> <p><b>THEN</b> pull all cords (supplied with the liner) around the package of material</p> <p><b>THEN</b> securely tie each cord.</p>
5	<p>Classify the material as "RQ, Environmentally Hazardous Substance, Solid, n.o.s., UN3077, 9, III, (TH-232)" on a bill-of-lading.</p> <div data-bbox="474 921 1317 1283" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>A bill-of-lading must</p> <ul style="list-style-type: none"> <li>• be prepared for each gondola used to transport the material for disposal</li> <li>• be prepared, signed, and dated by the appropriate BNI personnel, and</li> <li>• contain a complete description of the material.</li> </ul> </div> <p><u>Explanation:</u> The total activity of material in each gondola will exceed the reportable quantity listed in 49 CFR Part 172.101, Appendix A, for natural thorium to be classified as a hazardous substance.</p>
6	<p>Placard and mark each gondola in accordance with 49 CFR Parts 172.300 through 172.448.</p>
7	<ul style="list-style-type: none"> <li>• Prepare Envirocare manifest (EC-3100) and any other applicable paperwork required by the disposal facility and (or) the railroad.</li> <li>• Notify the disposal facility of an incoming shipment.</li> </ul>

*Continued on next page*

**Waste Management and Transportation,  
Continued**

(continued)

Stage	Activity
8	<p>Deliver both the bill-of-lading and Envirocare manifest (EC-3100) to the railroad.</p> <p><u>Note:</u> The railroad takes possession of the material for transport when the appropriate railroad personnel signs and dates the bill-of-lading.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Distribution of both the bill-of-lading and Envirocare manifest (EC-3100) requires that the originals remain with the package of material and a copy be</p> <ul style="list-style-type: none"> <li>• filed at MISS</li> <li>• sent to the Waste Management Department for file and processing through the Project Document Control Center, and</li> <li>• sent by Fedex to the disposal facility.</li> </ul> </div>
9	<p>Fax both the bill-of-lading and manifest (EC-3100) to Envirocare.</p> <p><b>THEN</b>, within five days after the railroad takes possession of the package <b>FORWARD</b> to Envirocare by Fedex both the manifest (EC-3100) and bill-of-lading.</p>
10	<p>Maintain "cradle to grave" tracking of each packaged gondola car en route for disposal until its arrival at Envirocare.</p> <p><u>Note:</u> Tracking is accomplished through continuous oral and written communications between BNI and the railroad.</p>

**Class 9  
placard**

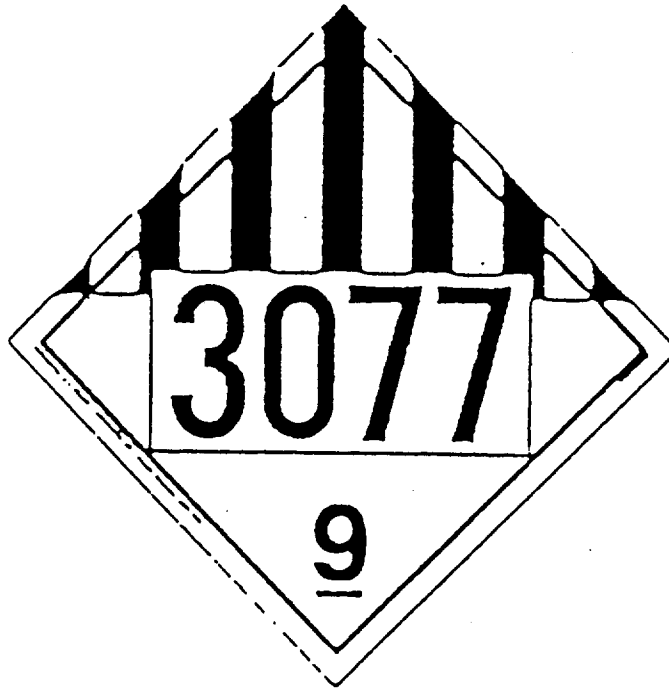
Before BNI transfers custody of any gondola to the railroad, a Class 9 placard and a UN3077 mark will be placed upon

**EACH** side and  
**EACH** end of  
**EACH** gondola.

*Continued on next page*

**Example:  
placard and  
mark**

Here is an example of a Class 9 placard and a UN3077 mark.



**Arrival at  
Envirocare**

Upon the material's arrival at the disposal site, Envirocare personnel

- inspect the incoming shipment for compliance with pre-approved acceptance criteria, and
- take samples for "fingerprinting" and independent third-party analysis.

Note: The fingerprint parameters must be verified before any unloading of waste.

*Continued on next page*

**Waste Management and Transportation,  
Continued**

Vicinity Properties  
RD/RAIP  
Section 10  
Page 14 of 14

---

**Third-party  
analysis**

After acceptable independent third-party analysis confirms shipment compliance with the appropriate DOE contract, the material will be taken to a cell for burial by Envirocare.

---

**After  
verification**

After verification of the material, Envirocare signs (and sends to BNI) a copy of the

- manifest (EC-3100), and
- bill-of-lading.

---

**Chain-of-  
custody**

To complete the chain-of-custody, the bill-of-lading must have been signed by

- the appropriate BNI transportation/logistics coordinator when offering the material for transport
  - the railroad upon accepting the material for transport, and
  - Envirocare upon acceptance of the material for disposal.
-

# Appendixes

**Cross  
reference**

This table offers a cross reference of the text and the appendixes presented in this RD/RAIP.

Appendix	Is referenced in section(s),	On page	Under label(s)
A Design Drawings	<ul style="list-style-type: none"><li>• 4</li><li>• 9</li></ul>	<ul style="list-style-type: none"><li>• 2 of 13</li><li>• 6 of 13</li><li>• 7 of 13</li><li>• 6 of 16</li><li>• 7 of 16</li></ul>	<ul style="list-style-type: none"><li>• Design packages</li><li>• Summary and explanation table</li><li>• Implementation</li><li>• Site preparation</li><li>• Excavation limits and depths</li></ul>
B Technical Specifications	<ul style="list-style-type: none"><li>• 4</li><li>• 9</li></ul>	<ul style="list-style-type: none"><li>• 3 of 13</li><li>• 6 of 16</li><li>• 7 of 16</li></ul>	<ul style="list-style-type: none"><li>• Technical specifications</li><li>• Site preparation</li><li>• Excavation</li></ul>
C Allowable Surface Contamination Levels	<ul style="list-style-type: none"><li>• 6</li></ul>	<ul style="list-style-type: none"><li>• 1 of 3</li></ul>	<ul style="list-style-type: none"><li>• Established criteria</li></ul>
D Scope of Work	<ul style="list-style-type: none"><li>• 5</li></ul>	<ul style="list-style-type: none"><li>• 2 of 2</li><li>• 2 of 2</li></ul>	<ul style="list-style-type: none"><li>• Remedial action subcontract</li><li>• Restoration subcontract</li></ul>

**APPENDIX A**  
**DESIGN DRAWINGS**





### Design Drawings

Number of drawing	Title of Drawing
138-DD505-C01	Remedial Action Property Groups - General Notes and Vicinity Plans
138-DD513-C01	Restoration Property Groups - General Notes and Restoration Plan
138-DD505-C02	Utilities - Standard Civil Details
138-DD513-C02	Standard Civil Details
138-DD505-C03	Erosion and Sedimentation Control - Standard Details
138-DD505-C04	Alternate Trench Method I - Standard Structural Details
138-DD505-C05	Alternate Trench Method II - Standard Structural Details
138-DD505-C06	Standard Structural Details
138-DD505-C07	Open Trench Shoring Details
138-DD505-C23	20 and 22 Long Valley Road - Excavation Plan
138-DD505-C24	20 and 22 Long Valley Road - Sections A and B
138-DD513-C17	20 and 22 Long Valley Road - Restoration Plan
138-DD505-C31	2 and 4 Branca Court - Excavation Plan
138-DD505-C32	2 and 4 Branca Court - Sections
138-DD513-C21	2 and 4 Branca Court - Restoration Plan
138-DD505-C35	Lodi Municipal Park - Excavation Plan
138-DD505-C36	Lodi Municipal Park - Sections
139-DD513-C23	Lodi Municipal Park - Restoration Plan



**APPENDIX B**  
**TECHNICAL SPECIFICATIONS**



### Technical Specifications


Number of specification	Title
138-SP505-003	Earthwork
138-SP505-004	Shoring, Sheeting, and Structural Timber
138-SP505-005	Concrete, Forming, and Reinforcement
138-SP505-006	Masonry
138-SP505-007	Structural Steel
138-SP513-001	Grass Establishment and Landscaping



TECHNICAL SPECIFICATION  
 FOR  
 EARTHWORK

FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM  
 (FUSRAP)

BY  
 BECHTEL NATIONAL, INC.  
 OAK RIDGE, TENNESSEE

0	2-17-95	ISSUED FOR USE	MT	JKL	MR	Red	
REV.	DATE	REASON FOR REVISION	BY	CHECK	EGS	PE	
ORIGIN 			JOB NO. 14501				
			SPECIFICATION NO.				REV.
			138-SP505-003				0
			Sheet 1		of		12



## TECHNICAL SPECIFICATION

## FOR

## EARTHWORK

## 1.0 GENERAL

- 1.1 SUMMARY
- 1.2 ABBREVIATIONS AND ACRONYMS
- 1.3 RELATED SPECIFICATIONS
- 1.4 REFERENCES
- 1.5 GENERAL REQUIREMENTS
- 1.6 SUBMITTALS
- 1.7 DEFINITIONS

## 2.0 PRODUCTS

- 2.1 BACKFILL MATERIALS
- 2.2 CAPILLARY WATER BARRIERS
- 2.3 MISCELLANEOUS PRODUCTS

## 3.0 EXECUTION

- 3.1 CLEARING
- 3.2 GRUBBING
- 3.3 SALVAGEABLE MATERIALS
- 3.4 REMEDIAL EXCAVATION
- 3.5 DRAINAGE AND DEWATERING
- 3.6 BACKFILL PREPARATION
- 3.7 BORROW
- 3.8 PLACEMENT AND COMPACTION
- 3.9 CAPILLARY WATER BARRIER
- 3.10 TOPSOIL REPLACEMENT
- 3.11 UTILITY AND DRAIN TRENCHES
- 3.12 FINAL GRADES
- 3.13 SOIL TESTING

**TECHNICAL SPECIFICATION****FOR****EARTHWORK****1.0 GENERAL****1.1 SUMMARY**

This specification defines the technical requirements for earthwork relating to remediation and restoration of residential, commercial, and public properties. Some work described herein may not be applicable for each property.

**1.2 ABBREVIATIONS**

The abbreviations listed below, where used in this specification, shall have the following meanings:

ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
NJDOT	New Jersey Department of Transportation
OSHA	Occupational Safety and Health Administration
SS	Bechtel Site Superintendent
SSRS	Subcontractor Submittal Requirements Summary
UCC	State of New Jersey Uniform Construction Code Act and Regulations Book

**1.3 RELATED SPECIFICATIONS**

Technical Specification "Demolition of Structures", 138-SP505-001.

Technical Specification "Shoring, Sheeting, and Structural Timber", 138-SP505-004.

**1.4 REFERENCES**

Unless otherwise specified, the following specifications, guides, test methods, codes, and standards of the latest issue at the time of the bid shall apply to the extent indicated herein.

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

- D 698-91 Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

Specification  
14501-138-SP505-003

- D 1556-90 Test Methods for Density and Unit Weight of Soil in Place by the Sand-Cone Method
- D 2167-84 (R 1990) Test Methods for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method
- D 2487-93 Test Methods for Classification of Soils for Engineering Purposes
- D 2922-91 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- D 2937-83 (R 1990) Test Methods for Density of Soil in Place by the Drive-Cylinder Method

#### OTHER REFERENCES

Occupational Safety and Health Administration (OSHA), 29 CFR 1926, Subpart P, Excavations.

New Jersey Department of Agriculture, "Standards for Soil Erosion and Sediment Control in New Jersey", April 1987.

State of New Jersey Uniform Construction Code Act and Regulations Book (UCC).

New Jersey Department of Transportation (NJDOT), "Standard Specifications for Road and Bridge Construction", 1989, Section 200 - Earthwork; Section 900 - Materials.

#### 1.5 GENERAL REQUIREMENTS

- 1.5.1 Earthwork shall be carefully coordinated with all other related work.
- 1.5.2 Dust mitigation and control shall be accomplished by employing a potable water mist.
- 1.5.3 Sediment run-on/run-off control shall be in place prior to the start of earthwork and shall be maintained throughout restoration operations. Sediment control shall be in accordance with the design drawings and with the above referenced publication "Standards for Soil Erosion and Sediment Control in New Jersey".
- 1.5.4 Underground utilities shall be located and identified prior to the start of any work described in this specification. Utilities which are to remain in service shall be protected from damage during the

work described herein. Exposed utilities that are susceptible to freezing shall be appropriately protected. Damaged utilities shall be repaired immediately.

Prior to discontinuance or interruption of utilities, all necessary permits, notifications, and arrangements as required by the public utility and/or private utility company shall be in place. Utilities shall be properly isolated prior to the start of any work described in this section.

- 1.5.5 Open excavations shall be barricaded to protect the public.
- 1.5.6 Trees and landscape plants on the property which are not identified for removal shall be protected from damage.
- 1.5.7 Burning and blasting will not be permitted for any of the work described herein.

#### 1.6 SUBMITTALS

All submittals shall be in accordance with the Subcontractor Submittal Requirements Summary (SSRS) as specified in Part VI of the subcontract documents. Bechtel will determine if documentation is complete as submitted and reserves the right to reject and require resubmittal of any document that does not meet the requirements.

#### 1.7 DEFINITIONS

##### Salvageable Materials

Salvageable materials shall refer to uncontaminated materials and items which may be disassembled, stored, and/or reused in restoration work. These include recreational features and landscaping materials such as wood decks, outdoor planters, above ground swimming pools, decorative rock work, uncontaminated topsoil, etc. Salvageable materials may also include uncontaminated excavated soil that can be reused as backfill material.

##### Clearing

Clearing shall refer to the felling and trimming of trees, and removal of vegetation, brush, snags and rubbish occurring within the areas to be cleared.

**Grubbing**

Grubbing shall refer to the removal and disposal of stumps and roots with diameters greater than 1.5 inches within the areas to be excavated.

**Remedial Excavation**

Remedial excavation shall refer to any removal of soil and buried debris as directed by Bechtel to meet clean up criteria.

**Structural Backfill**

Structural backfill shall refer to any fill to be used beneath foundations, floor slabs, driveways, sidewalks or other structures.

**General Backfill**

General backfill shall refer to all other fill that is not defined as structural backfill.

**2.0 PRODUCTS****2.1 BACKFILL MATERIAL**

- 2.1.1 Backfill material shall be classified by ASTM D 2487 as GW, GM, GC, SW, SM, or SC. Material shall be free of organic material, frozen material, rubbish or other unsuitable materials. No more than 15 percent of the material shall be finer than a number 200 sieve and no material shall be larger than 3 inches in any dimension. Classification frequency shall be in accordance with section 3.13 of this specification.
- 2.1.2 Backfill material shall be free from both chemical and radiological contamination. Borrow sources must be accessible to Bechtel for the collection of chemical and radiological soil samples. Provisions must exist for Bechtel to reserve the backfill material that has been verified clean.
- 2.1.3 Certification that the backfill material complies with the above requirements, shall be submitted in accordance with section 1.6.

## 2.2 CAPILLARY WATER BARRIERS

Material used as a capillary water barrier shall consist of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel. The maximum particle size shall be 1-1/2 in. and no more than 2 percent by weight shall pass a No. 4 sieve.

## 2.3 MISCELLANEOUS PRODUCTS

2.3.1 Topsoil shall meet the requirements of NJDOT 909.10 with the additional requirement that the soil shall be free from both chemical and radiological contamination. Certification that topsoil material complies with the above requirements, shall be submitted in accordance with section 1.6.

2.3.2 Sediment barriers such as haybales, silt fences, geotextiles, and/or rock filters, shall meet the requirements indicated on the design drawings.

## 3.0 EXECUTION

### 3.1 CLEARING

3.1.1 Trees, landscape plants, brush, and other vegetation in areas to be cleared shall be cut off flush with the original ground surface, unless otherwise indicated on the drawings or directed by Bechtel.

