Science Applications International Corporation

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TASK 8 - REPORT

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REMEDIATION STRATEGY

FOR

3004(u) SITES

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TABLE OF CONTENTS

Section	Page
List of Tables	iii
List of Figures	iv
1.0 INTRODUCTION	1-1
2.0 CHARACTERIZATION STRATEGY	2-1
2.1 Need for Action Evaluation	2-1
2.1.1 Waste Constituents Matrix	2-3
2.1.2 Release Potential and Need for Action Matrix	2-5
2.2 Site Locations and Groupings	2-8
2.2.1 100 B/C Area	2-9
2.2.2 100 D/DR Area	2-10
2.2.3 100 F Area	2-11
2.2.4 100 H Area	2-12
2.2.5 100 KE/KW Area	2-12
2.2.6 100 North Area	2-14
2.2.7 200 East Area	2-15
2.2.8 200 West Area	2-21
2.2.9 200 North Area	2-26
2.2.10 300 Area	2-26
2.2.11 400 Area	2-27
2.2.12 600 Area	2-27
2.2.13 700 Area	2-28
2.2.14 1100 Area	2-28
3.0 REMEDIATION STRATEGY	3-1
3.1 In-Place Remediation Techniques	3-1
3.1.1 Description of Techniques	3-2
3.1.2 Selection of In-Place Remedial Actions	3-8

TABLE OF CONTENTS (Continued)

Section	Page
3.2 Exhumation	3-11
3.3 Remedial Action Unit Cost	3-14
4.0 SUPPORT ACTIVITIES	4-1

List of Appendices

APPENDIX A - Remedial Action Technologies

APPENDIX B - Remediation Techniques and Costs

LIST OF TABLES

Table		Page
2-1	100 B/C Waste Constituents Matrix.	*
2-2	100 D/DR Waste Constituents Matrix	*
2-3	100 F Waste Constituents Matrix.	*
2-4	100 H Waste Constituents Matrix.	*
2-5	100 KE/KW Waste Constituents Matrix.	*
2-6	100 N Waste Constituents Matrix.	*
2-7	200 East Waste Constituents Matrix	*
2-8	200 West Waste Constituents Matrix	*
2-9	200 North Waste Constituents Matrix.	*
2-10	300 Waste Constituents Matrix.	*
2-11	400 Waste Constituents Matrix.	*
2-12	600 Waste Constituents Matrix.	*
2-13	700 Waste Constituents Matrix.	*
2-14	1100 Waste Constituents Matrix	*
2-15	100 B/C Release Potential/Need for Action Matrix	*
2-16	100 D/DR Release Potential/Need for Action Matrix.	*
2-17	100 F Release Potential/Need for Action Matrix	*
2-18	100 H Release Potential/Need for Action Matrix	*
2-19	100 KE/KW Release Potential/Need for Action Matrix	*
2-20	100 N Release Potential/Need for Action Matrix	*
2-21	200 East Release Potential/Need for Action Matrix.	*
2-22	200 West Release Potential/Need for Action Matrix.	*
2-23	200 North Release Potential/Need for Action Matrix	*
2-24	300 Release Potential/Need for Action Matrix	*
2-25	400 Release Potential/Need for Action Matrix	*
2-26	600 Release Potential/Need for Action Matrix	*
2-27	700 Release Potential/Need for Action Matrix	*
2-28	1100 Release Potential/Need for Action Matrix.	*
3-1	Potential In-Situ Remedial Actions for Waste Units	3-3

*Tables 2-1 to 2-14 follow page 2-29
Tables 2-15 to 2-28 follow page 2-30

LIST OF FIGURES

FIGURE PAGE

2-1 Flow Diagram of Characterization and Remediation Analysis 2-2

TASK 8 REPORT

REMEDIATION STRATEGY FOR 3004(u) SITES

1.0 INTRODUCTION

Several hundred sites have been identified that may potentially be subject to RCRA 3004(u) corrective action. These sites include a broad spectrum of waste and process management units with the period of use ranging from one month to more than 40 years. Some of these sites were last used over thirty-five years ago while others ceased operations only a few months ago (in 1987).

The diversity and large number of potential sites as well as their geographic proximity requires careful evaluation of the potential problems and history of waste management or other use in order to determine characterization and remediation needs. From such an assessment, a characterization strategy and remediation strategy may be developed into a plan for the broad spectrum of sites and characterization and remediation activities for these sites can be coordinated with similar activities for nearby CERCLA sites.

This report presents the basis for a remediation strategy for the potential RCRA 3004(u) sites. Included is the development of a strategy for characterizing the sites, identifying ways in which the sites may be grouped for characterization and remediation, identifying remediation approaches, and estimating cost and support requirements. Section 2 presents the characterization strategy for the 3004(u) sites. Section 3 presents the remediation strategy. Section 4 presents support activities identified for characterization and remediation.

2.0 CHARACTERIZATION STRATEGY

The characterization strategy has been developed based on identification of potential groupings of sites and identification of RCRA 3004(u) corrective action issues. Approximately 510 RCRA 3004(u) sites have been identified. These sites have been identified by Hanford area (100 N, 200 east, 600, etc.) as an initial grouping because of the generally distinct geographic distribution of the sites within the Hanford area.

Figure 2-1 presents an overview of the characterization strategy process for evaluating the 3004(u) sites. This approach has been developed based on the 3004(u) requirements outlined in the Task 2 report. Section 2.1 addresses Steps 1 through 4 (determine unit type, wastes constituents matrix, release potential and need for action matrix, and need for action coding). Section 2.2 addresses Steps 5, 6, and 10 (determining site groupings and site locations). Steps 7 through 9 (remediation strategy and support activities) are addressed in Sections 3 and 4, respectively.

2.1 NEED FOR ACTION EVALUATION

The characterization strategy for a given site will depend upon the need for action. At a RCRA 3004(u) site, the need for action includes remediation or simply verification of the absence of a problem (past, present, or future release; absence of hazardous constituents; or residual contamination). No further action may also be selected for a given site if no hazardous constituents are present or where no present or future contamination problem is likely. In each case, the characterization needs will differ largely in terms of the extent of sampling or other information collection that may be needed.