3.1.2 Limbs and branches to be trimmed shall be neatly cut close to the trunk or main branches. Cuts more than 1½ inches in diameter shall be painted with appropriate tree-wound paint.

3.1.3 Trees shall be felled in such a manner as to avoid damage to adjacent property, structures, pavements, overhead utilities, and landscaping to remain; and with due regard for the safety of employees, neighboring residents, motorists and pedestrians.

3.1.4 Cleared trees, shrubs, and other material shall be radiologically surveyed for contamination. Uncontaminated material shall be kept separate from contaminated material and disposed of at an approved landfill facility in accordance with state and local regulations.

3.1.5 Contaminated material shall be decontaminated to the extent possible and appropriately disposed. Contaminated material to be disposed of shall be reduced in size so that the smallest dimension is

less than 10 inches and the largest dimension is less than 8 feet.

### 3.2 GRUBBING

- 3.2.1 Stumps and roots to be grubbed shall be removed to a depth of at least 18 inches below the original grade. In areas where excavation will be deeper than 18 inches, stumps and roots with diameters greater than 1.5 inches shall be removed to the depth of the excavation.
- 3.2.2 If stump grinding equipment is used, precautions shall be taken to control the spread of flying chips and soil.
- 3.2.3 Stumps that are removed by other methods shall be reduced in size so that the smallest dimension is less than 10 inches.
- 3.2.4 Grubbed material, including chips produced from stump grinding equipment, shall be handled as contaminated material and transported to the designated contaminated waste staging area.

### 3.3 SALVAGEABLE MATERIALS

Salvageable materials shall be disassembled, removed, and/or excavated, and stored for reuse to the maximum extent practicable. Items that may have been in contact with contaminated soil shall be radiologically surveyed and decontaminated, if necessary, to the maximum extent possible.

### 3.4 REMEDIAL EXCAVATION

- 3.4.1 Excavation techniques and equipment shall be compatible with existing site conditions, particularly in areas adjacent to existing structures. The cutting edges of excavation equipment shall be toothless to prevent digging in of contaminated material.
- 3.4.2 Portland cement and asphalt concrete surfaces which require removal shall be sawcut. Portland cement concrete surfaces shall be sawcut at existing joints wherever possible.
- 3.4.3 Contaminated soil shall be removed from each property by an iterative process of field soil sampling followed by excavation. Excavation shall initially proceed based on field soil sample results and continue based on successive field soil sample

results. Excavation shall cease when field soil sample results indicate that remediation criteria have been met.

- 3.4.4 Excavations shall be shored or sloped as indicated on the design drawings.
- 3.4.5 If contamination extends below the bottom of a footing of a structure, the structure shall be supported as needed prior to excavation and any related demolition. Supports and excavation methods for this situation shall be in accordance with the design drawings and subcontract documents.
- 3.4.6 If unidentified utility lines are encountered during excavation, work in the immediate area of the utility line shall cease until the line is properly identified and isolated.
- 3.4.7 If buried fuel oil tanks are encountered during excavation, the Bechtel site superintendent (SS) shall be notified. Removal of buried tanks, if encountered, shall be in compliance with appropriate federal, state, and local regulations.
- 3.4.8 If unusual odors or soil staining is observed during excavation, excavation shall cease and the SS shall be notified.
- 3.4.9 Upon completion of excavation, subsurface basement walls, foundation elements and utility conduits which have not been removed, shall be decontaminated to below the remedial action criteria for surface contamination. Methods of decontamination shall not generate airborne dust nor excessive wastewater.

### 3.5 DRAINAGE AND DEWATERING

- 3.5.1 Surface water shall be diverted away from excavations by means of temporary berms or dikes, as shown on the design drawings. Diversion of surface water shall not cause nuisance conditions or damage to adjacent properties.
- 3.5.2 Excavation dewatering, if required, shall be in accordance with the design drawings.
- 3.5.3 Any groundwater or surface water control systems installed during excavation shall be maintained throughout backfilling and restoration operations.



### 3.6 BACKFILL PREPARATION

- 3.6.1 Backfill operations shall not begin until site areas have been fully remediated, as determined by an independent verification contractor. Backfill operations for each property will commence only upon approval by Bechtel. Remediated areas shall be isolated from the contaminated areas to prevent recontamination.
- 3.6.2 The subgrade on which backfill is to be placed shall be free from vegetation, roots, debris, and organic material.
- 3.6.3 Backfill shall not be placed on snow, ice, standing water, frozen ground surfaces or muddy surfaces.
- 3.6.4 Subgrades with slopes steeper than one vertical to four horizontal on which backfill is to be placed shall be plowed, scarified, or benched in such a manner that the backfill material will either bond with or key into the subgrade. The subgrade shall be wetted or dried as necessary to obtain a good bonding surface.

### 3.7 BORROW

When a sufficient quantity of salvageable backfill material is not available, backfill material conforming to the requirements in section 2.1 shall be obtained from an offsite borrow source as approved by Bechtel.

### 3.8 PLACEMENT AND COMPACTION

- 3.8.1 Backfilling shall be coordinated with other restorative construction, utility hook-ups, and building inspections.
- 3.8.2 Backfill placement shall conform to the specified lines, grades, sections and elevations shown on the contract drawings. Grading tolerances shall be plus or minus 0.1 feet for all exposed surfaces of backfill unless otherwise indicated on the design drawings. Grading shall not create swales or areas where ponding of water will occur.
- 3.8.3 Backfill material shall be placed in horizontal lifts not exceeding 8 inches in loose thickness or 6 inches in compacted thickness. Structural backfill shall be compacted to 95% of the maximum density determined by ASTM D 698. General backfill shall be compacted to 85% of the maximum density determined by ASTM D 698.

Density tests shall be performed in accordance with section 3.13 of this specification. Test results shall be submitted in accordance with section 1.6.

- 3.8.4 Heavy compaction equipment such as sheepsfoot rollers, pneumatic-tire rollers, steel wheel rollers, etc., shall not be used within 5 feet of existing structures.

### 3.9 CAPILLARY WATER BARRIER

Capillary water barriers under concrete floors and slabs on grade shall be placed as indicated on the design drawings, and shall be compacted with a minimum of two passes of a hand-operated plate-type vibratory compactor. The thickness of the barrier shall be as shown on the design drawings.

### 3.10 TOPSOIL REPLACEMENT

Topsoil shall be replaced to a minimum thickness of 6 inches with material conforming to the requirements of section 2.3.1. Surfaces to receive topsoil shall be free of materials that would hinder planting or maintenance operations. Topsoil shall not be placed when the subgrade is frozen, excessively wet or dry, or in a condition otherwise detrimental to seeding, planting, or proper grading. The subgrade shall be pulverized to a depth of 2 inches by disking or plowing for the bonding of topsoil with the subgrade soil. Topsoil shall then be uniformly spread, graded, and compacted to the lines and grades shown on the drawings. Topsoil shall be compacted by one pass of a roller weighing 100 to 160 pounds per linear foot.

### 3.11 UTILITY AND DRAIN TRENCHES

Trenches for underground utilities systems and drain lines shall be excavated to the required alignments and depths. The bottoms of trenches shall be graded to secure the required slope and shall be tamped if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Bedding and backfill material shall not contain rocks larger than 1/2 inch. Compaction over utility trenches shall be to the percent of maximum density indicated on the design drawings.

### 3.12 FINAL GRADES

Final grades shall be constructed with a grading tolerance of plus or minus 0.1 feet. All fill areas shall be uniformly smoothed and graded to match adjoining grades. Graded areas within 2 feet of building structures shall be sloped at a minimum of 2 percent away from the structure to facilitate

drainage. If necessary, minor adjustments in lines or grades will be acceptable due to discrepancies on the drawings or in order to obtain satisfactory construction.

### 3.13 SOIL TESTING

Soil testing shall be in accordance with the following table:

TEST	METHOD	LOCATION	FREQUENCY	NOTES
Compaction Curve	ASTM D 698	Borrow Source	Every 5000 cubic yards.	(A)
Soil Classification	ASTM D 2487	Borrow Source	Every 5000 cubic yards.	(A)
Dry Density-Nuclear Methods	ASTM D 2922	Compacted Fill	One test for every 4000 sq.ft. of lift area.	(B) (C)
Dry Density-Verification Methods	ASTM D 1556 ASTM D 2167 ASTM D 2937	Compacted Fill	One test for every 20 nuclear tests.	(D) (E)


#### NOTES:

- (A) A minimum of one test per borrow source shall be performed.
- (B) Instrument shall be calibrated and operated in accordance with the manufacturer's instructions.
- (C) Probe depth shall be 6 inches.
- (D) Only one of the test methods is required. The appropriate test for the soil conditions shall be performed.
- (E) Density obtained by nuclear methods should be within 10% of density obtained by verification methods.

**TECHNICAL SPECIFICATION  
FOR  
SHORING, SHEETING, AND STRUCTURAL TIMBER**

**FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM  
(FUSRAP)**

**BY  
BECHTEL NATIONAL, INC.  
OAK RIDGE, TENNESSEE**

0	2-17-95	ISSUED FOR USE	<i>MPB</i>	<i>KR</i>	<i>EGS</i>
REV.	DATE	REASON FOR REVISION	BY	CHECK	EGS PE
ORIGIN				JOB NO. 14501	
				SPECIFICATION NO.	REV.
				138-SP505-004	0
				Sheet 1	of 10

**TECHNICAL SPECIFICATION  
FOR  
SHORING, SHEETING, AND STRUCTURAL TIMBER**

**1.0 GENERAL**

- 1.1 SUMMARY
- 1.2 ABBREVIATIONS AND ACRONYMS
- 1.3 RELATED SPECIFICATION
- 1.4 REFERENCES
- 1.5 SUBMITTALS
- 1.6 DELIVERY AND STORAGE

**2.0 PRODUCTS**

- 2.1 LUMBER AND SHEETING
- 2.2 SLOPE STABILIZATION
- 2.3 SHEET PILING
- 2.4 ACCESSORIES AND NAILS

**3.0 EXECUTION**

- 3.1 GENERAL REQUIREMENTS
- 3.2 FIELD OPERATIONS
- 3.3 ERECTION REQUIREMENTS
- 3.4 INSTALLATION OF SHEET PILING

**TECHNICAL SPECIFICATION**  
**FOR**  
**SHORING, SHEETING, AND STRUCTURAL TIMBER**

**1.0 GENERAL****1.1 SUMMARY**

This specification defines the technical requirements for shoring, sheeting, sheet piling, and temporary support system as necessary for excavation and demolition work.

**1.2 ABBREVIATIONS AND ACRONYMS**

The abbreviations listed below, where used in this specification, shall have the following meanings:

AITC	American Institute of Timber Construction
ASTM	American Society for Testing and Materials
BOCA	Building Officials and Code Administrators International, Inc.
FS	Federal Specifications
NFOR	National Forest Products Association
OSHA	Occupational Safety and Health Administration
SS	Bechtel Site Superintendent

**1.3 RELATED SPECIFICATION**

Technical specification "Earthwork," 138-SP505-003.

Technical specification "Concrete, Forming, and Reinforcement," 138-SP505-005.

**1.4 REFERENCES**

Unless otherwise specified or shown, the following specifications, guides, test methods, codes, and standards of the latest issue at the time of the bid shall apply to the extent indicated herein.

The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the abbreviations shown in the list below.

Specification  
14501-138-SP505-004

**AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)**

AITC-01 Timber Construction Manual

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

ASTM A 307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

ASTM A 328 Standard Specification for Steel Sheet Piling

ASTM A 857 Steel Sheet Piling, Cold-formed Light Gage

ASTM C 79 Standard Specification for Gypsum Sheathing Board

**FEDERAL SPECIFICATIONS (FS)**

FS-FF-N Nails, Brads, Staples, and Spikes: Wire, cut and Wrought

**NATIONAL FOREST PRODUCTS ASSOCIATION (NFOR)**

NFOR National Design Specification for Wood Construction

WCD NO 1 Manual For Wood Frame Construction

**OTHER REFERENCES**

BOCA Building Officials and Code Administrators International, Inc.

NJDOT New Jersey Department of Transportation

OSHA Occupational Safety and Health Administration Part 29 CFR 1910 and Part 29 CFR 1926

UCC State of New Jersey Uniform Construction Code Act and Regulations Book

**1.5 SUBMITTALS**

All submittals (e.g., drawings, data, tests, catalog cuts, samples, and material lists) shall be in accordance with this specification and the Subcontractor Submittal Requirements Summary (SSRS) as specified in Part VI of the Subcontract documents. Bechtel will determine if documentation is complete as submitted and reserves the right to reject and

require resubmittal of any document that does not meet the requirements.

#### 1.5.1 Certificates of Compliance

Certificates of compliance shall be provided, that state the material(s) meets or exceeds the requirements, appropriate specification, guides, test methods, codes, and standards for shoring, sheeting, sheet piling, and other related items. The description of pile driving equipment to be employed in the work with the manufacturer's name, model numbers, capacity, rated energy, hammer detail cushion material, helmet, and templates shall be submitted for approval to Bechtel.

#### 1.6 DELIVERY AND STORAGE

Material shall be delivered, handled, stored, and protected to avoid contact with soil or contaminating material in order to minimize deterioration and contamination.

#### 2.0 PRODUCTS

##### 2.1 LUMBER AND SHEETING

Materials shall bear the grademark, stamp, or other identifying marks indicating grades of material and rules or standards under which the material was produced. The inspection agency for lumber shall be certified by the Board of Review, American Lumber Standards Committee, to grade species used. Except for structural laminated members, plywood, and lumber, bundle marking will be permitted in lieu of marking each individual piece.

Timber bracing, shoring, and other shoring methods will be performed in conformance with OSHA Part 29 CFR 1926 and shall be stamped structural grade Southern Pine or Douglas Fir.

Allowable stresses for designing of members and fastenings shall conform to AITC-01. Other stress-graded or dimensioned items such as blocking, carriages, sleepers, and studs, shall be standard or No. 2 grade, except that studs may be Stud Grade.

##### 2.2 SLOPE STABILIZATION

Concrete for slope stabilization and protection shall conform to the requirements of Specification 138-SP505-003.



### 2.3 SHEET PILING

Steel sheet piles shall be new or like-new conforming to ASTM A 328. The interlock of sheet piling shall be free-sliding, allow a swing angle of at least 5 degrees when threaded, and maintain continuous interlocking when installed. Steel plates, bolts, nuts, and washers shall conform to the requirements of Specification 138-SP505-007.

### 2.4 ACCESSORIES AND NAILS

Accessories and nails shall conform to the following:

- Anchor Bolts: ASTM A 307 size as indicated, complete with nuts and washers.
- Bolts: lag, toggle, and miscellaneous bolts and screws. Type, size, and finish best suited for intended use.
- Clip Angles: steel angles, best suited for intended use or zinc-coated steel or iron commercial clips designed for connecting wood members.
- Expansion Shields: type and size best suited for intended use.
- Joist Hangers: steel or iron zinc-coated; size to fit members where used, with sufficient strength to develop the full strength of supported member, complete with any special nails required.
- Metal Bridging: optional to wood bridging; zinc-coated steel; size and design to provide rigidity equivalent to specified wood bridging.
- Nails and Staples: FS FF-N-105, size and type best suited for purpose. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1-inch-thick lumber and for toe nailing 2-inch-thick lumber; 16-penny or larger nails shall be used for nailing through 2-inch-thick lumber. Nails used with treated lumber and sheathing shall be galvanized.
- Timber Connectors: unless otherwise specified, in accordance with NFOR-01 or AITC-01.

**3.0 EXECUTION****3.1 GENERAL REQUIREMENTS**

All shoring shall comply, at a minimum, with the following criteria:

- OSHA Part 29 CFR 1926, subpart P, Excavations
- Adequate capacity of its structural elements to sustain the stresses imposed on them
- Ability to transmit acting forces to other structures, embankments, or soil in such a way that the stresses imposed on them are within their structural tolerances
- Adequate support in a manner that deflections, displacements, or settlements of the supported structures are within code allowables

**3.2 FIELD OPERATIONS**

Any damage resulting from failure of shoring or inadequate shoring of temporary supports shall be corrected with no addition to the cost.

Members shall be closely fitted, accurately set to required lines and levels, and rigidly secured in place. Nailing shall be in accordance with the recommended Nailing Schedule as contained in NFOR-02. Where detailed nailing recommendations are not specified, nail size and nail spacing shall be sufficient to develop an adequate strength for the connection without splitting the members. Installation of timber connections shall conform to applicable requirements of NFOR-01. Members shall be framed for passage of ducts, and pipes shall be cut, notched, or bored in accordance with applicable requirements of NFOR-02.

**3.3 ERECTION REQUIREMENTS****3.3.1 Structural Members**

Members shall be adequately braced during erection. Members shall be aligned and all connections completed before removal of bracing.

### 3.3.2 Shoring

Excavation shoring shall be constructed along the lines indicated on the subcontract drawings. The purpose of the shoring is as follows and shall be in accordance with OSHA Part 29 CFR 1926:

- To limit the material to be excavated and therefore disposed,
- To protect the worker,
- To protect against damage to structures,
- To protect against damage to public streets,
- To protect against sloughing, and
- To insure the stability of the limits of the excavations.

Excavation shoring shall be adequate to withstand all pressures to which it will be subjected. Any movement or bulging which may occur shall be corrected to provide the required clearances and dimensions.

Each structure shall be inspected to determine the type of support system to utilize for construction. The method(s) selected shall be based on the structural survey and existing soil conditions.

The selected method(s) of shoring shall be submitted for approval as specified in Part VI of the subcontract documents.

Provisions shall be made to repair any damage to the support system for completing the work as specified, without additional compensation.

All temporary shoring shall be removed upon completion of work.

### 3.3.3 Sheeting

Excavation sheeting shall be driven by a vibratory hammer or impact hammer in such a manner as not to subject the sheeting to damage and to insure interlocking throughout their length. Bracing shall be installed within a maximum deviation of 3 inches from the design plan location. In the event that any bracing interlock becomes disengaged or damaged, the work shall be completed as shown and specified.

In order to limit rainfall run-off from entering the excavation, sheeting shall be driven or cut off so as to project at least 8 inches above the existing grade.

Upon completion of work, sheeting adjacent to existing streets shall be cut off 3 feet below finished grade. All other sheeting shall be removed unless directed otherwise. The sheeting must be decontaminated prior to removal from the site. All voids caused by withdrawal of bracing shall be immediately refilled with sand by ramming tools specifically adapted to that purpose.

Sufficient openings shall be provided in sheeting along streets to restore existing utility connections.

#### 3.3.4 Shoring and Temporary Support

Where excavations are made adjacent to or under existing buildings or structures or paved streets, protective measures shall be taken to preserve the foundation subgrade, street subgrade and structure; such measures may include the use of geo-textiles, pumping-in concrete, temporary shoring or other means to ensure protection. These measures will require prior approval.

### 3.4 INSTALLATION OF SHEET PILING

The sheet piling shall be designed to suit site conditions and submit to Bechtel for approval.

#### 3.4.1 Pile Hammer

A pile hammer shall be used having a delivered force or energy suitable for the total weight of the pile and the character of subsurface material to be encountered. Hammer shall be operated at the rate(s) recommended by the manufacturer throughout the entire driving period and in accordance with local noise control ordinances. Structural framing shall be sufficiently rigid to resist lateral and driving force and to adequately support the sheet piling until design tip elevation is achieved. Piles shall be extended as required to reach the top elevation by splicing. Splice piles shall be interlocked with connecting alignment so that there are no discontinuities, dips, or camber at the abutting interlocks.

Specification  
14501-138-SP505-004

### 3.4.2 Installation Records

A pile driving record shall be maintained and submitted to Bechtel. Installation record shall indicate installation dates and times, type and size of hammer, rate of operation, total driving time, dimensions of driving helmet and cap used, blows required per foot for each foot of penetration, pile locations, tip elevations, ground elevations, cut-off elevations, and any reheading or cutting of piles.

**TECHNICAL SPECIFICATION  
FOR  
CONCRETE, FORMING, AND REINFORCEMENT**


FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

(FUSRAP)

BY

BECHTEL NATIONAL, INC.

OAK RIDGE, TENNESSEE

0	2-17-95	ISSUED FOR USE	<i>MPB</i>	<i>dkl</i>	<i>SE</i>	<i>Rao</i>
REV.	DATE	REASON FOR REVISION	BY	CHECK	EGS	PE
ORIGIN			JOB NO. 14501			
			SPECIFICATION NO.			REV.
			138-SP505-005			0
			Sheet 1 of 22			

**TECHNICAL SPECIFICATION**  
**FOR**  
**CONCRETE, FORMING, AND REINFORCEMENT**

**1.0 GENERAL**

- 1.1 SUMMARY
- 1.2 ABBREVIATIONS-AND ACRONYMS
- 1.3 RELATED SPECIFICATIONS
- 1.4 REFERENCES
- 1.5 SUBMITTALS
- 1.6 DELIVERY AND STORAGE
- 1.7 QUALITY ASSURANCE

**2.0 PRODUCTS**

- 2.1 FORMWORK
- 2.2 REINFORCING STEEL
- 2.3 CONCRETE WORKS
- 2.4 GROUT
- 2.5 JOINTS

**3.0 EXECUTION**

- 3.1 FORMS
- 3.2 REINFORCEMENTS
- 3.3 WELDED-WIRE FABRIC
- 3.4 DOWELS
- 3.5 PREPARATION OF CONCRETE SURFACES
- 3.6 PLACING CONCRETE
- 3.7 CURING AND PROTECTION
- 3.8 REMOVAL OF FORMS
- 3.9 FINISHING OF FORMED SURFACES
- 3.10 MISCELLANEOUS CONCRETE ITEMS
- 3.11 FLOOR SLAB FINISH
- 3.12 JOINTS
- 3.13 WATERSTOPS

**TECHNICAL SPECIFICATION**  
**FOR**  
**CONCRETE, FORMING, AND REINFORCEMENT**

**1.0 GENERAL**

**1.1 SUMMARY**

This specification defines the technical requirements for concrete work, formwork, and reinforcement.

The following items are also covered by this specification:

Formwork, accessories, and installment;  
Concrete reinforcement and accessories;  
Placement, curing, and finishing of concrete;  
Nonshrink grout;  
Waterstops;  
Vapor barriers;  
Crack control (contraction joints);  
Expansion joints;  
Bond between the concrete placements (construction joints); and  
Concrete side walks, curbs, gutters, and aprons.

**1.2 ABBREVIATIONS AND ACRONYMS**

The abbreviations listed below, where used in this specification, shall have the following meanings:

ANSI	American National Standards Institute
ASTM	American Society For Testing and Materials
ACI	American Concrete Institute
AWS	American Welding Society
BOCA	Building Officials and Code Administrators International, Inc.
COE	Corps of Engineers



CRSI	Concrete Reinforcing Steel Institute
DOC	Department of Commerce
NJ	New Jersey
NJDOT	New Jersey Department of Transportation
NRMCA	National Ready-mixed Concrete Association
PVC	Polyvinyl Chloride
SS	Bechtel Site Superintendent
SSRS	Subcontractor Submittal Requirements Summary
UCC	State of New Jersey Uniform Construction Code Act and Regulations Book

**1.3 RELATED SPECIFICATIONS**

Technical specification "Earthwork," 138-SP505-003  
 Technical specification "Masonry," 138-SP505-006

**1.4 REFERENCES**

Unless otherwise specified or shown, the following specifications, guides, test methods, codes, and standards of the latest issue at the time of the bid shall apply to the extent indicated herein.

The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the abbreviations shown in the list below.

**AMERICAN CONCRETE INSTITUTE (ACI)**

ACI-301	Structural Concrete for Building
ACI-304R	Measuring Mixing, Transporting, and Placing Concrete
ACI-305R	Hot Weather Concreting
ACI-306R	Cold Weather Concreting
ACI-308	Standard Practice for Curing Concrete
ACI 318/318R	Building Code Requirements for Reinforced Concrete
ACI-347R	Guide to Formwork for Concrete

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

ASTM A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
------------	---

Specification  
14501-138-SP505-005

ASTM A 497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	Deformed and Plain Billet - Steel Bars for Concrete Reinforcement
ASTM A 675	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
ASTM A 706	Low-Alloy Steel Deformed Bars for Concrete Reinforcement
ASTM C 33	Concrete Aggregates
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 94	Ready-Mixed Concrete
ASTM C 150	Portland Cement
ASTM C 260	Air Entraining Admixtures for Concrete
ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Chemical Admixture for Concrete
ASTM C 1107	Packaged Dry, Hydraulic-Cement Grout (nonshrink)
ASTM D 1751	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction
ASTM D 2103	Polyethylene Film and Sheeting

**CORPS OF ENGINEERS (COE)**

COE CRD-C 513	Rubber Waterstops
COE CRD-C 572	Polyvinylchloride Waterstops

**OTHER REFERENCES**

ANSI A135.4	Basic Hardboard
BOCA	Building Officials and Code Administrators International, Inc.

CRSI MSP-1	Manual of Standard Practice
DOC PS 1	Construction and Industrial Plywood
NJDOT	Standard Specifications for Road and Bridge Construction
NRMCA TMMB 1	Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards
UCC	State of New Jersey Uniform Construction Code Act and Regulations Book

### 1.5 SUBMITTALS

All submittals (e.g., drawings, data, tests, catalog cuts, samples, and material lists) shall be in accordance with this specification and the Subcontractor Submittal Requirements Summary (SSRS) as specified in Part VI of the Subcontract documents. Bechtel will determine if documentation is complete as submitted and reserves the right to reject and require resubmittal of any document that does not meet the Subcontract requirements.

#### Certificates of Compliance

Certificates of compliance shall be provided, that state the material(s) meets or exceeds the requirements of appropriate specifications, guides, test methods, codes, and standards for formwork, reinforcement, joints, concrete materials, concrete mix, and other related concrete items.

### 1.6 DELIVERY AND STORAGE

#### 1.6.1 Sealants

Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

#### 1.6.2 Reinforcements

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

**1.7 QUALITY ASSURANCE**

Perform concrete work in accordance with ACI-301.

A copy of ACI-301 shall be maintained on site.

**2.0 PRODUCTS****2.1 FORMWORK****2.1.1 Form Materials**

Forms for Class B finished surfaces shall be plywood panels conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels.

Forms for Class D finished surfaces, except where concrete is placed against earth, shall be the specified concrete form plywood, lumber, or other approved concrete form material.

**2.1.2 Form Ties**

Form ties shall be factory-fabricated metal ties, of the removable or internal disconnecting or snap-off type, and of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inch in diameter.

**2.1.3 Form Releasing Agents**

Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

**2.2 REINFORCING STEEL**

Reinforcing steel shall be deformed bars conforming to ASTM A 615 or ASTM A 706. Grades and sizes shall be as indicated in the Subcontract documents.

**2.2.1 Welded Wire Fabric**

Welded wire fabric shall conform to ASTM A 185, Plain type; or ASTM A 497, Deformed type. The fabric shall be in coiled rolls or flat sheets and have an uncoated finish.

**2.2.2 Wire Ties**

Wire ties shall be 16-gauge or heavier black annealed steel wire.

**2.2.3 Supports**

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks. Precast concrete blocks shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

**2.2.4 Dowels**

Dowels shall conform to ASTM A 675, Grade 80.

**2.3 CONCRETE WORKS****2.3.1 Concrete Materials**

Cement:

ASTM C 150, Type 1 Portland cement (unless specified otherwise on the subcontract drawings).

Fine and Coarse Aggregates:

ASTM C 33, size 467 for coarse aggregates.

Water:

Clean and not detrimental to concrete.

**2.3.2 Admixtures**

Calcium Chloride:

Calcium chloride or admixtures containing more than 0.1% chloride ions shall not be permitted. Written conformance to the chloride ion content will be required from the admixture manufacturer prior to mix design.

**Air-Entrainment:**

Air-entraining admixtures for Portland cement concrete shall conform to ASTM C 260.

Admixtures for higher strength or rapid curing shall conform to ASTM C 494.

Plasticizer (or Super Plasticizer) shall conform to ASTM C 494.

Flowing concrete admixture shall conform to ASTM C 494.

**2.3.3 Accessories**

**Vapor Barrier:**

Polyethylene sheeting, 6 mil thickness meeting the requirements of ASTM D 2103.

**Caulking and Sealants:**

See subcontract drawings.

**2.3.4 Curing Materials**

**Water:**

Clean and potable. Water for curing shall not contain any substance injurious to concrete, or which causes staining.

**Membrane Curing Compound:**

Clear, non-yellowing curing compound, in conformance with ASTM C 309. Must not hinder the bonding of adhesives for floor tile or carpet.

**2.3.5 Concrete Mix**

- A. Concrete shall be mixed in accordance with ASTM C 94.
- B. Structural Concrete (e.g., footings, walls, beams, etc.) (unless otherwise noted on the subcontract drawings):

- 1. Compressive strength @ 28 days:  
3000 psi (as determined in accordance with ASTM C 39).
- 2. Slump:  
3 inch maximum (unless Plasticizer is used).
- 3. Total air content by volume:  
5 to 7 percent.

C. Floor Slabs and others:

- 1. Compressive strength @ 28 days:  
3000 psi (as determined in accordance with ASTM C 39).
- 2. Slump:  
4" max.
- 3. Total air content by volume:  
5 to 7 percent.

D. Sidewalks, Driveways, Porches, Steps, Stairs, Curbs, Gutters, and Aprons:

- 1. NJDOTS's Standard Specification Sections 607 and 914.
- 2. Portland Cement Concrete shall be Class B.
- 3. Compressive strength @ 28 days shall be 4000 psi.

E. Air entraining agent shall be added to mix for concrete exposed to freeze-thaw cycling.

2.4 GROUT

2.4.1 Drypack Grout

Drypack mix shall use 1" - 1½" size aggregate or approximately 1/4" smaller than the dimension of the spacing. The "paste" shall consist of one part sand to one part cement, with just enough water so that it retains its shape when squeezed in the hand.

**2.4.2 Nonshrink Grout**

Nonshrink grout shall conform to ASTM C 1107, Grade A, and shall be a formulation suitable for the application.

**2.5 JOINTS**

**2.5.1 Contraction-Joint Strips**

Contraction-joint strips shall be 1/8-inch thick tempered hardboard conforming to ANSI A135.4-82, Class 1. In lieu of hardboard strips, rigid PVC insert strips specifically designed to induce controlled cracking in slabs on grade may be used. Such insert strips shall have a removable top section.

**2.5.2 Expansion-Joint Filler**

Expansion-joint filler shall be premolded material conforming to ASTM D 1751-83. Unless otherwise indicated, filler material shall be 3/8-inch thick and of a width applicable for the joint formed. Sawed joint shall be used as specified in Section 3.12.

**2.5.3 Waterstops**

Waterstops shall conform to CRD-C 513-74 or CRD-C 572-74.

**3.0 EXECUTION**

**3.1 FORMS**

**3.1.1 Formwork Design**

Formwork shall be designed in accordance with ACI-301 and the methodology of ACI-347R for anticipated loads, lateral pressures, and stresses. Forms shall be supported, braced, and maintained sufficiently rigid to prevent deformation under load.

**3.1.2 Installation**

Forms shall be mortar-tight, properly aligned and adequately supported to produce concrete surfaces specified in Section 2.1.1 and conforming to construction tolerance given in TABLE 1. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be reused if there is any evidence of surface wear and



**TABLE 1**  
**TOLERANCE FOR FORMED SURFACES**

1.	Variations from the plumb:	In any 10 feet of length-----1/4 in
a.	In the lines and surfaces of columns, piers, walls, and in arises	Maximum for entire length---1 in
2.	Footings:	
a.	Variation of dimensions in plan	Minus -----1/2 in Plus -----2 in
3.	Variations from the level or from the grades indicated on the drawings:	In any 10 ft of length-----1/4 in
a.	In slab and in arises	Maximum for entire length---3/4 in
4.	Variation in steps:	Riser-----1/8 in
a.	In a flight of stairs	Tread-----1/4 in
b.	In consecutive steps	Riser-----1/16 in Tread-----1/8 in
5.	Variation in cross-sectional dimensions of columns and in the thickness of slabs & walls	Minus-----1/4 in Plus-----1/2 in

tear or defects which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond breaker.

**3.1.3 Chamfering**

Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms. The size shall be as shown on Subcontract Drawings.

**3.1.4 Coating**

Finished surfaces of forms shall be coated with a form-releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

**3.1.5 Removal of Forms**

Forms shall be removed in a manner that will prevent injury to the concrete and ensure the complete safety of the structure. Formwork for columns, walls, sides of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement.