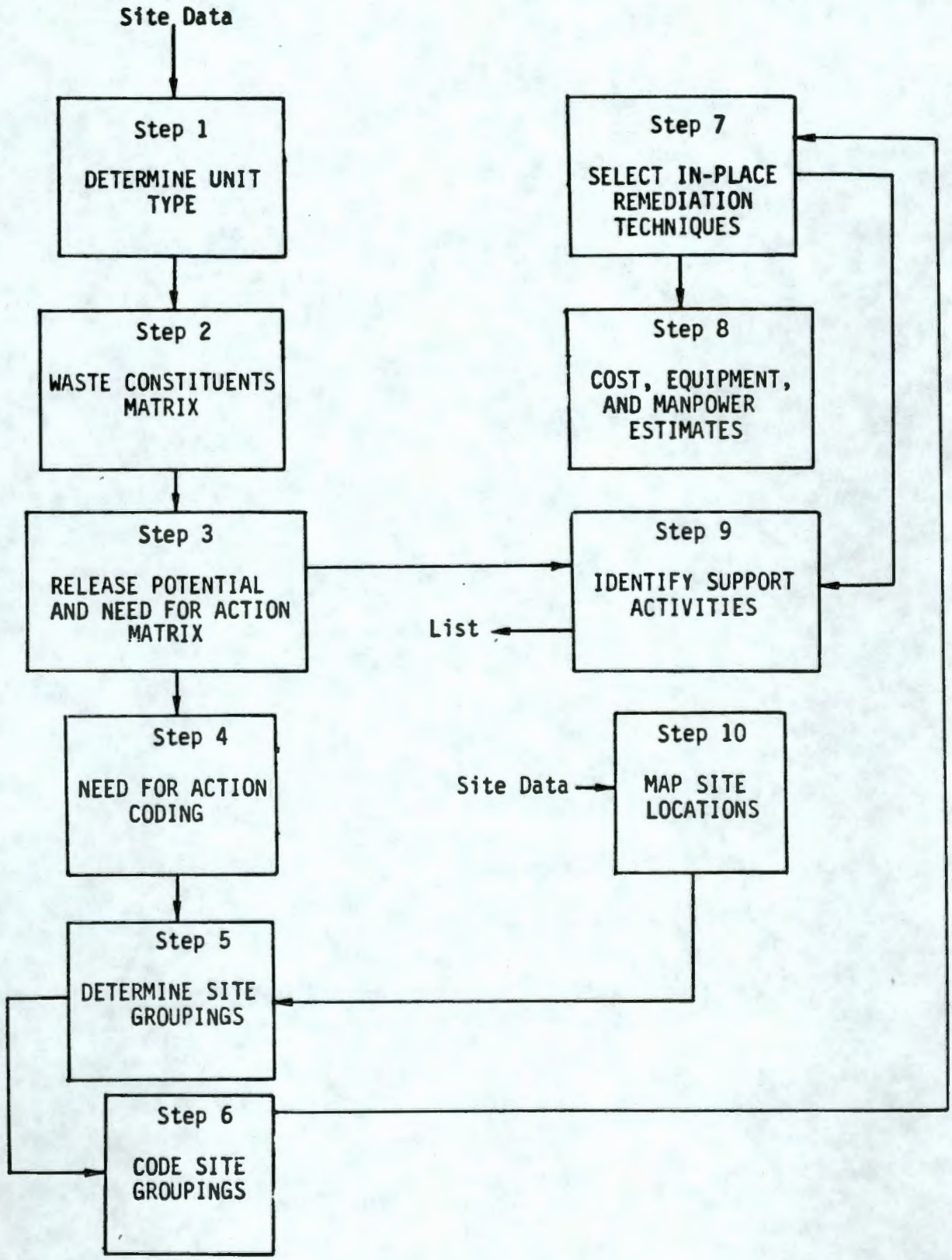

Figure 2-1. Flow Diagram of Characterization and Remediation Analysis

The need for action depends upon a number of factors. These include:

- o containment provided by the waste management unit itself in preventing release to the environment
- o past, present, or future adequacy of the containment provided by the unit
- o nature of the wastes disposed (solid, liquid, gas) as an indicator of the likelihood of transport in the subsurface environment
- o constituents of concern in the wastestream disposed and their behavior in the environment (e.g., subject to subsurface transport or partitioning in the vadose zone)
- o potential exposure hazards, potential media impacted, and pathways of migration
- o evidence of past release to the environment and nature of action taken
- o adequacy of data and documentation to support need for action decisions or to demonstrate the absence of a problem.

Overall, the need for action is a function of the release potential of a unit and the waste constituents present in that unit. These two areas are the basis of the characterization evaluations conducted. This evaluation focused on the development of two matrices: a waste constituents matrix and a need for action matrix. These matrices and the supporting evaluations are described in more detail in the following sections.

2.1.1 Waste Constituents Matrix

Each site was evaluated to determine the type of unit involved (function and structure) and the characteristics of the wastes/materials present (Steps 1 and 2 in Figure 2-1). The analysis proceeded on a site-by-

site basis within a given Hanford area. Tables 2-1 through 2-14 at the end of Section 2 present the waste constituent matrices completed for the inactive RCRA 3004(u) sites that have been identified in the following areas: 100 B/C, 100 D/DR, 100 F, 100 H, 100 KE/KW, 100 N, 200 North, 200 West, 200 East, 300, 400, 600, 700, and 1100. A key to the codes used are provided on the matrices. These data are subsequently used to evaluate release potential and identify the remediation/characterization needs for each site.

The waste constituents matrices completed for each Hanford area include the identification of a general type of designation for each site listed as potential RCRA 3004(u). The waste constituent matrices also include "checkoffs" for whether the waste source and constituent chemicals were specifically identified; identification of chemical components (organics, volatiles, inorganics, metals, pH); identification of radionuclide components (fission products, other radionuclides, residual radioactivity); waste volume disposed; and identification of the nature of the waste (solid/hazardous waste, mixed waste, or radioactive only waste). These data serve to identify the nature of the wastes disposed/released and, in a broad sense, a summary of their potential behavior in the environment.

In evaluating the waste constituent matrices, nonradioactive chemical characteristics were evaluated separately from radionuclides. The chemical characteristics focused on analysis identifying basic components of the wastes managed and disposed that move differently or "behave" differently in the environment. As mentioned above, these components are: organics, volatiles, inorganics, metals and pH. Metals (as a chemical component) did not include radionuclides that are also metals (e.g., uranium). Radioactive components were addressed in a separate analysis. pH was included in the evaluation because the disposal of acidic or basic materials can substantially alter behavior of other components in the environment (e.g., metals mobility). Radionuclides were identified as being fission products or other radionuclides. Fission products included strontium, cobalt, and cesium while other radionuclides included uranium and plutonium. The comments section of the matrices notes where tritium is included as "other" radionuclides.

Exhumed sites were evaluated as if the wastes were still present for the purposes of waste characterization. The release potential evaluation conducted subsequent to this step considers the fact that the wastes, as a source of continuing release to the environment, have been removed.

2.1.2 Release Potential and Need for Action Matrix

Each site was evaluated for its release potential, i.e., the past, present, or future potential for release of hazardous constituents to the environment from the unit in question. This evaluation addresses releases to soil, groundwater, surface water, and air as well as the generation of subsurface gas (toxic or methane). This information serves as the basis for determining the need for action as well as site groupings. Sites that are in the same vicinity and affecting the same pathways could be grouped together.

Tables 15 through 28 at the end of Section 2 present the release potential and need for action matrices for the following areas: 100 B/C, 100 D/DR, 100 F, 100 H, 100 KE/KW, 100 N, 200 North, 200 West, 200 East, 300, 400, 600, 700, and 1100. The codes identified on the matrices are defined in the key associated with each matrix. The comments column presents a brief summary of key information or technical issues that affected the decisions presented in the matrix.

A preliminary assessment of the need for action at each site has been performed to provide a basis for the costing analysis. A final determination on remedial action can not be made until the completion of the formal remedial investigation/feasibility study process. There are five categories of action identified for the inactive 3004(u) sites: remediation, verify no release, verify no hazardous constituents, verify no residual contamination, and no further action. Remediation is selected where the waste constituents are particularly toxic, are affecting a broad spectrum of media, are continuing to be released in the environment, or pose a hazard which may be eliminated or reduced by taking action. This will involve characterization of the site in question and will gnerally follow the RI/FS process for CERCLA sites except that cost will not be a factor of the analysis (as described in the Task 2 Report). Verification of no release is selected where wastes remain in place but no release to the

environment is believed to have occured either through the construction of the unit or the nature of the wastes or both. Verification of no hazardous constituents is selected where a solid waste generally posing little threat (such as sanitary wastewater) may have served as a source of release of hazardous constituents based on the nature of the operations served. Verification of no residual contamination is selected where action has been taken to remediate a release to the environment but documentation of findings is incomplete or chemical contamination from a mixed waste spill does not appear to have been adequately assessed/addressed by the actions identified. The time period over which the site was used, the volume of waste disposed, and the time since last use were all considered in making these assessments.