**3.2 REINFORCEMENT**

Reinforcement shall be fabricated to shapes and dimensions shown on the Subcontract Drawings and shall conform to the requirements of ACI-318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety.

**3.2.1 Placement**

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce

bond with the concrete. Reinforcement shall be placed in accordance with ACI-318 at locations shown on the Subcontract Drawings. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI-318. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

### 3.2.2 Splicing

Splices of reinforcement shall conform to ACI-318 and shall be made only as required. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

### 3.3 WELDED-WIRE FABRIC

Welded-wire fabric shall be placed in slabs as indicated on the Subcontract Drawings. Fabric placed in slabs on grade shall be continuous between expansion, construction, and construction joints. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of supports.

### 3.4 DOWELS

Dowels shall be installed in slabs on grade at right angles to the joint being doweled. Dowels shall be accurately aligned parallel to the finished concrete surface and

rigidly supported during concrete placement. One end of each dowel shall be coated with a bond breaker.

### 3.5 PREPARATION OF CONCRETE SURFACES

#### 3.5.1 Preparation of Surfaces

Surfaces to receive concrete shall be clean and free from frost, ice, and water. Conduit and other similar items shall be in place and clean of any deleterious substance.

#### 3.5.2 Foundations

Earthwork for foundation shall be as specified in Technical Specification for "Earthwork," 138-SP505-003.

#### 3.5.3 Vapor Barrier

Unless otherwise indicated subgrades for slabs shall be covered with a vapor barrier. Vapor barrier edges shall be lapped at least 4 inches and ends shall be lapped not less than 6 inches. Patches and lapped joints shall be sealed with pressure-sensitive adhesive or tape not less than 2 inches wide and compatible with membrane.

#### 3.5.4 Preparation of Previously Placed Concrete

Concrete surfaces to which other concrete is to be bonded shall be roughened in a manner that will expose sound aggregate uniformly without damaging the concrete.

Laitance and loose particles shall be removed. Surfaces shall be moist but without free water when concrete is placed.

### 3.6 PLACING CONCRETE

All concrete shall be measured, transported and placed in accordance with ACI-304 and as herein specified.

#### 3.6.1 Preparation

Access shall be provided for delivery of concrete. Sufficient equipment and manpower shall be provided to rapidly place all concrete.

Ready-mixed concrete shall be batch, mixed, and transported in accordance with ASTM C 94, except as otherwise specified. Truck mixers, agitators, and non-agitating units shall comply with NRMCA TMMB 1.

Prior to placing concrete, formwork shall have been completed and snow, ice, water and debris shall be removed from within forms.

Water shall be sprinkled sufficiently to eliminate water loss from the concrete. Concrete shall not be placed on frozen ground.

Before fresh concrete is placed against hardened concrete, laitance and loose or damaged materials shall be removed and surfaces dampened with water.

### 3.6.2 Pre-Placement Inspection

Before placing concrete, the formwork installation, reinforcing steel, and items to be embedded or cast-in shall be inspected and completed. Other crafts shall be notified to permit the installation of their work. Cooperation shall be maintained with other trades in setting such work as required.

### 3.6.3 Conveying

Concrete shall be handled from mixer to final deposit rapidly by methods which will prevent segregation or loss of ingredients to maintain required quality of concrete.

### 3.6.4 Placing

Concrete shall be placed before initial set. Concrete placement shall not be permitted when weather conditions prevent proper placement and consolidation. The method of depositing concrete shall be such as to avoid displacing the reinforcement and segregating the aggregate. Deposited concrete shall not be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be provided as specified in Section 3.12.4. Concrete shall be deposited as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.

Concrete shall be deposited in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined cold joints.

Concrete slabs shall be deposited and consolidated in a continuous operation, within the limits of joints, until the placing of a panel or section is completed. Slab surfaces shall be brought to the correct level with a

straightedge and strikeoff. Before bleed water begins to appear, bull floats shall be used to smooth the surface, leaving it free of humps or hollows. Water shall not be sprinkled on the plastic surface. The slab surfaces shall not be disturbed prior to beginning finishing operations.

Reinforcing shall be maintained in the proper position during concrete placement operations.

**3.6.5 Mechanical Vibrators**

High frequency mechanical vibrators shall be used to the extent necessary to obtain proper consolidation of the concrete. Care shall be taken to avoid segregation of aggregates by excessive vibration.

**3.6.6 Removal of Surface Water**

Water which accumulates on the surface of the concrete during placing shall be removed by drags or absorption with porous materials in a manner that prevents removal of cement.

**3.6.7 Cold Weather Requirements**

Special protection measures shall be used if freezing temperatures are anticipated during the specified curing period. The temperature of the concrete when placed shall be not less than 50°F nor more than 75°F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Follow the recommendations in ACI-306R.

**3.6.8 Hot Weather Requirements**

The temperature of the concrete placed during warm weather shall not exceed 85°F except where an approved retarder is used. The mixing water or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. In no case shall the placing temperature exceed 95°F. Follow the recommendations in ACI-305R.

**3.7 CURING AND PROTECTION**

**3.7.1 General**

Curing and protecting of concrete shall be in accordance with ACI-308. All concrete shall be cured by an approved method for the period of time given below:

Concrete with Type I, II, IP or IS cement: 7 days

Immediately after placement, concrete shall be protected from premature drying extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. Air and forms in contact with concrete shall be maintained at a temperature above 50°F for the first 3 days and a temperature above 32°F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. All materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat shall be permitted near or in direct contact with the concrete at any time.

**3.7.2 Moist Curing**

Concrete to be moist-cured shall be maintained continuously wet for the entire curing period. If water or curing materials used stains or discolors concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned. When wooden forms are left in place during curing, they shall be kept wet at all times. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Horizontal surfaces shall be cured by ponding, by covering with a 2 inch minimum thickness of continuously saturated sand, or by covering with waterproof paper, polyethylene sheet, polyethylene-coated burlap or saturated burlap.

**3.8 REMOVAL OF FORMS**

Forms shall be removed in a manner which will prevent damage to the concrete.

**3.9 FINISHING OF FORMED SURFACES**

**3.9.1 General**

After removal of forms, concrete surfaces shall be given one or more of the finishes specified below in locations indicated on drawings or herein after specified.

**3.9.2 Standard Rough Form Finish**

Unless otherwise shown or specified, standard rough form finish shall be used for formed concrete surfaces not exposed to view in the finish work or by other construction.

Surfaces shall be true to line and level. Tie holes and defects shall be patched and fins exceeding 1/4 inch rubbed down. Otherwise, surfaces shall be left with texture imparted by forms.

**3.9.3 Standard Smooth Form Finish**

Unless otherwise shown or specified, standard smooth form finish shall be used for formed concrete surfaces exposed-to-view or that are to be covered with a coating material applied directly to the concrete or a covering material bonded to the concrete, such as dampproofing, waterproofing, painting or other similar coating material.

**3.9.4 Smooth Rubbed Finish**

A smooth rubbed finish shall be provided to all exposed-to-view wall surfaces, which have received smooth form finish treatment, not later than one day after form removal.

Concrete surfaces shall be moistened and rubbed with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.

**3.10 MISCELLANEOUS CONCRETE ITEMS**

Holes and openings left in concrete structures for passage of work by other trades shall be filled in, unless otherwise shown or directed, after work of the other trades is in place. Concrete shall be mixed, placed, and cured as herein specified, to blend with in-place construction. Other miscellaneous concrete filling shown or required shall be provided to complete the work.



Monolithic finish shall be provided to interior curbs by stripping form while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

### 3.11 FLOOR SLAB FINISH

- A. Concrete floor surfaces shall be finished in accordance with ACI-301.
- B. Concrete shall be uniformly spread, screed, and floated. Grate tampers or mesh rollers shall not be used. Concrete shall be consolidated as herein specified.
- C. Final surface finish shall be a hard steel troweled finish.
- D. Tolerances:

Class A tolerance shall be provided to floor slabs according to ACI-301. Pitch to drains shall be 1/4 inch per foot.

### 3.12 JOINTS

Joints shall be installed at the required locations shown on the Subcontract Drawings.

#### 3.12.1 Contraction Joints

Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC insert strips into the plastic concrete or by cutting the concrete with a saw after concrete has set for a minimum of 6 hours to a maximum of 12 hours. Joints shall be approximately 1/8 inch wide and shall extend into the slab approximately one-fourth the slab thickness but not less than 1 inch.

#### 3.12.2 Sawed Joints

Joint sawing shall be performed early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Concrete-sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

### 3.12.3 Expansion or Isolation Joints

Premolded expansion joint filler shall be used in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces such as walls, and existing slabs. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8 inch radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dress-and-oiled wood strip temporarily-secured to the top to form a recess 3/4 inch deep which shall be filled with sealant. The wood strip shall be removed after the concrete has set. In lieu of the wood strip a removable expansion filler cap designed and fabricated for this purpose may be used.

### 3.12.4 Construction Joints

A construction joint shall be used if concreting is interrupted long enough for the placed concrete to harden. The location and requirements for construction joints shall be as specified in Section 6.4 of ACI-318. Unless otherwise indicated, reinforcing steel shall extend through construction joints. Construction joints in slabs on grade shall be keyed or doweled.

Lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints are required, a strip of 1 inch square-edge lumber, bevelled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed.

### 3.12.5 Joint Filler

Joint filler units shall be set at depth or position in joint to coordinate with other work. Voids or gaps shall not be left between ends of joint filler units.

### 3.12.6 Joint Sealant

Joint sealant shall be as directed by Subcontract Drawings.

126890

Specification  
14501-138-SP505-005

### 3.13 WATERSTOPS

Waterstops shall be installed per manufacturer's instructions. Adequate provision shall be made to support and completely protect the waterstops during the progress of the work. Any waterstop punctured or damaged shall be repaired or replaced. Splices shall be made in conformance with the recommendations of the waterstop manufacturer. Continuity of cross sectional features shall be maintained across the splice. Splices showing evidence of separation after bending shall be remade.

TECHNICAL SPECIFICATION

FOR  
MASONRY


FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

(FUSRAP)

BY

BECHTEL NATIONAL, INC.

OAK RIDGE, TENNESSEE

0	2-17-95	ISSUED FOR USE	MAB	RR	EGS	PE
REV.	DATE	REASON FOR REVISION	BY	CHECK	EGS	PE
ORIGIN 			JOB NO. 14501 SPECIFICATION NO. 138-SP505-006		REV. 0	
			Sheet 1		of 14	

**TECHNICAL SPECIFICATION****FOR****MASONRY****1.0 GENERAL**

- 1.1 SUMMARY
- 1.2 ABBREVIATIONS AND ACRONYMS
- 1.3 RELATED SPECIFICATIONS
- 1.4 REFERENCES
- 1.5 SUBMITTALS
- 1.6 DELIVERY AND STORAGE

**2.0 PRODUCTS**

- 2.1 CONCRETE MASONRY UNITS
- 2.2 MORTAR AND GROUT
- 2.3 AGGREGATES
- 2.4 JOINTS REINFORCEMENT, ANCHORS AND TIES

**3.0 EXECUTION**

- 3.1 ENVIRONMENTAL REQUIREMENTS
- 3.2 PREPARATION
- 3.3 COURSING
- 3.4 PLACING AND BONDING
- 3.5 REINFORCEMENT AND ANCHORAGES
- 3.6 LINTELS
- 3.7 GROUTED COMPONENTS
- 3.8 JOINTING
- 3.9 CONSTRUCTION AND CONTROL JOINTS
- 3.10 EMBEDDED ITEMS
- 3.11 MORTAR
- 3.12 REINFORCING STEEL
- 3.13 PLACING GROUT
- 3.14 PARING BASEMENT WALLS
- 3.15 DAMPPROOFING
- 3.16 CLEANING
- 3.17 PROTECTION

**TECHNICAL SPECIFICATION****FOR****MASONRY****1.0 GENERAL****1.1 SUMMARY**

This specification defines the technical requirements for Concrete masonry units, mortar, grout, and parging of basement walls.

**1.2 ABBREVIATIONS AND ACRONYMS**

The abbreviations listed below, where used in this specification, shall have the following meanings:

ASTM	American Society for Testing and Materials
ACI	American Concrete Institute
BOCA	Building Officials and Code Administrators International, Inc.
NJ	New Jersey
SS	Bechtel Site Superintendent
UCC	State of New Jersey Uniform Construction Code Act and Regulations Book

**1.3 RELATED SPECIFICATION**

Technical specification for "Concrete, Forming, and Reinforcement," 138-SP505-005.

**1.4 REFERENCES**

Unless otherwise specified or shown, the following specifications, guides, test methods, codes, and standards of the latest issue at the time of the bid shall apply to the extent indicated herein.

The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the abbreviations shown in the list below.

**AMERICAN CONCRETE INSTITUTE (ACI)**

ACI 530/ASCE 5	Building Code Requirements for Masonry Structures and Specifications for Masonry Structures
----------------	---

Specification  
14501-138-SP505-006

ACI SP-66 ACI Detailing Manual

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

ASTM A 82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A 153	Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware
ASTM A 366	Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
ASTM A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 67	Standard Test Methods of Sampling and Testing Brick and Structural Clay Tile
ASTM C 90	Standard Specification for Load-Bearing Concrete Masonry Units
ASTM C 140	Standard Methods of Sampling and Testing Concrete Masonry Units
ASTM C 216	Standard Specification for Facing Brick
ASTM C 270	Standard Specification for Mortar for Unit Masonry
ASTM C 476	Standard Specification for Grout for Masonry
ASTM C 641	Standard Test Methods of Staining Materials in Lightweight Concrete Aggregates
ASTM C 780	Standard Test Methods for Preconstruction and Construction Evaluation of Mortar for Plain and Reinforced Unit Masonry
ASTM C 1019	Standard Test Methods of Sampling and Testing Grout

**OTHER REFERENCES**

BOCA	Building Officials and Code Administrators International, Inc.
------	--

UCC State of New Jersey Uniform Construction  
Code Act and Regulations Book

## 1.5 SUBMITTALS

All submittals (e.g., drawings, data, tests, catalog cuts, samples, and material lists) shall be in accordance with this specification and the Subcontractor Submittal Requirements Summary (SSRS) as specified in Part VI of the Subcontract documents. Bechtel will determine if documentation is complete as submitted and reserves the right to reject and require resubmittal of any document that does not meet the requirements.

### 1.5.1 Certificates of Compliance

Certificates of Compliance shall be provided, that state the material(s) meets or exceeds the requirements of appropriate specifications and codes for masonry units, bricks, mortar, grout, and other related masonry items.

## 1.6 DELIVERY AND STORAGE

Material shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminated material.

### 1.6.1 Masonry and Brick Units

Concrete masonry units and bricks shall be covered or protected from inclement weather and shall conform to the moisture content as specified in ASTM C 90 when delivered to the site.

### 1.6.2 Reinforcement and Ties

Steel reinforcing bars, ties, and joint reinforcement shall be stored above the ground.

## 2.0 PRODUCTS

### 2.1 CONCRETE MASONRY UNITS

Hollow Load Bearing Units: ASTM C 90, Grade N, Type I, normal weight. Minimum equivalent thickness shall be determined in conformance with ASTM C 140.

Brick: ASTM C 216, Type FBS



**2.2 MORTAR AND GROUT**

Mortar: ASTM C 270, masonry cement Type S.

Grout: ASTM C 476. Coarse grout and grout slump shall be between 8 and 10 inches and shall conform to ASTM C 1019.

**2.3 AGGREGATES**

Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units, shall comply with the following requirement: when tested for stain-producing iron compounds in accordance with ASTM C 641 (visual classification method), the iron stain deposited on the filter paper shall not exceed the "light stain" classification.

**2.4 JOINT REINFORCEMENT, ANCHORS AND TIES****2.4.1 Horizontal Joint Reinforcement**

Steel reinforcing bars and uncoated ties shall be free from loose mill scale and rust. Prefabricated from cold-drawn steel wire conforming to ASTM A 82, of solid welded construction. Wire shall be zinc coated after fabrication by the hot-dip process conforming to ASTM A 153. Reinforcement shall be of truss design type with two (2) No. 9 gage deformed longitudinal wires and weld-connected with No. 12 gage diagonal cross wires, unless otherwise noted on the Subcontract drawings.

**2.4.2 Reinforcing Steel Bars**

Reinforcing steel bars shall be deformed steel conforming to ASTM A 615, Grade 60, and of sizes shown in the subcontract drawings. The bars shall be in accordance with the Technical Specification "Concrete, Forming, and Reinforcement," 138-SP505-005. Reinforcing bending details shall conform to the requirements of ACI SP-66.

**2.4.3 Anchors, Ties, and Accessories**

Anchors, ties, and accessories shall conform to the following specification:

- Sheet Metal Anchors and Ties (ASTM A 366)
- Wire Ties and Anchors (ASTM A 82)

**3.0 EXECUTION****3.1 ENVIRONMENTAL REQUIREMENTS**

Before erecting masonry when ambient temperature fall below 40°F, a written statement of proposed cold weather construction procedures shall be submitted for approval. Precautions shall be taken during cold and hot weather erection.

**3.1.1 Hot Weather Installation**

If the ambient air temperature is more than 99°F in the shade and the relative humidity is less than 50 percent, all masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 4 feet ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

**3.1.2 Cold Weather Installation**

If mean daily air temperature falls below 40°F, sand and mixing water shall be heated to produce mortar and grout temperatures between 40° and 120°F. Temperature of mortar on boards shall be maintained above freezing. Enclosure and auxiliary heat shall be provided to maintain air temperature above 32°F. Completed masonry and masonry not being worked on shall be protected from rain or snow for 24 hours by covering with weather-protective membrane if mean daily air temperature is between 40° and 25°F; masonry shall be covered with insulating blankets or equally protected to maintain a temperature of 32°F or above for 24 hours if mean daily air temperature is 25°F and below.

**3.2 PREPARATION**

Anchor bolts shall be properly sized and located.

Lines, levels, and coursing shall be established and protected from disturbance.

Temporary bracing of masonry shall be provided during erection of masonry and maintained in place until building structure provides permanent bracing. Bracing of walls shall be maintained until backfilling operations are complete. In no case shall supporting forms or shores be removed in less than 10 days.

### 3.3 COURSING

Unless otherwise noted on the design drawings, concrete masonry units shall be laid in running bond. One block unit and one mortar joint shall be coursed equal to 8 inches.

Masonry courses shall be maintained to uniform width. Vertical and horizontal joints shall be made equal and of uniform thickness, except where work is adjacent to existing walls, in which case existing coursing shall be matched.

Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved, in which case the tolerances shall be plus or minus 1/2 inch.

Tooled concave mortar joints shall be formed at all exposed wall conditions and flush joints at all other locations.

Units used in exposed masonry surfaces shall be free from chipped edges or other imperfections detracting from the appearance of the finished work.

Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below.

The tolerances for erection of masonry shall be in accordance with ACI 530.

### 3.4 PLACING AND BONDING

Masonry shall be laid in full bed of mortar, properly jointed with other work. Buttering corners of joints and deep or excessive furring of mortar joints are not permitted.

Intersections and external and internal corners shall be bonded.

After mortar has taken initial set, masonry units shall not be shifted or tapped. Where adjustments must be made, remove mortar and replace.

Excess mortar shall be removed.

Job site cutting shall be performed with masonry saw to provide straight unchipped edges, taking care to prevent breaking masonry unit corners or edges.

The tolerances for erection of masonry shall be in accordance with ACI 530.

### 3.5 REINFORCEMENT AND ANCHORAGES

Horizontal joint reinforcement shall be installed 16 inches o.c.

Lap joint reinforcement shall end at a minimum 6 inches and extend 16 inches at each side of openings.

Masonry joint reinforcement shall be placed in first and second horizontal joints above and below openings.

Joint reinforcement shall be placed continuous, in first and second joint below top of walls.

All anchor bolts shall be grouted solid in concrete block cores. Locations and length of anchor bolt projection shall be coordinated with the affected trade.

Intersecting walls shall be anchored by steel connectors having a minimum section of 1/4 inch by 1-1/2 inch with ends bent up at least 2 inches or with cross pins to form anchorage. Such anchors shall be at least 24 inches long and the maximum spacing shall be 4 feet.

The longitudinal wires of joint reinforcement shall be placed to provide not less than 5/8 inch cover to either face of the unit.

### 3.6 LINTELS

Loose lintels shall be installed.

Required minimum 4 inches bearing lengths shall be provided.

Precast lintels, unless otherwise shown, shall be reinforced with not less than two No. 4 bars for full lintel length. Reinforced lintels shall be used to span all openings over 12 inches wide in masonry. A minimum clearance of 3/4 inch shall be maintained between reinforcement and faces of units. Lintels shall have top labeled "TOP" and shall be identified to show location in work.

### 3.7 GROUTED COMPONENTS

Bond beams shall be reinforced with one No. 5 bar, 1 inch from bottom web.

Grout fill shall be placed and consolidated without disturbing reinforcing.

At bearing points, masonry cores shall be filled with grout minimum 12 inches from opening.

### 3.8 JOINTING

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as described below.

#### 3.8.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet area shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall. Joints in unparted masonry walls below grade shall be pointed tight. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.

#### 3.8.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

#### 3.8.3 Door and Window Frame joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.

#### 3.8.4 Joint Widths

Concrete masonry units shall have 3/8 inch joints. Same as prefaced concrete masonry units except the prefaced side shall have not less than 3/16 inch nor more than 1/4 inch wide. Brick joint widths shall be the difference between the actual and nominal dimensions of the brick in either height or length.

**3.9 CONSTRUCTION AND CONTROL JOINTS**

Horizontal joint reinforcing shall be continued across construction or control joints.

Sheet building paper bond breaker shall be used to form joint, with one side fitted to hollow contour of block unit end. Created core shall be filled with mortar fill. Joint at exposed faces shall be raked for backer rod and sealant.

**3.10 EMBEDDED ITEMS**

Spaces around built-in items shall be filled with mortar. Openings around flush-mount electrical outlet boxes in wet locations shall be pointed with mortar. Anchors, ties, wall plugs, accessories, flashing, pipe sleeves, and other items required to be built-in shall be embedded as the masonry work progresses. Anchors, ties, and joint reinforcement shall be fully embedded in the mortar. Cells receiving anchor bolts and cells of the first course below bearing plates shall be filled with grout. Mortar that has reached its initial set within 2 1/2 hours after mixing shall be used.

**3.11 MORTAR**

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but no more than 5 minutes. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability.

**3.12 REINFORCING STEEL**

Reinforcement shall be placed prior to grouting. Unless otherwise indicated, vertical wall reinforcement shall extend to within 2 inches of tops of walls.

**3.12.1 Positioning Bars**

Vertical reinforcing may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Column and pilaster ties shall be wired in position around the vertical steel. Ties shall be in contact with the vertical reinforcement and shall not be placed in horizontal bed joints.

### 3.13 PLACING GROUT

Cell containing reinforcing bars shall be filled with grout. Hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, and voids at door and window jambs shall be filled solid with grout.

Cells under lintel bearings on each side of openings shall be filled solid with grout for full height of openings. Walls below grade, lintels, and bond beams shall be filled solid with grout. Grout not in place within 1-1/2 hours after water is first added to the batch shall be discarded. Sufficient time shall be allowed between grout lifts to preclude displacement or cracking of face shells of masonry units. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt.

#### 3.13.1 Grouting Equipment

Grout Pumps:

Pumping through aluminum tubes will not be permitted. Pumps shall be operated to produce a continuous stream of grout without air pockets, segregation, or contamination. Upon completion of each day's pumping, waste materials and debris shall be removed from the equipment and disposed of outside the masonry.

Vibrators:

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. At least one spare vibrator shall be maintained at the site at all times. Vibrators shall be applied at uniformly spaced points not farther apart than the visible effectiveness of the machine. Duration of vibration shall be limited to time necessary to produce satisfactory consolidation without causing segregation.

### 3.14 PARGING BASEMENT WALLS

The outside face of below-grade exterior concrete-masonry unit walls enclosing usable rooms and space, except crawl spaces, shall be parged with portland cement mortar as described below.

Masonry walls shall be parged in two uniform coats. The first coat shall be 3/8-inch thick and the second coat shall be 1/4-inch thick, for a total of 5/8-inch thickness from top

of footing to a line 6 inches below adjacent finish grade. Masonry walls shall be dampened prior to application. Base coat shall be scarified to ensure full bond to subsequent final coat. Surface shall be steel-trowelled smooth and flat. Loose and damaged parging on existing walls shall be removed and repaired. Parging shall be damp-cured for 48 hours or more before dampproofing and backfilling. After parging has dried, dampproofing shall be applied so that the entire parged surface is covered.

### 3.15 DAMPPROOFING

#### 3.15.1

Dampproofing materials shall be installed on all exterior walls exposed by excavation, unless otherwise noted on the subcontract drawings.

#### 3.15.2

Exterior wall surface preparation, wall dampproofing materials, and application shall conform to all local building codes but, as a minimum, shall meet the following criteria:

- Dampproofing shall be a bituminous material specified by W. R. Meadow, Inc, or approved equal.
- Surface preparation of wall shall be in accordance with paragraph 3.14.

### 3.16 CLEANING

Excess mortar and smears shall be removed.

Defective mortar shall be replaced. Adjacent work shall be matched.

A non-acidic solution which will not harm masonry or adjacent materials shall be used to clean soiled surfaces. Consult masonry manufacturer for acceptable cleaners.

Nonmetallic tools shall be used in cleaning operations.

### 3.17 PROTECTION

Adjacent finished installations shall be protected.



Protective boards shall be maintained at exposed external corners of walls which may be damaged by construction activities.

Protection shall be provided without damaging completed work.

At day's end, unfinished walls shall be covered to prevent moisture infiltration. A non-staining waterproof covering or membrane shall be used when work is not in progress. Covering shall extend a minimum of 2 feet down on each side of wall and be held securely in place.


Sand shall be stored in a manner to prevent contamination.

Anchors, ties, joint reinforcement, and mortar shall be stored in a dry location.

TECHNICAL SPECIFICATION  
 FOR  
 STRUCTURAL STEEL

FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM  
 (FUSRAP)

BY  
 BECHTEL NATIONAL, INC.  
 OAK RIDGE, TENNESSEE

0	2-17-95	ISSUED FOR USE	<i>MPB</i>	<i>ALL</i>	<i>R</i>	<i>Res</i>
REV.	DATE	REASON FOR REVISION	BY	CHECK	EGS.	PE
ORIGIN				JOB NO. 14501		
				SPECIFICATION NO.		REV.
				138-SP505-007		0
				Sheet 1 of 7		

**TECHNICAL SPECIFICATION  
FOR  
STRUCTURAL STEEL**

**1.0 GENERAL**

- 1.1 SUMMARY
- 1.2 ABBREVIATIONS AND ACRONYMS
- 1.3 RELATED SPECIFICATION
- 1.4 REFERENCES
- 1.5 SUBMITTALS
- 1.6 DELIVERY AND STORAGE

**2.0 PRODUCTS**

- 2.1 STRUCTURAL STEEL
- 2.2 STEEL PIPE
- 2.3 STRUCTURAL TUBING
- 2.4 NORMAL STRENGTH BOLTS
- 2.5 HIGH STRENGTH BOLTS
- 2.6 LAG SCREWS
- 2.7 WELDING
- 2.8 MISCELLANEOUS STRUCTURAL SHAPES
- 2.9 PAINT

**3.0 EXECUTION**

- 3.1 FABRICATION
- 3.2 INSTALLATION

**TECHNICAL SPECIFICATION****FOR****STRUCTURAL STEEL****1.0 GENERAL****1.1 SUMMARY**

This specification defines the technical requirements for structural steel used for underpinning and support systems.

**1.2 ABBREVIATIONS AND ACRONYMS**

The abbreviations listed below, where used in this specification, shall have the following meanings:

AISC	American Institute of Society Steel Construction
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Standards
BOCA	Building Officials and Code Administrators International, Inc.
SS	Bechtel Site Superintendent
SSPC	Steel Structures Painting Council
SSRS	Subcontractor Submittal Requirements Summary
UCC	State of New Jersey Uniform Construction Code Act and Regulations Book

**1.3 RELATED SPECIFICATION**

Technical specification for "Concrete, Forming, and Reinforcement," 138-SP505-005.

**1.4 REFERENCES**

Unless otherwise specified, the following specifications, guides, test methods, codes, and standards of the latest issue at the time of the bid shall apply to the extent indicated herein.

The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the abbreviation shown in the list below.

Specification  
14501-138-SP505-007

**AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)**

AISC Manual of Steel Construction Allowable Stress Design

AISC Manual of Steel Construction Volume-II Connections

AISC Code of Standard Practice for Steel Buildings and Bridges

AISC S 335 Specification for the Structural Steel Buildings - Allowable Stress Design and Plastic Design

**AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)**

ASME B18.2.1 Square and Hex Bolts and Screws

ASME B18.21.1 Lock Washers

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

ASTM A 6 Standard Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use

ASTM A 36 Standard Specification for Structural Steel

ASTM A 53 Standard Specification for Pipe; Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A 307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

ASTM A 325 Standard Specification for High Strength Bolts for Structural Steel Joints

ASTM A 500 Standard Specification for Cold Formed, Welded and Seamless Carbon Steel Tubing in Rounds and Shapes

**OTHER REFERENCES**

AWS D 1.1 American Welding Standards (AWS), Structural Welding Code Steel

BOCA Building Officials and Code Administrators International, Inc.

UCC State of New Jersey Uniform Construction Code  
Act and Regulations Book

SSPC Paint 25 Steel Structures Painting Council

## 1.5 SUBMITTALS

All submittals (e.g., drawings, data, tests, catalog cuts, samples, and material lists) shall be in accordance with this specification and the Subcontractor Submittal Requirements Summary (SSRS) as specified in Part VI of the Subcontract documents. Bechtel will determine if documentation is complete as submitted and reserves the right to reject and require resubmittal of any document that does not meet the requirements.

### 1.5.1 Certificates of Compliance

Certificates of Compliance shall be provided, that state the material(s) meets or exceeds the requirements of appropriate ASTM Specifications for Structural Steel, Bolts, Nuts, Washers, Miscellaneous Steel, and other related structural steel items.

## 1.6 DELIVERY AND STORAGE

Material shall be delivered, handled, stored, and protected to avoid contact with soil or contaminated material in order to minimize deterioration.

## 2.0 PRODUCTS

### 2.1 STRUCTURAL STEEL

Structural grade steel shall conform to ASTM A 36.

### 2.2 STEEL PIPE

Steel Pipe shall conform to ASTM A 53, Grade B..

### 2.3 STRUCTURAL TUBING

Structural tubing shall conform to ASTM A 500, Grade B.

### 2.4 NORMAL STRENGTH BOLTS

Normal strength bolts shall conform to ASTM A 307, including nuts and washers.

**2.5 HIGH STRENGTH BOLTS**

High strength bolts shall conform to ASTM A 325, including nuts and washers.

**2.6 LAG SCREWS**

Lag screws shall be flat head carbon steel and shall comply with ASME B 18.2.1.

**2.7 WELDING**

E70XX Welding electrode and welding wire shall comply with AWS D 1.1.

**2.8 MISCELLANEOUS STRUCTURAL SHAPES**

Miscellaneous steel shapes (including plates, sheet piling, and bars) shall conform to ASTM A 6.

**2.9 PAINT**

Paint shall conform to SSPC specification.

**3.0 EXECUTION****3.1 FABRICATION**

Fabrication shall be in accordance with the applicable provisions of the AISC S 335. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be qualified under the AISC quality certification program for structural steelwork.

**3.2 INSTALLATION**

Erection of structural steel shall be in accordance with the applicable provisions of AISC S 335.

**Base Plates and Bearing Plates**

Base plates and bearing plates shall be provided with full bearing after the supported members have been plumbed and properly positioned but prior to placing superimposed loads. The area under the plate shall be solidly damp packed with bedding mortar.

**Field Welded Connections**

Field welded structural connections shall be completed before load is applied to comply with AWS code.

**Fastening to In-place Construction**

Steel plates, angles, and fasteners, including through-bolts, wood screws, and other connectors, shall be provided as required.

**Cutting, Fitting and Placement**

Cutting, drilling, and fitting required for installation and securing structural members shall be provided. Work shall be set accurately in location, alignment and elevation, plumb, level, true and free of rack, as measured from established lines and levels.

**Connections**

Anchor bolts and other connections between the structural steel and foundations shall be provided and shall be properly located and built into connecting work.

**Paint**

After erection, boltheads and nuts, welds, and any abrasions in the shop coat shall be cleaned, primed, and painted with the same paint as used in the shop in accordance with SSPC paint specification.