The final activity in evaluating the need for action was to code the sites based on the waste type and action area identified. The three digit code appears under the column "Site Code." This three digit code allows ready identification of each site's need for action and will be used for additional site sorting in later tasks.

The first digit of the code refers to the preliminary remedial action used for the costing analysis as follows:

1 = site requires remediation (and characterization prior to remediation)
2 = site requires verification of no release
3 = site requires verification of no hazardous constituents
4 = site requires verification of no residual contamination
5 = no further action required.

The code was assigned to reflect the most to least "pressing" status of a unit.

The second digit of the code refers to the unit type code (alphabetic: A-O).

Each unit in an area received an alphabetic code designating the unit type. The inactive units present at Hanford cover a wide variety of

techniques, but many of them function in the same general manner for waste disposal or dispersion and can thus be grouped into distinctive "types." These unit type codes have been developed to uniquely identify sites based on construction, operation, and environmental releases as a result of operations in order to select one "in-place" remediation technique for that situation. The codes developed for type of unit are as follows:

SOLID WASTE SITES

- o A - aboveground covered landfill
- o B - aboveground uncovered landfill
- o C - belowground covered landfill
- o D - belowground uncovered landfill

LIQUID WASTE SITES

- o E - surface impoundments (includes large bottom percolation systems, ponds, etc.)
- o F - ditches (includes bottom/side dispersion systems ditches, small trenches)
- o G - underground dispersion systems (french drains, tile fields, cribs)
- o H - aboveground tank
- o I - underground tank
- o J - spills

MISCELLANEOUS

- o K - underground vault
- o L - burning pit
- o M - incinerator
- o N - process sewer
- o O - other

In this designation system, "covered" landfill is defined as a landfill or waste pile where some material has been placed on top of the wastes (soil,

gravel, ash, etc.) rather than an engineered structure. "Uncovered" landfill is defined as a landfill or waste pile in which the wastes are exposed.

The third digit of the site code refers to the nature of the waste managed in the unit. The code is assigned as follows:

Q = solid/hazardous wastes = nonradioactive wastes
R = radioactive waste = does not include chemical wastes
M = mixed wastes = wastes with both chemical and radioactive components

2.2 SITE LOCATIONS AND GROUPINGS

Within a given area, site locations were compared with other RCRA 3004(u) site locations and CERCLA site locations to determine if and how sites may be grouped together for characterization and remediation purposes. Evaluation factors considered included: geographic proximity of sites, need for action category, and potential for contamination from other nearby sites (subsurface and surface interactions). Geographic proximity was the major factor in site groupings. Sites within 100ft of each other were generally grouped together.

Frequently, the need for action category was readjusted to account for nearby contamination sources. For example, three or four cribs may be located next to each other. One crib, based on the data evaluated, may have been flagged for remediation while the others were used sufficiently long ago that verification of no residual contamination was an appropriate action selection. Under such circumstances, the need for action was "upgraded" to remediation because of the influence of the nearby site.

It is not uncommon for more than one waste management unit type to be grouped together. Timing of characterization efforts was an additional factor in establishing the site groupings. A more extensive site characterization/remediation effort in one area could readily accommodate a limited sampling effort in the same vicinity.

The following sections describe the site groupings determined in each site area.

2.2.1 100B/C Area

In the 100B/C Area, 28 sites have been identified. Of these 28 sites, 12 may be organized into groups. The remaining 16 sites would be addressed individually.

The 12 sites have been organized into five groups of waste sites to facilitate scheduling and planning of anticipated additional site investigation. In each grouping, waste sites are as follows:

A.	116-B-6(1)	111B Crib
	116-B-6-2	111B Crib
	118-B-7	Burial Ground
	118-B-5	Burial Ground
B.	116-B-10	Dry well, Quench Tank
	118-B-6	Burial Ground
C.	116-B-5	Crib
	116-B-9	French Drain
D.	118-B-3	Burial Ground (Construction)
	118-B-2	Burial Ground (Construction)
E.	107-B	Retention basin
	107-C	Retention basin (tanks)

[Note: CERCLA site 116-B-1 should be considered for inclusion in this group.]

The sites in the first four groups (A-D), have been identified as requiring verification that no residual contamination remains. Release of contaminants to subsurface soil is projected to have occured at all sites. The individual groupings are based on geographic proximity.

Group E consists of three large retention basins exhibiting residual radioactivity and surrounded by contaminated soil, and a CERCLA site (trench) which received effluent from the retention basins. Although these sites are encompassed by a relatively large area (1000 feet on each side), it is useful to consider these sites as a unit for the purpose of corrective action as they are part of the same processing facility and the zones of contamination for each one may be indistinguisable. Site remediation has been recommended for both RCRA sites 107-B and 107-C.

2.2.2 100 D/DR Area

In the 100 D/DR Area, 24 sites have been identified. Of these 24 sites, 10 may be organized into groups. The remaining sites would be addressed individually.

The 10 sites have been organized into four groups of waste sites. Sites within each group are sufficiently close in proximity and like in character to be treated as a unit for the purpose of site remediation/corrective action. The groups are as follows:

A. 116-DR-4 Crib
   116-DR-3 Crib
   118-D-5 Burial Ground
   116-DR-8 Crib
   [Note: CERCLA site 116-DR-7 should also be included in the group.]

B. 116-D-3 French Drain
   116-D-4 French Drain

C. 116-D-6 French Drain
   116-D-2 Crib

D. 107-D Retention Basin
107-DR Retention Basin
[Note: CERCLA sites 116-DR-1 and 116-DR-2 should be considered for inclusion in this group.]

In Group A, subsurface soil contamination is likely to be an issue at each site and the sites are located near one another. It has been recommended that these sites be examined for residual contamination. In Groups B and C, French Drains and Cribs are located in close proximity. Again, subsurface soil contamination is anticipated to have occured and each site should be evaluated for residual contamination. Group D consists of two Retention Basins both of which are currently radioactive. Soil contamination has been documented and surface water and ground water contamination is likely to have occured. Remediation has been recommended for both sites in this group.

2.2.3 100 F Area

In the 100 F Area, 22 sites have been identified. Of these 22 sites, 8 sites may be organized into groups. The remaining sites would be addressed individually.

The 8 sites have been organized into four groups of waste sites to facilitate planning and scheduling of site remediation/corrective action. Waste sites in each of these groups are sufficiently close in proximity or like in character to be considered as a unit. The four groups are as follows:

Group A

118-F-1 Burial Ground
118-F-6 Solid Waste Burial Ground

Group B

116-F-13 Experimental garden
116-F-12 French drain

Group C

116-F-11	French drain
1608-F	Pumping station

Group D

118-F-4	Pit
118-F-3	Burial ground

Release of contaminants to soil is the primary issue at all of these sites. Recommendations have been made to verify that no release has occured, or to verify that no hazardous constituents or residual contamination remains. The geographic proximity of the sites was a key factor in each grouping.

In developing plans for remediation in the 100 F Area, CERCLA site 116-F-3 is quite close to RCRA site 116-F-4 (crib) and these two sites could be addressed together.

2.2.4 100 H Area

In the 100 H Area, 15 sites have been identified. These sites are not sufficiently close enough in proximity, or like in character, to develop "groupings" for the purposes of site remediation/corrective action. However, RCRA site 118-H-5 is near the 116-H-2 CERCLA site and these two units could be addressed together or may be influencing each other.

2.2.5 100 KE/KW Area

In the 100 KE/KW Area, 23 sites have been identified. Of these 23 sites, 10 sites may be organized into groups. The remaining sites would be addressed individually.