**TECHNICAL SPECIFICATION  
FOR  
GRASS ESTABLISHMENT AND LANDSCAPING**

**FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM  
(FUSRAP)**

**BY  
BECHTEL NATIONAL, INC.  
OAK RIDGE, TENNESSEE**

0	7/20/95	ISSUED FOR USE	BY <i>JKA</i>	CHECK <i>CPH</i>	GL <i>MSM</i>	PE <i>Rao</i>			
REV.	DATE	REASON FOR REVISION	BY	CHECK	GL	PE			
ORIGIN		<b>FUSRAP</b>	JOB NO.: 14501						
			TECHNICAL SPECIFICATION NO.:						
			138-SP513-001						
			Sheet 1 of 12						

**TECHNICAL SPECIFICATION  
FOR  
GRASS ESTABLISHMENT AND LANDSCAPING**

**CONTENTS**

- 1.0 GENERAL
  - 1.1 SUMMARY
  - 1.2 ABBREVIATION AND ACRONYMS
  - 1.3 RELATED SPECIFICATIONS
  - 1.4 REFERENCES
  - 1.5 GENERAL REQUIREMENTS
  - 1.6 SUBMITTALS
  - 1.7 DEFINITIONS
  
- 2.0 PRODUCTS
  - 2.1 EROSION CONTROL MATERIAL
  - 2.2 FERTILIZER
  - 2.3 GRASS SEED
  - 2.4 MULCH
  - 2.5 PLANT STOCK
  - 2.6 SOD
  - 2.7 TOPSOIL
  - 2.8 WATER
  
- 3.0 EXECUTION
  - 3.1 SITE PREPARATION
  - 3.2 EROSION CONTROL MATERIAL
  - 3.3 SEEDING
  - 3.4 SODDING
  - 3.5 PLANT INSTALLATION
  - 3.6 FINAL ACCEPTANCE

TECHNICAL SPECIFICATION  
FOR  
GRASS ESTABLISHMENT AND LANDSCAPING

**1.0 GENERAL**

**1.1 SUMMARY**

This specification defines the technical requirements for grass establishment and landscaping relating to restoration of residential, commercial, and public properties. Some work described herein may not be applicable for each property.

**1.2 ABBREVIATIONS**

The abbreviations listed below, where used in this specification, shall have the following meanings:

ANSI	American National Standards Institute
NJDOT	New Jersey Department of Transportation
OSHA	Occupational Safety and Health Administration
SS	Bechtel Site Superintendent
SSRS	Subcontractor Submittal Requirements Summary
USDA	United States Department of Agriculture

**1.3 RELATED SPECIFICATIONS**

Technical Specification "Earthwork," 138-SP505-001

**1.4 REFERENCES**

Unless otherwise specified, the following specifications, guides, test methods, codes, and standards of the latest issue at the time of the bid shall apply to the extent indicated herein.

American National Standards Institute (ANSI), Z60.1, Nursery Stock, 1990

New Jersey Department of Transportation (NJDOT), "Standard Specifications for Road and Bridge Construction," 1989

**1.5 GENERAL REQUIREMENTS**

**1.5.1** Grass Establishment and Landscaping activities shall be carefully coordinated with all other related work.

**1.5.2** Any open excavations shall be barricaded to protect the public.

## **1.6 SUBMITTALS**

All submittals shall be in accordance with the Subcontractor Submittal Requirements Summary (SSRS) as specified in Part VI of the subcontract documents. Bechtel will determine if documentation is complete as submitted and reserves the right to reject and require resubmittal of any document that does not meet the requirements.

## **1.7 DEFINITIONS**

### **Stand of Turf**

A stand of turf from the sodding operation is defined as living sod uniform in color and leaf texture. Bare spots shall be no larger than 150 mm (6 inches) square. The total bare spots shall not exceed 2 percent of the total sodded area.

## **2.0 PRODUCTS**

### **2.1 EROSION CONTROL MATERIAL**

- 2.1.1** Soil erosion control blanket shall be machine-produced mat of wood excelsior formed from a web of interlocking wood fibers, covered on one side with either plastic netting or twisted kraft paper cord netting.
- 2.1.2** Soil erosion control fabric shall be of knitted construction of polypropylene yarn with uniform mesh openings 20 mm to 25 mm (3/4 inch to 1 inch) square with strips of biodegradable paper.
- 2.1.3** Soil erosion control blanket and fabric shall be delivered in the original manufacturer's packaging.
- 2.1.4** Certification that soil erosion control material meets the above requirements shall be submitted in accordance with Section 1.6.

### **2.2 FERTILIZER**

- 2.2.1** Fertilizer shall be commercial, mixed, free-flowing granules or pelleted fertilizer, 10-20-10 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) grade for lawn and naturalized areas. Fertilizer shall be delivered in original, unopened containers, each showing the manufacturer's guaranteed analysis conforming to applicable state fertilizer laws. At least 40 percent of the nitrogen in the fertilizer shall be in slowly available (organic) form.

2.2.2 Certification that fertilizer complies with the above requirements shall be submitted in accordance with Section 1.6.

### 2.3 GRASS SEED

2.3.1 Seed shall be in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable state seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination; that date shall be within a period of six months prior to commencement of planting operations. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less than 85%, a percentage of germination not less than 90%, a weed content of not more than 1% and contain no noxious weeds. The seed mixtures shall consist of seed proportioned by weight as follows:

- Fine Fescue
  - Hard Fescue 30%
  - Creeping Red Fescue 20%
  - Chewings Fescue 30%
- Kentucky Bluegrass 10%
- Perennial Ryegrass 10%

The seed shall be furnished and delivered premixed in the proportions specified above.

2.3.2 Certification that grass seed complies with the above requirements shall be submitted in accordance with Section 1.6.

### 2.4 MULCH

2.4.1 Straw mulches shall be stalks from oats, wheat, rye, barley, or rice and shall be furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment. Mulches shall be free from weeds, mold, and other deleterious materials, in addition to meeting the requirements of NJDOT Standards, Section 811.

2.4.2 Hay mulch shall consist of cured hay (native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings) furnished in an air dry condition suitable for placing with commercial mulch-blowing equipment. It shall be free from primary noxious weed seeds and rough or woody materials.

2.4.3 Certification that mulch material complies with the above requirements shall be submitted in accordance with Section 1.6.

## **2.5 PLANT STOCK**

- 2.5.1** Plants shall be nursery grown or plantation grown stock conforming to ANSI Z60.1 and shall be of the varieties specified in the plant list bearing botanical names listed in the publication for Standardized Plant Names.
- 2.5.2** Planting stock shall be well-branched and well-formed, sound, vigorous, healthy, and free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and shall have healthy, normal, and unbroken root systems. Deciduous trees and shrubs shall be symmetrically developed, of uniform habit of growth, with straight boles or stems, and free from objectionable disfigurements. Evergreen trees and shrubs shall have well-developed symmetrical tops with typical spread of branches for each particular species or variety. Ground covers and vines shall be vigorous, have the number and length of runners and clump size specified, and be the proper age for the grade of plants specified. Only vines and ground cover plants well established in removable containers or integral containers shall be used. Plants shall have been grown under climatic conditions similar to those in the locality of the project.
- 2.5.3** The minimum acceptable sizes of all plants, measured before pruning and with branches in normal position, shall conform to the measurements indicated on the restoration drawings. Plants larger in size than specified may be used as approved. If larger plants are used, the ball of earth or spread of roots shall be increased in accordance with ANSI Z60.1.
- 2.5.4** Certification that plant stock complies with the above requirements shall be submitted in accordance with Section 1.6.

## **2.6 SOD**

- 2.6.1** Sod shall be "Cultivated Sod" as specified in the NJDOT Standards, Section 909.08. Sod shall be machine-cut to a uniform thickness of 30 mm (1-1/4 inches) within a tolerance of 6 mm (1/4 inch), excluding top growth and thatch. Each individual sod section shall be of a size to permit rolling and lifting without breaking. Irregularly shaped pieces of sod and torn or uneven ends will be rejected. The sod shall be free of weeds or undesirable plants, stones larger than 50 mm (2 inches) in any dimension, woody plant roots and other material detrimental to the development of the turf.
- 2.6.2** Certification that sod complies with the above requirement shall be submitted in accordance with Section 1.6.

## **2.7 TOPSOIL**

- 2.7.1** Topsoil shall meet the requirements specified in Technical Specification 138-SP505-003, Earthwork.

2.7.2 Certification that topsoil complies with these requirements shall be submitted in accordance with Section 1.6.

## 2.8 WATER

2.8.1 Bechtel will identify the water source to be used at each property.

## 3.0 EXECUTION

### 3.1 SITE PREPARATION

3.1.1 The Bechtel SS shall verify the finished grades as indicated on the restoration drawings, and that the placing of topsoil and the smooth grading has been completed in accordance with Specification 14501-138-SP505-003 (Earthwork).

3.1.2 Site preparation work shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, frozen ground, or other unsatisfactory conditions prevail, the work shall be stopped as directed by the Bechtel SS.

3.1.3 Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rains, traffic, or other cause shall be reworked to restore the ground condition previously specified.

3.1.4 Plant material locations and bed outlines shall be staked on the project site before any plant pits or beds are dug. Plant material locations may be adjusted by the Bechtel SS to meet field conditions.

3.1.5 The surrounding turf shall be covered before excavations are made in a manner that will protect turf areas. Existing trees, shrubbery, and beds that are to be preserved during construction shall remain barricaded in a manner that will effectively protect them during planting operations.

3.1.6 If underground utilities are encountered, other locations for planting may be selected by the Bechtel SS.

3.1.7 Plant pits shall be dug to produce vertical sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The minimum allowable dimensions of plant pits shall be 150 mm (6 inches) deeper than the depth of ball or the depth of base roots; for ball or root spreads up to 600 mm (2 feet), pit diameters shall be twice the root spread; for ball or root spreads from 0.6 to 1.2 meters (2 to 4 feet), pit diameters shall be 600 mm (2 feet) greater; for ball or root spreads over 1.2 meters (4 feet), pit diameters shall be 1-1/2 times the ball root spread.



### **3.2 EROSION CONTROL MATERIAL**

- 3.2.1** The need for erosion control material shall be determined by the Bechtel SS.
- 3.2.2** Erosion control material shall be installed in accordance with the manufacturer's instructions.
- 3.2.3** Placement of erosion control material shall be accomplished without damaging other installed material or without deviation to finished grade.

### **3.3 SEEDING**

- 3.3.1** Seeding shall only be done during the periods within the seasons which are normal for such work as determined by weather and by locally acceptable practice and which are approved by the Bechtel SS.
- 3.3.2** Seed shall be uniformly broadcast at the rate of 5 kilograms per 100 square meters (10 pounds per 1,000 square feet) using broadcast seeders. Half of the seed shall be broadcast in one direction, and the remainder at right angles to the first direction. Seed shall be covered to an average depth of 6 mm (1/4 inch) by disk harrow, steel mat drag, cultipacker, or other Bechtel-approved device.
- 3.3.3** Alternately, seed shall be uniformly drilled to an average depth of 12.5 mm (1/2 inch) and at the rate of 5 kilograms per 100 square meters (10 pounds per 1,000 square feet) using equipment having drills not more than 165 mm (6-1/2 inches) apart. Row markers shall be used with the drill seeder.
- 3.3.4** Hydroseeding shall be conducted in accordance with accepted industry practice, as approved by the Bechtel SS. Hydroseeding shall not take place when wind velocity is sufficient to prevent uniform seed distribution.
- 3.3.5** After seeding, straw or hay mulch shall be applied simultaneously with asphalt adhesive at the rate of 34 kilograms per 100 square meters (70 pounds per 1,000 square feet) by using a hydro-mulcher. The entire area shall be spread evenly. Do not bunch the mulch. All seeded areas shall be mulched on the same day they are seeded.

### **3.4 SODDING**

- 3.4.1** Sod shall be placed only during the periods within the seasons which are normal for such work as determined by weather and by locally acceptable practice and which are approved by the Bechtel SS.
- 3.4.2** Areas shall be sodded as indicated on the restoration drawings. Sod shall be placed in accordance with the NJDOT Standards, Section 810 in the areas indicated. The time limitation between

harvesting and placing sod is 36 hours. Sod that has become dry, moldy, or yellow from heating will be rejected.

- 3.4.3 Adequate soil moisture shall be ensured prior to sodding by spraying water on the area to be sodded and wetting the soil to a minimum depth of 50 mm (2 inches). On long slopes sod shall be laid at right angles to slopes. In ditches sod shall be laid at right angles to the flow of water. When required, the sod shall be anchored by placing anchors a minimum distance of 600 mm (2 feet) on center with a minimum of 2 anchors per sod section.
- 3.4.4 Air pockets shall be eliminated and a true and even surface shall be provided by tamping or rolling the sod in place. Displacement of the sod shall be prevented by knitting of sod to the soil. Frayed edges shall be trimmed and holes or missing corners shall be patched.
- 3.4.5 Watering shall be started immediately after completing each day of sodding. Water shall be applied at the rate sufficient to ensure moist soil conditions to a minimum depth of 50 mm (2 inches). Run-off and puddling shall be prevented.
- 3.4.6 On completion of the last day of sodding activities, the Turf Establishment Period will be in effect.
- 3.4.7 The turf establishment period shall be a minimum of 8 weeks. The Bechtel SS will inspect all work for provisional acceptance at the end of the turf establishment period.
- 3.4.8 Maintenance of the turfed areas shall include eradicating weeds, protecting embankments and ditches from erosion, maintaining erosion control material, and protecting turfed areas from traffic.
- 3.4.9 Turf condition shall be reestablished as specified herein for eroded areas, damaged or barren areas. Mulch shall be repaired or replaced as required.
- 3.4.10 Turfed areas shall be mowed to a minimum height of 75 mm (3 inches) when the average height of the turf becomes 125 mm (5 inches). Clippings shall be removed when the amount of cut turf is heavy enough to damage the turfed areas.
- 3.4.11 Watering shall be at intervals to obtain a moist soil condition to a minimum depth of 50 mm (2 inches). Frequency of watering and quantity of water shall be adjusted in accordance with the growth of the turf. Run-off, puddling, and wilting shall be prevented.
- 3.4.12 Nitrogen carrier fertilizer shall be applied at the rate of 2.9 kilograms per 100 square meters (6 pounds per 1,000 square feet) 6 months after the initial application. The application shall be timed prior to the advent of winter dormancy and shall avoid excessive high nitrogen levels.
- 3.4.13 When a pest or disease becomes apparent during the Turf Establishment Period, a state-certified applicator shall apply required chemicals in accordance with EPA label restrictions and

recommendations. Hydraulic equipment for the liquid application of chemicals shall be provided with a leak-proof tank, positive agitation methods, controlled application pressure and metering gauges. Pre-emergent herbicides will not be used.

### **3.5 PLANT INSTALLATION**

- 3.5.1** Planting shall only be done during the periods within the seasons which are normal for such work as determined by weather and by locally acceptable practice and which are approved by the Bechtel SS. If planting occurs between June 15 and August 15 or during periods of drought, watering shall be provided by the Subcontractor as directed by the Bechtel SS.
- 3.5.2** Balled and burlapped and container-grown plants shall be handled and moved only by the ball or container. Plants shall be set plumb and held in position until sufficient soil has been firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are even with the depth at which they were grown in the nursery, collecting field, or container. Plant fertilizer shall be placed prior to backfilling and in accordance with the manufacturer's recommendations. Ground cover plants may be planted after the mulch is in place. Care shall be taken to avoid contaminating the mulch with the planting soil.
- 3.5.3** Balled and burlapped stock shall be backfilled with planting soil mixture to approximately half the depth of the ball and then tamped and watered. Burlap and tying materials shall be carefully removed or opened and folded back. Plastic wrap shall be completely removed before the placement of backfill. The remainder of backfill of planting soil mixture shall be tamped and watered. Earth saucers or water basins shall then be formed around isolated plants. Water-holding basins shall be ample enough in size and height to hold at least 9.5 liters (2-1/2 gallons) for shrubs or 19 liters (5 gallons) for trees.
- 3.5.4** Existing stock which is moved by means of a mechanical transplanter shall be removed from the ground with a ball attached. The ball shall be wrapped with proper material and kept moist if it is not replanted immediately. The plant's stem or trunk shall be centered in the ball, and all roots at the ball's surface shall be cut cleanly. No roots shall be pulled from the ground.
- 3.5.5** Bare-root stock shall be planted so that the roots are arranged in a natural position. Damaged roots shall be removed with a clean cut. Cuts larger than 12.5 mm (1/2 inch) in diameter shall be painted with tree wound dressing. Planting soil mixture shall be carefully worked in among the roots. Remainder of backfill of planting soil mixture shall be tamped and watered. Earth saucers or water basins shall then be formed around isolated plants.
- 3.5.6** Container grown stock shall be removed from containers without damaging plant or root system. Prior to planting, the root mass shall receive three vertical cuts, spaced equidistant about the perimeter. Each cut, about 12.5 mm (1/2 inch) deep, shall begin at the top of the root mass and continue to the bottom. Planting shall be completed as specified for balled and burlapped plants.

- 3.5.7** Mulching shall take place immediately after planting. All tree pits shall be covered with a three-inch layer of the specified mulch and shrub and ground cover beds shall be treated with weed retardant in accordance with manufacturer's instructions and covered with three-inch layer of mulch. Mulch shall be kept out of the crowns of shrubs and off buildings, sidewalks, light standards, and other structures.
- 3.5.8** Plants shall be watered as necessary to maintain an adequate supply of moisture within the root zone. As a minimum, plantings must be watered twice within the first twenty-four hours of the time of planting, and not less than twice per week until preliminary inspection by the Bechtel SS. Water shall not be applied with a force sufficient to displace mulch and shall not be applied so quickly that it cannot be absorbed by the mulch and plants. Dead plants shall be removed and replaced.
- 3.5.9** Maintenance shall begin immediately after each plant is installed. Plants shall be pruned and mulch replaced as required. Stakes, guys, and eroded plant saucers shall be replaced as required. In plant beds, grass and weeds shall not be allowed to reach a height of 75 mm (3 inches) before being completely removed, including the root growth. When plants are in groups other than cultivated beds, the Subcontractor shall not permit grass or other vegetation between them to become more than 125 mm (5 inches) in height. Other work, such as spraying insecticides and fungicides to control pests, shall be done to ensure plant survival in a healthy, growing condition.

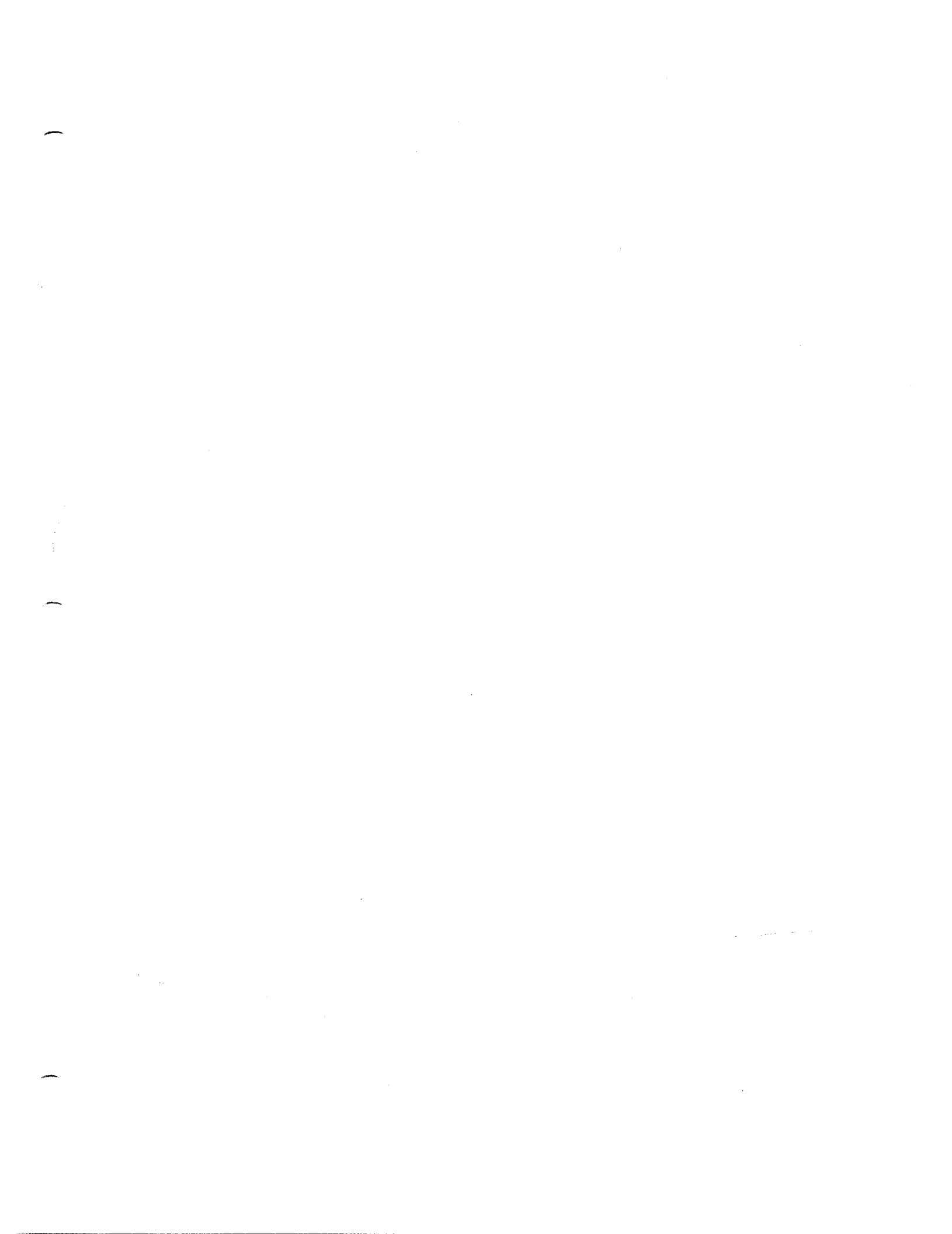
### **3.6 FINAL ACCEPTANCE**

- 3.6.1** For sodded areas, a final inspection will be made at the end of the Turf Establishment Period. Final acceptance of the turf will be based upon a satisfactory stand of turf as defined in Section 1.7. Rejected areas shall be replanted or repaired as directed by the Bechtel SS.
- 3.6.2** A preliminary inspection will be held 8 weeks from the date of the beginning of plant establishment period to determine plant acceptability and the number of replacements. Plants not in healthy growing condition will be noted and as soon as seasonal conditions permit shall be removed from the site and replaced with plants of the same species and sizes as originally specified. Alternate or substituted varieties of plants shall be used only if approved.
- 3.6.3** All plants, including relocated material, shall be guaranteed by the Subcontractor for not less than one full year from the time of preliminary inspections.
- 3.6.4** At the end of this period, any plant that is missing, dead, not true to name or size as specified, or not in satisfactory growth, as determined by the Bechtel SS, shall be replaced. In case of any question regarding the condition and satisfactory establishment of a rejected plant, the Bechtel SS's decision is final. The Subcontractor shall provide a guarantee for all replacement plants for at least one full growing season.

- 3.6.5 All replacements shall be plants of the same kind and size as specified. They shall be furnished and planted as specified herein. The cost of replacement shall be borne by the Subcontractor (except where it can definitely be shown that loss resulted from vandalism).
- 3.6.6 At the end of guarantee period, inspection will be made by the Bechtel SS upon written request submitted by the Subcontractor at least ten days before the anticipated date.
- 3.6.7 After all necessary corrective work has been completed, the Bechtel SS will certify in writing the final acceptance of the planting.

**APPENDIX C**

**ALLOWABLE SURFACE CONTAMINATION LEVELS**



## APPENDIX C

### Surface Contamination Guidelines

<u>Radionuclides</u> <sup>b</sup>	Allowable Total Residual Surface Contamination (dpm/100 cm <sup>2</sup> ) <sup>a</sup>		
	<u>Average</u> <sup>c,d</sup>	<u>Maximum</u> <sup>d,e</sup>	<u>Removable</u> <sup>d,f</sup>
Transurancics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231.	100 <sup>g</sup>	300 <sup>g</sup>	20 <sup>g</sup>
Th-Natural, Sr-90, I-126, I-131, I-133, Ra-223, Ra-224, U-232, Th-232.	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay product, alpha emitters.	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. <sup>h</sup>	5,000	15,000	1,000

<sup>a</sup>As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

<sup>b</sup>Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

<sup>c</sup>Measurements of average contamination should not be averaged over an area of more than 1 m<sup>2</sup>. For objects of less surface area, the average should be derived for each such object.

<sup>d</sup>The average and maximum dose rates associated with surface contamination resulting from beta-gamma-emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

<sup>e</sup>The maximum contamination level applies to an area of not more than 100 cm<sup>2</sup>.

<sup>f</sup>The amount of removable material per 100 cm<sup>2</sup> of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm<sup>2</sup> is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.



## APPENDIX C

(continued)

<sup>g</sup>This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

<sup>h</sup>Because no valves are presented in this order, FUSRAP uses the values shown based on "DOE Guidelines for Residual Radioactive Materials at FUSRAP and Remote SFMP Sites, Revision 2, March 1987 (CCN 046176).

**APPENDIX D**  
**SCOPE OF WORK DOCUMENTS**



### Scope of Work Documents

Number of document	Title
138-SW505-001	Scope of Work for Maywood Vicinity Properties Remedial Action
138-SW513-001	Scope of Work for Restoration of Maywood Vicinity Properties




**SCOPE OF WORK  
FOR  
MAYWOOD VICINITY PROPERTIES  
REMEDIAL ACTION**

**FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM  
(FUSRAP)**

**BY**

**BECHTEL NATIONAL, INC.**

**OAK RIDGE, TENNESSEE**

0	6/20/95	Issued for Bid	<i>CPH</i>	<i>JKA</i>	<i>HSM</i>	<i>Roa</i>			
REV.	DATE	REASON FOR REVISION	BY	CHECK	GL	PE			
ORIGIN		FUSRAP		JOB NO.: 14501					
				SCOPE OF WORK NO.: 138-SW505-001					
				Sheet 1 of 14					

## SCOPE OF WORK

### WORK INCLUDED

The work involves furnishing all labor, tools, equipment, supplies, and articles necessary to perform remedial action activities at the Vicinity Properties in the communities of Maywood, Rochelle Park, and Lodi, New Jersey. A list of these property addresses is shown in Attachment 1. Labor and equipment needs will be as directed by Bechtel.

Remediation activities shall be accomplished by the excavation of radiologically contaminated soil. The following services are required to be performed by the Subcontractor.

- Mobilization
- Site Security
- Regulatory Compliance
- Installing soil erosion and sediment control measures
- Demolition
- Removal of Asbestos-Contaminated Materials
- Underpinning
- Excavation
- Decontamination of Contaminated Surfaces
- Forming and Concrete Work
- Handling and Storage of Clean Soil
- Handling and Storage of Contaminated Material
- Loading and Transportation of Contaminated Material
- Handling and Disposal of Uncontaminated Material
- Moisture Conditioning Soil
- Loading Material into Railroad Gondola Cars

- Backfilling
- Furnishing miscellaneous materials and equipment
- Utility Restoration
- Demobilization

All remediation activities shall be performed in accordance with this Scope of Work, and any other documents made a part of this subcontract. All activities shall be performed as directed by Bechtel. Work includes furnishing all labor, tools, and consumables required to perform the work.

## **1.0 MOBILIZATION**

Mobilization will include: delivering to the jobsite and work areas radiologically and chemically uncontaminated construction equipment, furnishing all tools, materials, supplies, and incidentals necessary to perform the work described in this scope of work, and providing a work force sufficient to commence and sustain remediation activity.

The Subcontractor shall provide personnel that have successfully completed the 40 hours OSHA training, as required by 29 CFR 1910.120. The Subcontractor shall also assure that their field personnel have successfully completed medical examinations prior to beginning onsite work.

All electrically powered tools used by the Subcontractor shall be grounded and shall comply with the requirements of the NEC and all OSHA regulations.

## **1.1 TEMPORARY FACILITIES**

The Subcontractor shall mobilize and demobilize temporary facilities as directed by Bechtel. Mobilization shall consist of the following:



- Installation of site office trailer
- Installation of small equipment, tools, and materials storage trailer

The Subcontractor shall be responsible for all utility connections to the trailer(s). Laydown area for the office trailer and storage trailer shall be as directed by Bechtel.

Upon completion of construction, the Subcontractor shall disconnect all utilities, remove trailers from the site, and clean up the laydown area.

## **1.2 RADIOLOGICAL SURVEY**

Prior to equipment mobilization on site, Bechtel will complete a radiological survey to verify that equipment, tools, etc., are not radiologically contaminated. Equipment will be free of accumulations of mud, grease, etc., to facilitate such surveys. All equipment should meet OSHA requirements and be in good working condition.

## **1.3 SITE SECURITY**

The Subcontract shall provide personnel for site security as directed by Bechtel. Security shall be available during normal and non-work hours.

## **2.0 SITE PREPARATION**

The Subcontractor shall prepare each vicinity property for remedial action as directed by Bechtel. The Subcontractor shall furnish all labor and craft required for site preparation and prepare a list of materials required to complete and maintain the site.

## **2.1 INSTALLATION OF CONTROLLED AREA FENCING**

The Subcontractor shall provide and install and maintain a 4-foot high, plastic construction fence at Vicinity Properties as directed by Bechtel.

## **2.2 INSTALLATION OF STORMWATER AND SPILL PREVENTION CONTROL BARRIERS**

The Subcontractor shall provide, install, and maintain all soil erosion and sediment control barriers as directed by Bechtel. Management of stormwater will also be as directed by Bechtel. The Subcontractor in its operations must employ measures to prevent spills of hazardous substances into the environment.

## **2.3 REMOVAL AND STORAGE OF POOLS, FENCES, DECKS, PORCHES, AND PATIOS**

The Subcontractor shall remove, as directed by Bechtel, exterior property features including, but not limited to: swing sets, above ground swimming pools, fences, decks, porches, sheds, and other yard accessories. Wherever possible, the subcontractor shall disassemble such features and store them at a location on the property, or at another location as directed by Bechtel.

If disassembly is not possible, the subcontractor shall remove such features and store at designated locations for disposal.

## **2.4 CLEARING AND GRUBBING**

Clearing and grubbing shall be performed as directed by Bechtel.

### **3.0 REMEDIAL ACTION ACTIVITIES**

#### **3.1 DEMOLITION**

Demolition shall be performed as directed by Bechtel. Debris shall be removed daily and disposed in accordance with Section 6.0 unless otherwise directed by Bechtel so as not to allow accumulation inside or outside the property.

#### **3.2 EXCAVATION**

All excavation activities shall be performed as directed by Bechtel.

##### **3.2.1 CLEAN MATERIAL EXCAVATION**

The Subcontractor shall excavate clean material as directed by Bechtel. Clean material shall be temporarily stockpiled on residential property where material was excavated. Stockpile location shall be a directed by Bechtel.

##### **3.2.2 CONTAMINATED MATERIAL EXCAVATION**

The Subcontractor shall excavate contaminated material as directed by Bechtel. Contaminated material shall be transported to the Maywood Interim Storage Site (MISS) staging area as directed by Bechtel. Transportation of material is described in Section 5.0.

#### **3.3 INSTALLATION AND REMOVAL OF SHORING**

Shoring shall be constructed for open excavations as directed by Bechtel. To the extent possible, shoring materials may be reused. Care shall be taken to prevent the spread of contaminated material during the relocation of shoring material.

During backfill operations, shoring shall be removed as directed by Bechtel. Shoring material shall be decontaminated prior to removal from the site. Shoring that cannot be radiologically released shall be transported to the MISS site staging area and loaded in railroad gondola cars. The material shall be reduced in size prior to loading so that the maximum dimension is 8 feet. Transportation, size reduction, and loading shall be as directed by Bechtel.

### **3.4 INSTALLATION AND REMOVAL OF GROUNDWATER CONTROLS**

The Subcontractor shall install and maintain groundwater controls and dewater excavations as directed by Bechtel. Any water collected from an excavation shall be containerized in suitable containers and stored, as approved by Bechtel.

### **3.5 DECONTAMINATION OF CONTAMINATED SURFACES**

Subcontractor shall perform radiological decontamination operations on items such as concrete floors, piping, exterior of concrete masonry unit foundation walls, rubble and debris, and other items in contact with contaminated material as directed by Bechtel.