The 10 sites have been organized into three groups of waste sites to facilitate scheduling/planning of site remediation and corrective action. These sites are sufficiently close in proximity and like in character to

warrant consideration as a unit or group. The first group (A) is composed of four RCRA sites, but is in the immediate vicinity of two related CERCLA sites, as follows:

Group A

183-KE Sodium dichromate tank
183-KE1 Sulfuric acid tank
183-KE2 Sulfuric acid tank
100KE*3 Filter water facility trench
(100KE*2: CERCLA site)
(100KE*1: CERCLA site)

In Group B, release of contaminants to soil is the primary issue of concern. Recommendations have been made to verify that no residual contamination remains, or that no release has occured.

Group B

116-KE-3	French drain
116-KE-1	Crib
105-KE	Diesel fuel tank.

Group C is composed of three RCRA sites but is in the vicinity of two related CERCLA sites. At the RCRA-designated sites, release of contaminants to soil is anticipated to have occured, and recommendations have been made to verify that no residual contamination remains.

Group C

183-KW	Sodium dichromate tank
183-KW1	Sulfuric acid tank
183-KW2	Sulfuric acid tank
(100KW*2	CERCLA site)
(100KW*1	CERCLA site)

2.2.6 100 N Area

In the 100 N Area, 11 sites have been identified. Of these 11 sites, 8 sites may be organized into groups. The remaining sites would be addressed individually.

The 8 sites have been organized into three groups of waste sites to facilitate scheduling/planning of site remediation and corrective action. Waste sites within each of these groups are sufficiently close in proximity and like in character to be treated as a unit. Group A consists of two French drains which have received sulfuric acid:

Group A

108-N	French drain
120-N-7	Acid unloading facility French drain

Soil contamination is the primary issue of concern at both sites.

Group B consists of four septic tanks. Subsurface soil contamination is anticipated at all of these locations and recommendations have been made to verify that no residual contamination remains.

Group B

124-N-5	Septic tank
124-N-6	Septic tank
124-N-7	Septic tank
124-N-8	Septic tank

Group C consists of two sites at which diesel oil supply line leaks had occured.

UN-116-N-22
UN-116-N-23.

2.2.7 200 East Area

In the 200 East Area, 155 sites have been identified. Of these 155 sites, 118 sites may be organized into groups. The remaining sites would be addressed individually.

The 118 sites have been organized into twenty-six (26) groups of waste units. These units are grouped based on: (1) their proximity, (2) their commonalities such as type of unit, type of wastes, or type of releases to the environment, and (3) a combination of these two factors.

The grouping of the waste units in the 200 East Area is as follows:

Group A

216-B-47	Crib
216-B-48	CERCLA Site
216-B-49	CERCLA Site
216-B-50	CERCLA Site
216-B-43	CERCLA Site
216-B-44	CERCLA Site
216-B-45	CERCLA Site
216-B-46	CERCLA Site

Group B

241-BX	Tank Farm
241-BXR-153	Diversion Box
241-BX-155	Diversion Box
241-BX-153	Diversion Box
241-BXR-152	Diversion Box
241-BX-154	Diversion Box
241-BX-302-A	Catch Tank
241-BX-302-B	Catch Tank
241-BX-302-C	Catch Tank

(Sites are within confines of tank farm boundary)

Group C

241-BY	Tank Farm
241-BYR-151	Diversion Box
241-BYR-152	Diversion Box
241-BYR-153	Diversion Box
241-BYR-154	Diversion Box

(Sites are within confines of tank farm boundary)

Group D

241-B	Tank Farm
241-B-151	Diversion Box
241-B-152	Diversion Box
241-B-153	Diversion Box
241-B-154	Diversion Box
241-B-252	Diversion Box
241-BR-152	Diversion Box
242-B	Evaporator
241-B-301-B	Catch Tank
241-B-301-C	Catch Tank
241-B-302-B	Catch Tank

(Sites are within confines of tank farm boundary)

Group E

216-B-35	Trench
216-B-36	Trench
216-B-37	Trench
216-B-38	Trench
216-B-39	Trench
216-B-40	Trench
216-B-41	Trench
216-B-42	Trench

Group F

218-E-2	Burial Ground
218-E-5	Burial Ground
218-E-9	Burial Vault
218-E-2A	Burial Ground
218-E-4	Burial Ground

Group G

216-B-4	Reverse Well
216-B-13	French Drain
218-E-6	Burial Ground
218-E-7	Burial Vaults
UPR-200-E-80	Waste Line

Group H

216-B-10B	Crib
216-B-10A	CERCLA Site

Group I

216-B-2-1	Ditch
216-B-2-2	CERCLA Site

Group J

216-B-3-1	Ditch
216-B-3-2	Ditch

Group K

241-C	Tank Farm
216-E-9	Burial Vault
241-C-252	Diversion Box
241-C-151	Diversion Box
241-C-152	Diversion Box
241-C-153	Diversion Box
241-C-154	Diversion Box
241-CR-151	Diversion Box
241-CR-152	Diversion Box
241-CR-153	Diversion Box

(Sites are within confines of tank farm boundary)

Group L

216-A-18	Trench
216-A-19	Trench
216-A-20	Trench
216-A-34	Ditch

Group M

241-AZ-151	Diverter Station
241-AZ-151	Catch Tank
216-A-39	Crib

Group N

216-A-41	Crib
216-A-40	CERCLA Site

Group O

241-CX-70	Tank
241-CX-72	Tank
241-C-6	Crib
241-C-5	Crib
(216-C-1	CERCLA)

Group P

216-C-4	Crib
216-C-3	Leaching Pit

Group Q

216-A-3	Crib
216-A-22	Crib
(216-A-2B	CERCLA)

Group R

216-A-13	French Drain
216-A-35	French Drain

Group S

216-A-12	French Drain
216-A-14	French Drain

Group T

216-A-15	French Drain
(216-A-5	CERCLA)

Group U

216-A-33	French Drain
216-A-2	Crib
216-A-26A	French Drain
(216-A-4	CERCLA)

Group V

241-A	Tank Farm
216-A-16	French Drain
216-A-17	French Drain
216-A-23A	French Drain
216-A-23B	French Drain
241-A-152	Diversion Box
241-A-153	Diversion Box
241-A-302-B	Catch Tank

(Sites are within confines of tank farm boundary)

Group W

241-AY-152	Diversion Box
241-AY-152	Diverter Station

Group X

216-A-1	Crib
(216-A-7	CERCLA)

Group Y

216-B-14	Crib
216-B-15	Crib
(216-B-16	CERCLA)
216-B-17	Crib
216-B-18	Crib
216-B-19	Crib

Group Z

216-B-20	Trench
216-B-21	Trench
216-B-22	Trench
216-B-23	Trench
216-B-24	Trench
216-B-25	Trench
216-B-26	Trench
216-B-27	Trench
216-B-28	Trench
216-B-29	Trench
216-B-30	Trench
216-B-31	Trench
216-B-32	Trench
216-B-33	Trench
216-B-34	Trench
216-B-52	Trench
216-B-53A	Trench
216-B-53B	Trench
216-B-54	Trench
216-B-58	Trench

2.2.8 200 West Area

In the 200 West Area, 147 sites have been identified. Of these 147 sites, 75 sites may be organized into groups. The remaining sites would be addressed individually.

The 75 sites have been organized into eighteen (18) groups of waste units. These units are grouped based on: (1) their proximity, (2) their commonalities such as type of units, type of wastes, or type of releases to the environment, and (3) a combination of these two factors.

The grouping of the waste units in the 200 West area is as follows:

Group A

Trench	216-T-14
Trench	216-T-15
Trench	216-T-16
Trench	216-T-17

Group B

Crib	216-T-26
Crib	216-T-27
Crib	216-T-28 (CERCLA)

Group C

Crib	216-Z-6
Ditch	216-Z-17
Trench	216-Z-4
Crib	216-Z-5
Crib	216-Z-10 (CERCLA)

Group D

Trench	216-T-9
Trench	216-T-10
Trench	216-T-11

Group E

Trench	216-T-21
Trench	216-T-22
Trench	216-T-23
Trench	216-T-24
Trench	216-T-25

Group F

Tile Field	216-Z-1A
216-Z-182 (CERCLA)	

Group G

Pond	216-S-15
French Drain	216-S-3 (CERCLA)

Group H

Ditch	216-T-4-1
Ditch	216-T-4-2
Pond	216-T-4

Group I

Trench	216-U-6
Trench	216-U-5
French Drain	216-U-7

Group J

Burial Ground	218-W-4A
Burial Ground	218-W-11
Burial Ground	218-W-1
Burial Ground	218-W-2
Burial Ground	218-W-3

Group K

Ditch	216-Z-1
Ditch	216-Z-19
Ditch	216-Z-11
Ditch	216-Z-9
Pond	216-U-10

Group L

Vault	218-W-7
Vault	218-W-8

Group M

Diversion Box	241-UR-154
Diversion Box	241-UR-153
Diversion Box	241-U-252
Diversion Box	241-U-153
Diversion Box	241-UR-152
Catch Tank	241-U-301
Tank Farm	241-U
Vault	244-UR

(Sites are within confines of tank unit boundary)

Group N

Diversion Box	240-S-151
Diversion Box	240-S-152
Diversion Box	241-S-152
Catch Tank	240-S-302
Tank Farm	241-S

(Sites are within confines of tank unit boundary)

Group O

Diversion Box	241-SX-151
Diversion Box	241-SX-152
Catch Tank	241-SX-302
Tank Farm	241-SX

(Sites are within confines of tank farm boundary)

Group P

Diversion Box	241-TX-153
Diversion Box	241-TXR-152
Diversion Box	241-TXR-153
Diversion Box	241-TXR-244
Diversion Box	241-TXR-151
Diversion Box	241-TXR-155
Catch Tank	241-TX-302-A
Catch Tank	241-TX-302-B
Tank Farm	241-TX
Evaporator	242

(Sites are within confines of tank farm boundary)

Group Q

Diversion Box	241-TR-152
Diversion Box	241-T-152
Diversion Box	241-TR-153
Diversion Box	241-T-151
Catch Tank	241-301-B
Tank Farm	241-T

(Sites are within confines of tank farm boundary)

Group R

Diversion Box	241-TY-153
Catch Tank	241-TY-302-A
Catch Tank	241-TY-302-B
Tank Farm	241-TY

(Sites are within confines of tank farm boundary)

As identified above, there are four groups of RCRA units that are each near a CERCLA unit. As a result of such proximity to a site requiring action, the need for action previously suggested for some RCRA units is reconsidered based on the grouping to reflect the integrated process of recommending resolutions to waste units. For example, group E consists of five trenches that are located next to each other. A preliminary review

indicated that only trench 216-T-21 required remediation, while the remaining trenches (216-T-22, 23, 24, and 25) would only require verification that there is no residual contamination. However, because of the grouping, all trenches in the group are recommended for remediation since the trench requiring remediation is expected to have impacted the nearby trenches and it is difficult to remediate one without disturbing the other units.

2.2.9 200 North Area

In the 200 North Area, 7 sites have been identified. Of these 7 sites, 2 sites may be organized into groups. The remaining sites would be addressed individually. The 2 sites have been organized into a single grouping for characterization, as follows:

Group A

216-N-2	Trench
216-N-3	Trench

Both trenches have been identified for characterization to determine whether residual contamination is present. The primary consideration is their close proximity.

2.2.10 300 Area

In the 300 Area, 18 sites have been identified. Of these 18 sites, 6 sites may be organized into groups. The remaining sites would be addressed individually.

The 6 sites have been organized into three groups of waste sites to facilitate scheduling and planning of site remediation/corrective action. Waste sites in these groups are sufficiently close in proximity to be considered as a unit. These three groups are as follows:

Group A

(no number)	Uranium Acid Spill (313 Bldg)
(no number)	Methanol Storage Tank

Group B

UPR-300-31/40	Unplanned releases
(no number)	311 Tank farm

Group C

(no number)	323 Tanks
316-4	Cribs

In addition to the three groups noted above, a group of four 600 Area waste sites which are located at the northern end of the 300 area, have been identified to facilitate timing of corrective action. The four burial grounds are sites 618-1, 618-2, 618-3, and 618-8. Sites 618-2 and 618-3 form one large continuous unit.

2.2.11 400 Area

In the 400 Area, 5 sites have been identified. Of these 5 sites, 2 sites may be organized into one group. The remaining sites would be addressed individually.

The one site grouping consists of "400 Area retired French drains" and the "400 Area retired Sand bottom Trench". Both of these sites require verification that there are no hazardous constituents associated with the sites and they are located in close proximity.

2.2.12 600 Area

With the exception of the four burial grounds near the 300 Area (618-1, 618-2, 618-3, 618-8), none of the 31 waste sites in the 600 Area are in close enough proximity to constitute a group for the purposes of site remediation/corrective action. The 600 area sites should therefore be addressed individually. However, in developing a schedule for further site investigation and remediation, the following sites may be considered together:

- 618-9 West Burial Ground
  618-13 Contaminated Soil Burial Ground
  Horn Rapids Disposal

- 618-7 Burial Ground No. 7
  618-4 Burial Ground No. 4
  618-6 Burial Ground No. 6

The grouping of the burial grounds was described in Section 2.2.10.

2.2.13 700 Area

Only one site is identified in the 700 Area. This site, an underground tank, is the only "group" for this area.

2.2.14 1100 Area

In the 1100 Area, 4 sites have been identified. None of these sites are in close enough proximity to constitute a group and should therefore be addressed individually within the 1100 Area.

KEY TO TABLES 2-1 TO 2-14

Site Type Code (Column two of the Tables)

A	-	aboveground covered landfill
B	-	aboveground uncovered landfill
C	-	belowground covered landfill
D	-	belowground landfill
E	-	surface impoundments
F	-	ditches
G	-	underground dispersion systems
H	-	aboveground tank
I	-	underground tank
J	-	spills
K	-	underground vault
L	-	burning pit
M	-	incinerator
N	-	process sewer
O	-	other

TABLE 2-1. 100B/C WASTE CONSTITUENTS MATRIX

100 B/C Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
Burial Ground	C	110-B-1	100-B Burial Ground 110-B-1	Y	ND	ND	ND	?	Y	ND	Y	Y	Y	1.00E+06 KG		Y		METALLIC AND REACTOR WASTES
Burial Ground	C	110-C-1	100-C Burial Ground 110-C-1	Y	ND	ND	ND	?	Y	NS	Y		?	1.00E+06 KG		Y		MISC. SOLID WASTE INCLUDING CONTROL RODS, REACTOR HARDWARE, PROCESS TUBES, AND ALUMINUM SPACERS.
Burial Ground	C	110-B-7	111-B Solid Waste Burial Site	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		?		MISC. SOLID WASTES: DECONTAMINATION MATERIALS AND ASSOCIATED MATERIALS
Burial Ground	C	110-B-3	Construction Burial Ground 02	Y	ND	ND	ND	ND	ND	ND	ND	ND	?	4.00E+06 KG		?		SOLID WASTE: FROM EFFLUENT LINE AND REACTOR
Burial Ground	C	110-B-4	105-B Spacer Burial Ground	Y	ND				Y		ND	ND	?	2.00E+05 KG			?	FUEL SPACERS: PRESUMED TO BE STAINLESS STEEL.
Burial Ground	C	110-B-6	108-B Solid Waste Burial Ground	ND		ND	ND	ND	ND	ND		Y	?	1.00E+04 KG			?	TRITIUM WASTES (LABORATORY)
Burial Ground	C	110-B-2	Construction Burial Ground 01	Y	ND	ND	ND	ND	ND	ND	ND	ND	?	8.00E+04 KG		?		DRY WASTE FROM 107-B BASIN REPAIR WORK AND 116-B ALTERATIONS
Burial Ground	C	110-B-5	Ball 3X Burial Ground 110-B-5	Y		ND	ND	ND	ND	ND	ND	ND	?	2.00E+04 KG			?	"HEAVILY CONTAMINATED WASTES"...OLD THIMBLES, STEP PLUGS, ETC.
Burning Pit	L	100B/C	100 B/C Burning Pit	Y	I	Y	Y	Y	ND	ND				ND	Y			NONRADIOACTIVE COMBUSTIBLE MATERIALS: INCLUDES PAINTS AND SOLVENTS
Crib	B	116-B-5	100-B Crib 116-B-5 (5)	Y	ND	?	?	?	?	?	Y	Y	Y	1.00E+07 L		?		FISSION PRODUCT WASTES FROM CONTAMINATED MAINTENANCE SHOP AND DECONTAMINATION PRO
Crib	B	116-B-6-1	111-B Crib 01 116-B-6-1	Y	I	?		Y	Y	ND	Y	Y	Y	5.00E+03 L		Y		DECONTAMINATION WASTES
Crib	B	117-BN	117-B Crib	Y	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.20E+05 L		?		DRAINAGE FROM CONFINEMENT SYSTEM: 117 BLDG. SEAL PITS.
Crib	B	117-C#	117-C Crib	Y	ND	ND	ND	ND	ND		ND	ND	ND	4.00E+05 L		?		DRAINAGE FROM CONFINEMENT SYSTEM IN THE 117 BLDG. SEAL PITS.
Crib	B	116-B-6-2	111-B Crib 02 116-B-6-2	Y	I	?	ND	Y	Y	ND	Y	Y	Y	5.00E+03 L		?		EQUIPMENT DECONTAMINATION WASTES
Crib	B	116-B-3	108-B Pluto Crib 116-B-3	Y	I	ND	ND	Y	?	ND	Y	Y	Y	4.00E+03 L		Y		EFFLUENT FROM REACTOR TUBES; BORON SUSPECTED.
Crib Sandfilter	B	116-C-2-2	105-C Pluto Crib Sandfilter	Y	ND	ND	ND	ND	ND	ND	Y	Y	Y	3.50E+06 L		?		WASTES FROM DECONTAMINATION OF FUEL ELEMENTS
Dry Well	B	116-B-10	108-B Dry Well, Quench Tank	Y	ND	ND	ND	ND	ND	ND	ND	ND	?	5.00E+06 L		?		LIQUID FROM DECONTAMINATION WASTES: TUBE EXAM AND EXPERIMENTAL FACILITY
French Drain	B	116-B-9	104-B-2 French Drain	Y	ND	ND	ND	ND	ND	ND	ND	ND	?	4.00E+05 L		?		WASTE FROM P-10 STORAGE BLDG. DRAIN.
Pit	E	104-BN	104-B Powerhouse Ash Pit (3)	Y	ND				?					ND	Y			COAL ASH SLUICED WITH RIVER WATER. TESTING SHOWS NOT EP TOXIC.
Retention Basin	E	107-BN	107-B Retention Basin	Y	ND	NS	NS	Y	NS	NS	ND	ND	Y	ND			Y	RECEIVED COOLING WATER FROM 108 REACTOR.
Sump Tanks	I	107-C#	107-C Retention Basin	Y	ND	NS	NS	Y	NS	NS	Y	Y	?	ND			Y	COOLING WATER FROM 105 REACTOR.
Sump	E	108-BN	108-B Battery Acid Sump (3)	Y	Y			Y	?					ND	Y			BATTERY ACID
Tank	I	110-C-2	105-C Ball Storage Tank	ND	ND			Y	Y		ND	ND	Y	ND			Y	RADIOACTIVE BORON STEEL BALLS
Tank/Tile Field	I	1607-03N	1607-03 Septic Tank (3)	Y	ND	ND	ND	ND	ND	ND				ND	Y			SANITARY SEWAGE FROM 104-B POWERHOUSE. OPERATIONS FEEDING TO THIS SYSTEM NOT SPECIFIED.
Tank/Tile Field	I	1607-00N	1607-00 Septic Tank (3)	Y	ND	ND	ND	ND	ND	ND				ND	Y			SANITARY SEWAGE FROM 190-C PUMPHOUSE. OPERATIONS LEADING TO THIS SYSTEM NOT SPECIFIED.
Tank/Tile Field	I	1607-07N	1607-07 Septic Tank (3)	Y	ND	ND	ND	ND	ND	ND				ND	Y			SAME AS 1607-00.
Tank/Tile Field	I	1607-01N	1607-01 Septic Tank (3)	Y	ND	ND	ND	ND	ND	ND				ND	Y			SANITARY SEWAGE FROM FIRE STATION, OFFICES, CHANGE ROOMS AND SECURITY CHECKPOINT.
Trench	C	116-B-2	108-B Storage Basin Trench	Y	ND			?			Y	Y	?	4.00E+06 L			?	CONTAMINATED WASTE WATER FROM 108-B STORAGE BASIN: FUEL ELEMENT WASTE; BORON SUSPECTED

KEY: Y= yes; ND= no data; # = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-2. 100D/DR WASTE CONSTITUENTS MATRIX

100 D/DR Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	MATRIX OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
Basin Trench	E	116-UR-3	105-DR Storage Basin Trench	Y	ND			?			Y	Y	Y	4.00E+06 L			Y	CONTAMINATED SLUDGE AND WATER FROM FUEL STORAGE BASIN. INCLUDED TRITIUM.
Basin Trench	C	116-D-1A	105-D Storage Basin Trench 01	Y	ND	ND	ND	Y	ND		ND	ND	Y	2.00E+05 L			?	CONTAMINATED WATER AND SLUDGE FROM 105-D STORAGE BASIN.
Burial Ground	C	110-D-3	100 D Burial Ground 03 110-D-3	Y	I	ND	ND	ND	Y		Y		Y	7.00E+04 KG		?		BURIAL GROUND FOR IRRADIATED SOLID METALLIC WASTE. INCLUDED TRITIUM AND 100M SOLID WASTE.
Burial Ground	C	110-D-4	Construction Burial Ground	Y	ND				P		Y	ND	Y	1.00E+07 KG		?		BURIAL GROUND: CONTAMINATED MATERIAL FROM REACTOR BLDG....COMPONENTS AND HARDWARE
Burial Ground	C	110-D-1	100 D Burial Ground 01 110-D-1	Y	ND	ND	ND	ND	Y		Y	ND	Y	1.06E+06 KG		?		BURIAL GROUND FOR IRRADIATED SOLID WASTE AND METALIC WASTE NOT STATED THAT THESE TRENCHES WERE CLOSED ASSUMED SO HOWEVER.
Burial Ground	C	110-D-2	100 D Burial Ground 02 110-D-2	ND	ND	ND	ND	ND	Y		Y	ND	Y	1.00E+06 KG		?		BURIAL GROUND FOR CONTAMINATED/IRRADIATED SOLID WASTE AND METAL WASTE, 100M WASTE, TOO.
Burial Ground	C	110-D-5	Ball 3M Burial Ground 110-D-5	Y	ND				Y		Y	ND	Y	6.00E+03 KG			P	BURIAL GROUND FOR THIMBLES FROM REACTOR BLDG.
Burial Ground	C	110-DR-1	105-DR Gas Loop Burial Ground	Y	ND				Y		Y	ND	Y	1.00E+04 KG			P	IRRADIATED METAL ASSEMBLIES.
Burning Pit	L	100-D/DR#	100 D/DR Burning Pit	Y	I	Y	Y	?	?	ND				1.00E+03 M3	Y			BURNING OF PAINT WASTES, SOLVENTS, OTHER CHEMICALS.
Crib	B	117-DR	117-D Crib	Y	ND	ND	ND	ND	ND	ND	ND	ND		4.20E+05 L		ND	ND	DRAINAGE FROM CONTAINMENT SYSTEM. 1978 SAMPLING: NO RADIOACTIVITY ABOVE BACKGROUND
Crib	B	116-DR-4	105-DR Pluto Crib 116-DR-4	Y	ND			?	ND	ND	Y	Y	Y	4.00E+03 L		?		EFFLUENT FROM TUBES CONTAINING FAILED FUEL ELEMENTS.
Crib	B	116-DR-8	117-DR Crib	Y	ND	ND	ND	ND	ND	ND	ND	ND	Y	2.40E+05 L		?		DRAINAGE FROM CONTAINMENT SYSTEM SEAL PITS.
Crib	B	116-D-2	105-D Pluto Crib 116-D-2	Y	I	ND		Y	ND	ND	ND	ND		4.00E+03 L		?		WASTES FROM FAILED FUEL ELEMENTS. SODIUM BICHROMATE ALSO IDENTIFIED
French Drain	B	116-D-3	100-D Crib 01 116-D-3	Y	ND	?	ND	?	?	?	Y	ND	?	3.00E+05 L		?		WASTES FROM CONTAMINATED MAINTENANCE SHOP AND CASK DECONT. PAD.
French Drain	B	116-D-4	100-D Crib 02 116-D-4	Y	ND	?	ND	?	?	?	Y	ND	Y	3.00E+05 L		?		WASTES FROM CONTAMINATED MAINTENANCE SHOP AND CASK DECONT. PAD
French Drain	B	116-D-6	105-D Cushion Corridor French	ND	ND	ND	ND	ND	ND	ND	ND	ND	P	1.00E+06 L		?		DOMESTIC WATER FROM CHANGING ROOM, AND WATER FROM MASK DECONT. STATION.
Pumping Station	B	1608-DR#	1608-DR Waste Water Pumping	Y	Y	Y		Y		R	Y	Y	?	ND		Y		PUMPING UNIT RECEIVING WATER FROM REACTOR BLDG. DRAINS...TRACE AMTS OF LOW LEVEL RADIONUCL. AND DECONTAM. CHEMICALS. RADIONUCL. INVENTORY DATA AVAILABLE BUT NOT DETAILED IN SUMMARY.
Pumping Station	B	1608-DR	1608-D Waste Water Pumping	Y	Y	Y		Y		R	Y	Y	?	ND		Y		PUMPING UNIT RECEIVING WATER FROM REACTOR BLDG. DRAINS...LOW LEVEL RADIONUCL. AND DECONTAM. CHEMICALS.
Retention Basin	E	107-DR	107-D Retention Basin	Y	ND			?			ND	ND	Y	ND		?		CONCRETE-LINED, ASPHALT-COATED BASIN. RECEIVED REACTOR COOLING WATER EFFLUENT PRIOR TO DISCHARGE TO COLUMBIA RIVER.
Retention Basin	E	107-DR#	107-DR Retention Basin	Y	ND				ND		ND	ND	Y	ND		?		CONCRETE-LINED BASIN. RECEIVED REACTOR COOLING WATER EFFLUENT. CONTAMINATED/RADIOACTIVE BASIN WALLS AND SURROUNDING SOIL.
Storage Pad	B	100-DR	100-D Cask Storage Pad (3)	ND	ND	?	ND	?	ND	? R	ND	ND	Y	ND		?		STORAGE PAD RECEIVED RADIONUCL. AND DECONTAM. CHEMICALS. TRACE AMOUNTS REMAIN. STORAGE PAD DISCHARGES TO PROCESS SEWER. PAD CONTAINS ONE CONTAMINATED DRAIN.
Tank	I	1706-DR	1706-D Gas Storage Tank (3)	Y	Y	Y	Y								Y			STORAGE TANK CONTAINED GASOLINE...HAS EMPTIED AND FILLED WITH WATER. PRESENTLY CONTAINS WATER.
Tank/Tile Field	B	1607-D1#	1607-01 Septic Tank	Y	ND	ND	ND	ND	ND					ND	Y			SEPTIC TANK RECEIVED SANITARY WASTEWATER FROM SECURITY CHECKPOINT (GARAGEHOUSE) AND OTHER BUILDINGS.
Tank/Tile Field	B	1607-D4#	1607-04 Septic Tank	Y	ND	ND	ND	ND	ND					ND	Y			SEPTIC TANK RECEIVED SANITARY WASTEWATER FROM GAS RECIRCULATION BLDG.

KEY: Y= yes; ND= no data; # = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-3. WASTE CONSTITUENTS MATRIX

100 F Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste: Source Identified	Waste: Chemicals Identified	Chemical Components: Organics	Chemical Components: Volatiles	Chemical Components: Inorganics	Chemical Components: Metals	Chemical Components: pH	Other Residual: Fission Products	Other Residual: Radio-nuclides	Other Residual: Radio-Activity	Waste Volume Disposed	Mixture of Waste: Solid/Non-Haz. Waste	Mixture of Waste: Mixed Waste	Mixture of Waste: Rad. Only	Comments
Burial Ground	C	118-F-4	115-F Pit 118-F-4	Y	NO	?	NO	?	NO	NO	NO	NO	?	1.00E+04 M3		?		SILICA [illegible] FILTERS
Burial Ground	C	118-F-3	Burial Ground 82 118-F-3	Y	NO	NO	NO	NO	Y	NO	Y	NO	Y	7.0[illegible] M3		?		MISCELLANEOUS [illegible] CHEMICALS, STEP PLUGS; REMOVED FROM 100-F PILE.
Burial Ground	C	118-F-1	Burial Ground 81 118-F-1	Y	NO	NO	NO	NO	?	NO	Y	NO	Y	1.0[illegible]E+07 M3		?		MISCELLANEOUS RAD. SOFT WASTES, REACTOR COMPONENTS AND HARDWARE.
Burial Ground	C	118-F-2	Burial Ground 82 118-F-2	Y	NO	NO	NO	NO	?	NO	Y	?	Y	1.00E+06 M3		?		MISCELLANEOUS RAD. SOFT WASTES, REACTOR COMPONENTS AND HARDWARE.
Burial Ground	C	118-F-6	PNL Solid Waste Burial Ground	Y	I	?	NO	?	?	NO	Y	NO	Y	1.00E+04 M3		?		ANIMAL AND BIOLOGY LABORATORY WASTES.
Burial Ground	C	118-F-5	PNL Sandbed Repository 118-F-5	Y	Y						Y	Y	?	1.00E+04 M3			Y	LOW LEVEL ACTIVITY SANDBAGS FROM PENS.
Burial Vault	E	118-F-7	100F Miscellaneous Hardware	Y	NO	NO	NO	NO	NO	NO	Y	?	Y	1000 M3 (cap)			?	MISCELLANEOUS REACTOR HARDWARE.
Burning Pit	L	100-F8	100-F Burning Pits 82	Y	I	?	?	?	?	NO				NO	Y			NON-RAD. COMBUSTIBLE MATERIALS; PAINT WASTE, CHEMICAL SOLVENTS, OFFICE WASTES.
Crib	G	116-F-4	105-F Plute Crib 116-F-4 (5)	Y	NO	NO	NO	Y	?	NO	Y	Y	Y	4.00E+03 LITR		?		EFFLUENT FROM TUBES WITH FAILED FUEL ELEMENTS.
Crib	G	116-F-5	Ball Washer Crib 116-F-5	Y	NO	NO	NO	NO	NO	NO	Y	NO	Y	3.00E+03 LITR		?		DECON. WASTE FOR DRUM STEEL BALLS.
French Drain	G	116-F-12	140-F French Drain 116-F-12	Y	NO						NO	NO	?	1.00E+04 LITR			?	RECOVERED EFFLUENT PUMP PRIME.
French Drain	G	116-F-11	100-F Cushion Corridor French	Y	NO	NO	NO	NO	NO	NO	NO	NO	?	2.00E+05 LITR		?		CUSHION CORRIDOR DECON WASTE.
French Drain	G	116-F-13	1708-F Experimental Garden	Y	NO	NO	NO	NO	NO	NO	NO	NO	?	1.00E+04 LITR		?		EFFLUENT WATER FROM DRAWN EXPERIMENT.
French Drain	G	116-F-7	117-F Crib 116-F-7	Y	NO	NO	NO	NO	NO	NO	Y	Y	Y	3.00E+05 LITR			?	DRAINAGE FROM CONTAINMENT SEAL PITS.
Pit	E	104-F8	104-F Powerhouse Ash Pit (3)	Y	NO				?					NO	Y			COAL ASH SLUICED WITH RIVER WATER. ASH TESTS AS NOT EP TOXIC.
Pumping Station	G	1608-F8	1608-F Wastewater Pumping	Y	Y	Y		Y		A	?	?	?	NO			Y	BUILDING DRAINS: LOW-LEVEL RAD. AND DECON. CHEMICALS.
Retention Basin	E	107-F8	107-F Retention Basin	Y	NO			?			?	?	Y	NO			?	REACTOR COOLING WATER EFFLUENT.
Tank/Tile Field	G	1607-F6m	1607-F6 Septic Tank	Y	NO									NO	Y			SANITARY WASTE FROM BUILDINGS AND ANIMAL FARMS.
Tank/Tile Field	G	1607-F1m	1607-F1 Septic Tank	Y	NO									NO	Y			SANITARY WASTE FROM FIRE STATION, CHANGE ROOMS, OFFICES.
Tank/Tile Field	G	1607-F5m	1607-F5 Septic Tank	Y	NO									NO	Y			SANITARY WASTE FROM PUMPHOUSE.
Tank/Tile Field	G	1607-F3m	1607-F3 Septic Tank	Y	NO									NO	Y			SANITARY WASTE FROM PUMP STATION, WATER TREATMENT PLANT, AND SUBSTATION.
Tank/Tile Field	G	1607-F4m	1607-F4 Septic Tank	Y	NO									NO	Y			SANITARY WASTE FROM GAS RECIRCULATION BUILDING.

KEY: Y= yes; NO= no data; m = official number not assigned but identified by unit number; blank: no; I= incomplete data

8/26/87.

TABLE 2-4. 100H WASTE CONSTITUENTS MATRIX

100 H Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	MIXTURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
Burial Ground	C	110-H-2	H-1 Loop Burial Area, 100-H	ND	ND			ND	Y	ND	Y	ND	Y	1.00E+03 KG		?		CONCRETE VAULTS RECEIVED STEEL TUBE FROM REACTOR AND SMALL AMOUNTS OF CONTAMINATED PIPE(1958-1968).
Burial Ground	C	110-H-3	Construction Burial Ground	Y	ND	ND	ND	ND	?	ND	Y	ND	Y	3.00E+06 KG		?		BURIAL GROUND RECEIVED CONTAMINATED PIPE, REACTOR HARDWARE AND COMPONENTS(1955-1957).
Burial Ground	C	110-H-4	Bell 3H Burial Ground 110-H-4	Y	ND			ND	Y	ND	Y	ND	Y	1.00E+04 KG		?		BURIAL GROUND RECEIVED IRRADIATED SOLID WASTE KG.,THIMBLES AND GUIDES(1953-1955).
Burial Ground	C	110-H-1	100 H Burial Ground 01 110-H-1	ND	ND	ND	ND	ND	Y	ND	Y	ND	Y	1.06E+06 KG		?		BURIAL GROUND CONTAINING MISC. SOFT WASTES, REACTOR COMPONENTS AND HARDWARE(1948-1964). TRITIUM.
Burning Pit	L	100-H2=	100-H2 Burning Pit for Residue	ND	I	Y	?	?	?	ND				ND	Y			DISPOSAL/COMBUSTION OF OFFICE AND PAINT WASTES, AND CHEMICAL SOLVENTS. RESIDUAL CONTAMINATION /INCOMPLETE COMBUSTION POSSIBLE. 1948-1968
Burning Pit	L	101-H=	100 H Burning Pit	Y	I	Y	?	Y	?	ND				ND	Y			DISPOSAL/BURNING OF NON-RADIOACTIVE COMBUSTIBLE WASTE ED., PAINT AND OFFICE WASTES, AND CHEMICAL SOLVENTS(1949-1969)
Crib	G	117-H=	Crib 117-H	Y	ND	ND	ND	ND	ND	ND	ND	ND	?	3.00E+06 L		?		CRIB RECEIVED DRAINAGE FROM CONTINENT SYSTEM SEAL PITS(1960-1968). SAMPLING IN 1970: NO CONTAMINATION ABOVE BACKGROUND.
Crib	G	116-H-4	105-H Pluto Crib 116-H-4 (5)	ND		ND	ND	Y	ND	ND	?	?	ND	1.00E+03 L		?		CRIB RECEIVED EFFLUENT FROM TUBES CONTAINING FAILED FUEL ELEMENTS(1950-1952). CRIB EXHUMED IN 1960 AND MOVED TO 118-H-5 BURIAL GROUND.
Pit	C	118-H-5	105-H Thimble Pit 118-H-5	Y	I	ND	ND	Y	Y	ND	Y	ND	Y	1.00E+02 KG		?		BURIAL GROUND: RECEIVED THIMBLE ASSEMBLY AND PLUTO CRIB(FROM 108-H). 1950-1961. INCLUDES SODIUM DICHROMATE.
Pit	E	104-H=	104-H Powerhouse Ash Pit (3)	Y	Y	ND	ND	?	?					ND	Y			COAL ASH SLUICED INTO OPEN PITS WITH NON REACTOR WATER. ASH BED NOT EXCEED OF TOXICITY LIMITS. 1948-1968
Pumping Station	G	1608-H=	1608-H Waste Water Pumping	ND		Y	ND	Y	ND	A	ND	ND	?	ND		Y		PUMPING UNIT RECEIVED REACTOR WATER AND DECONTAMINATION CHEMICALS(1949-1965). FACILITY IS INACTIVE AND EMPTY. REFERENCE WITH DATA ON RADIONUCL. INVENTORY NOT AVAILABLE.
Retention Basin	E	107-H=	100-H Retention Basin 107-H	Y	ND	ND	