Any waste or contaminated water generated as a result of decontamination activities shall be containerized in suitable containers as directed by Bechtel.

### **4.0 STRUCTURE REMEDIATION**

Structure remediation shall be performed as directed by Bechtel to remove contaminated material located beneath structures.

#### **4.1 REMOVAL OF ASBESTOS-CONTAMINATED MATERIAL**

**4.1.1** The Subcontractor shall remove asbestos-contaminated material (ACM) as directed by Bechtel.

- 4.1.2** Performance of all asbestos work is the responsibility of the selected subcontractor. The subcontractor must be licensed by the New Jersey Department of Labor and asbestos supervisors and workers must be appropriately trained and permitted to perform asbestos work. The subcontractor shall submit to Bechtel prior to start of work copies of the employer's asbestos license and asbestos supervisor and worker permits for all employees that will perform asbestos work under this subcontract.
- 4.1.3** The Subcontractor shall submit all state and federally required pre-work notifications for asbestos removal activities. Copies of all required state and federal asbestos notifications must be provided to Bechtel at least 10 working days prior to beginning asbestos work. The subcontractor also is responsible for submitting any amendments that may be required to the original notifications. All amendments to asbestos notifications must be provided at the same time as submittal of the amended notification to the applicable state or federal authority.
- 4.1.4** Performance of asbestos work also must be in accordance with the work practices established in EPA 40 CFR 61, Subpart M; the Asbestos Hazard Abatement Subcode of the Uniform Construction Code, when applicable; and federal and state OSHA requirements.
- 4.1.5** Packaging, transportation and disposal of all asbestos waste in accordance with New Jersey solid waste management regulations is the responsibility of the subcontractor. The subcontractor is responsible for submitting a written notification of intent to dispose of asbestos waste as required by 7:26-2.12. A copy of this notification must be provided to Bechtel at least 10 working days prior to transport of asbestos waste. The subcontractor is responsible for ensuring that the selected asbestos waste hauler and disposal facility are licensed and permitted to handle asbestos waste.

## **4.2 INTERIOR PREPARATION**

The subcontractor shall remove mechanical equipment such as furnaces, water heaters, plumbing and electrical fixtures, air conditioners, and associated appurtenances as directed by Bechtel.

Salvageable material shall be stored and protected from deleterious conditions on residential properties for reuse as directed by Bechtel.

#### **4.3 INTERIOR DEMOLITION**

The Subcontractor shall remove interior partition walls, floor coverings and concrete floor slab as directed by Bechtel.

Removal of demolition debris shall be as directed by Bechtel. Disposal shall be in accordance with Section 6.0 of this scope.

#### **4.4 UNDERPINNING**

The Subcontractor shall install temporary support and underpinning systems used for the removal of material as directed by Bechtel.

#### **5.0 LOADING AND TRANSPORTATION OF CONTAMINATED MATERIAL**

The Subcontractor shall load, transport, and unload contaminated material to the MISS site staging area as directed by Bechtel. Dump trucks will be externally cleaned by the Subcontractor and scanned for external radiological contamination by Bechtel prior to leaving the Maywood VP site. Material staging area at the MISS site shall be in a location directed by Bechtel.

Dump trucks shall have water-tight beds, gates, and weatherproof tarpaulins. Weatherproof tarpaulins shall be without visual damage from wear or use and of quality highly resistant to tears, punctures, abrasion, and cracking.

The Subcontractor shall ensure that the waste does not escape from the dump truck during transportation.

The Subcontractor shall moisture condition soil at the MISS site as directed by Bechtel.

The Subcontractor shall load material into railroad gondola cars for shipment to a licensed disposal facility as directed by Bechtel. The Subcontractor shall install a fiber board protective layer and a sift-proof liner into each rail car. The fiber board and liner shall be installed as directed by Bechtel.

The Subcontractor shall remove any residual material for rail cars and cleaning rail cars that arrive at the MISS staging area as directed by Bechtel. All waste material derived from such operations shall be collected and disposed in accordance with Section 6.0.

The Subcontractor shall close and secure the loaded container as directed by Bechtel.

Sift-proof liners and fiber board shall be furnished by Bechtel.

## **6.0 DISPOSAL OF UNCONTAMINATED MATERIAL**

The Subcontractor shall dispose of all uncontaminated material and debris and decontaminated material and debris to a commercially licensed disposal facility. The Subcontractor shall provide to Bechtel the name and location of the licensed disposal facility. The Subcontractor shall identify and procure services of a commercial disposal facility for disposal of uncontaminated material.

## **7.0 PROPERTY RESTORATION**

### **7.1 BACKFILL**

The Subcontractor shall provide labor and equipment to place onsite and offsite common backfill and structural backfill as directed by Bechtel. Offsite common and structural backfill will be provided by Bechtel. Placement of onsite backfill will be from the soil excavated and stockpiled on the residential properties.

Backfill material shall be furnished by Bechtel.

## **7.2 CONCRETE WORK**

The Subcontractor shall restore concrete surfaces as directed by Bechtel. The Subcontractor shall supply all materials, equipment, and labor for restoring concrete basement slabs, footings, etc., and other areas directed by Bechtel. Technical Specification 138-SP505-005 (Concrete, Forming, and Reinforcement) has been included for information.

## **8.0 DEMOBILIZATION AND CLEANUP**

Demobilization includes removing from the job-site all equipment, tools, materials, supplies, incidentals, and labor used during work described in this scope of work.

Subcontractor shall perform work area and equipment cleanup at the completion of work as directed by Bechtel.

## **9.0 DECONTAMINATION**

All equipment shall be decontaminated prior to demobilizing from the site. Bechtel will complete a radiological survey to verify that all equipment, tools, supplies, and miscellaneous articles are not contaminated prior to being released for unrestricted use.

## **10.0 OTHER REQUIREMENTS**

### **10.1 TEMPORARY UTILITIES**

Subcontractor shall establish temporary utilities services as directed by Bechtel.



## **10.2 DUST CONTROL**

The Subcontractor shall provide dust control measures as directed by Bechtel.

## **10.3 RESTORATION OF UTILITIES**

The Subcontractor shall restore all utilities interrupted during remedial action as directed by Bechtel. Restoration of utilities shall be performed by qualified individuals in accordance with the state and local regulations.

## **10.4 MISCELLANEOUS EQUIPMENT RENTAL**

The Subcontractor shall provide miscellaneous equipment rental including all mobilization, fuel, lubricants, repair parts, service, maintenance, and taxes. Rental of miscellaneous equipment shall be as directed by Bechtel from sources that have been reviewed and approved by Bechtel, and shall be site dedicated until released by Bechtel.

## **10.5 MISCELLANEOUS MATERIALS AND SERVICES PROCUREMENT**

The Subcontractor shall provide miscellaneous materials, such as lumber, plywood, plastic sheeting, nails, control area fencing, soil erosion and sediment control barriers, etc., and services as determined and directed by Bechtel.

## **11.0 WORK NOT INCLUDED**

The following items of related work are not included:

- Radiological monitoring and support;
- Chemical monitoring and support;

- Health Physics support;
- Industrial hygiene and support;
- Providing storage drums, or other containers, for contaminated water;
- Disposal of radiologically/chemically contaminated material;
- Civil Survey support;
- Disposal of contaminated water.

**ATTACHMENT 1**

**List of Vicinity Properties Addresses**

Lodi

78 Avenue B  
90 Avenue C  
108 Avenue E  
112 Avenue E  
113 Avenue E  
2 Branca Court  
4 Branca Court  
6 Branca Court  
7 Branca Court  
11 Branca Court  
106 Columbia Lane  
Fire Station #2 (Brook Street)  
Fireman's Memorial Park (Brook Street)  
99 Garibaldi Avenue  
4 Hancock Street  
5 Hancock Street  
6 Hancock Street  
7 Hancock Street  
8 Hancock Street

10 Hancock Street  
I-80 Right of Way  
Kennedy Park (Kennedy Street)  
14 Long Valley Road  
16 Long Valley Road  
18 Long Valley Road  
20 Long Valley Road  
22 Long Valley Road  
24 Long Valley Road  
26 Long Valley Road  
Lodi Municipal Park (Redstone Lane)  
11 Redstone Lane  
17 Redstone Lane  
60 Trudy Drive  
62 Trudy Drive


Maywood

Ballod Property in Rochelle Park  
200 Brookdale Avenue  
136 West Central Avenue

**SCOPE OF WORK  
FOR  
RESTORATION OF MAYWOOD VICINITY PROPERTIES  
MAYWOOD, NEW JERSEY**

**FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM  
(FUSRAP)**

**BY  
BECHTEL NATIONAL, INC.  
OAK RIDGE, TENNESSEE**

0	7.13.95	Issued for Bid	JKA	<del>JKK</del>	NEW	JCM			
REV.	DATE	REASON FOR REVISION	BY	CHECK	GL	PE			
 <p style="text-align: center;"><b>FUSRAP</b></p>			JOB NO. 14501						
			SCOPE OF WORK NO. 138-SW513-001						
			Sheet 1 of 7						

## SCOPE OF WORK

### WORK INCLUDED

The work involves furnishing all labor, supervision, tools, equipment, supplies, and articles necessary to perform property restoration activities at each of the Maywood Vicinity Properties located in the communities of Maywood, Rochelle Park and Lodi, New Jersey. Remedial action will be performed under a separate Subcontract.

The Maywood Vicinity Properties consist of 36 properties which have been divided into four groups. Due to unforeseen circumstances, however, it may be necessary to move properties out of one group and into another. The actual sequence of restoration will be determined by Bechtel.

For bid purposes, the Base Work Period will cover 12 properties (Group 1); the Optional Work Period will cover 8 properties (Group 2). A complete list of property addresses is included as Attachment 1.

Restoration activities shall be accomplished by restoring remediated properties. To accomplish these activities, the following services shall be performed:

- Placement of gravel base;
- Installing and maintaining erosion and sediment controls;
- Reseeding lawns by hand or hydroseeding;
- Restoring lawns with sod;
- Restoring or reconstructing fences;
- Restoring trees, shrubs, flowers, and gardens;
- Repairing and/or replacing asphalt pavement;
- Repairing downspouts, as required;
- Replacing property features such as edging, sidewalks, driveways, curb and gutter, patios, walls; and
- Repairing and/or replacing miscellaneous property features.

All restoration activities under this subcontract shall be conducted in accordance with this Scope of Work, Restoration Design Drawings, applicable sections of the Technical Specifications, and other documents made part of this subcontract. Activities shall be conducted in accordance with all applicable state and local regulations.

## **1.0 MOBILIZATION**

Mobilization shall include:

- delivering to the jobsite and work areas radiologically and chemically uncontaminated construction equipment free of mud, dirt, oil, etc.;
- furnishing necessary tools, materials, supplies, and miscellaneous articles; and,
- establishing and furnishing a work force sufficient to commence and sustain restoration activities.

The Subcontractor shall be responsible for securing all necessary permits and providing required submittals to Bechtel for review as described in Section VI of this subcontract (Subcontractor Submittal Requirements Summary).

### **1.1 SITE-SPECIFIC TRAINING**

All of the Subcontractor's employees who will be mobilized to the site for work activities will attend a site-specific training session at the site. This training will be utilized to provide the site-specific safety and health aspects of the project in accordance with the Bechtel site-specific Safety and Health Plan. This is a one-time session requiring all appropriate staff to be in attendance during the training.

## **2.0 GRAVEL BASE**

The placement of gravel base shall be conducted in accordance with the notes provided on the associated Design Drawing and Technical Specification 138-SP505-003 (Earthwork).

## **3.0 SOIL EROSION AND SEDIMENT CONTROL**

The Subcontractor shall be responsible for installing and maintaining soil erosion and sediment control measures, as necessary, until restoration is complete and accepted. All soil erosion and sediment control measures shall be installed and maintained in accordance with Technical Specification 138-SP505-003 and Restoration Drawing 138-DD513-C04.

## **4.0 GRASS ESTABLISHMENT AND LANDSCAPING**

The Subcontractor shall conduct all grass establishment and landscaping activities including, but not limited to, seeding, sodding, mulching, and planting of trees and shrubs in accordance with the

associated Restoration Design Drawing for each Vicinity Property and Technical Specification 138-SP513-001 (Grass Establishment and Landscaping).

## 5.0 ASPHALT REPAIR AND REPLACEMENT

The Subcontractor shall repair or replace asphalt driveways in accordance with the associated Restoration Design Drawing for each Vicinity Property and New Jersey Department of Transportation (NJDOT) "Standard Specifications for Road and Bridge Construction," Section 400 (Surface Courses).

## 6.0 CONCRETE REPAIR AND REPLACEMENT

The Subcontractor shall restore concrete surfaces in accordance with the associated Restoration Design Drawing for each Vicinity Property and Technical Specification 138-SP505-005 (Concrete Forming and Reinforcement). The Subcontractor shall supply all materials, equipment, labor, and supervision to install new expansion joints, concrete, and subbase, as required. Ready-mix concrete shall be mixed and delivered in accordance with the requirements of Technical Specification 138-SP505-005.

## 7.0 RESTORATION OF EXTERIOR PROPERTY FEATURES

The Subcontractor shall be responsible for restoring exterior property features such as edging and fencing, as shown on the Restoration Drawings.

### 7.1 RESTORATION OF MISCELLANEOUS PROPERTY FEATURES

The Subcontractor shall restore the following miscellaneous property features:

#### Base Work Period

None

#### Optional Work Period

2 Branca Court - Stone Steps  
4 Branca Court - Masonry Steps  
11 Branca Court - Masonry Steps  
11 Redstone Lane - Masonry Wall  
Lodi Park - Asphalt Basketball Court  
with two (2) goals

Masonry components shall be restored in accordance with Technical Specification 138-SP505-006 (Masonry).

## **8.0 MISCELLANEOUS ITEMS**

The Subcontractor shall be responsible for restoring all miscellaneous items as identified and directed by Bechtel, which may include, but are not limited to, flagstone walkways, retaining walls, brick patios and walkways, gas grills, swing sets, and other surface items not listed herein but shown within the limits of restoration on the Restoration Drawings.

## **9.0 DEMOBILIZATION**

Subcontractor shall perform work area and equipment cleanup at the completion of work, remove all temporary construction facilities, and clean and restore all work areas as shown on the drawings and as directed by Bechtel.

The subcontractor shall be responsible for managing and removing from each property its own debris and garbage.

## **10.0 OTHER REQUIREMENTS**

### **10.1 EQUIPMENT**

It will be the subcontractor's responsibility to supply the equipment and other materials necessary to complete restoration activities as shown on the associated restoration drawings at each of the vicinity properties.

### **10.2 ELECTRICALLY POWERED TOOLS**

All electrically powered tools used by the Subcontractor shall be grounded and shall comply with the requirements of the National Electric Code (NEC) and all OSHA regulations.

### **10.3 SUBMITTALS**

All documentation required under the subcontract shall be submitted in accordance with Section VI., the Subcontractor Submittal Requirements Summary (SSRS).



## **11.0 WORK NOT INCLUDED**

- Civil Survey support
- Restoration of utilities
- Restoration of pools, shed, and decks
- Restoration of interior and exterior mechanical equipment

ATTACHMENT 1

LIST OF ADDRESSES  
MAYWOOD VICINITY PROPERTIES

Properties to be restored include:

Group 1

Lodi

79 Avenue B  
90 Avenue C  
108 Avenue E  
112 Avenue E  
113 Avenue E  
I-80 Right-of-Way  
14 Long Valley Road  
16 Long Valley Road  
18 Long Valley Road  
20 Long Valley Road  
22 Long Valley Road  
24 Long Valley Road  
26 Long Valley Road

Group 3

Lodi

4 Hancock Street  
5 Hancock Street  
6 Hancock Street  
7 Hancock Street  
8 Hancock Street  
10 Hancock Street  
60 Trudy Lane  
62 Trudy Lane  
99 Garibaldi Avenue  
106 Columbia Lane  
Fire Station #2  
Fireman's Memorial Park

Maywood

136 West Central Avenue  
200 Brookdale Street

Group 2

Lodi

2 Branca Court  
4 Branca Court  
6 Branca Court  
7 Branca Court  
11 Branca Court  
11 Redstone Lane  
17 Redstone Lane  
Lodi Municipal Park

Group 4

Lodi

Kennedy Park

Maywood

Ballod Property

NOTE:

These groupings may be subject to change.

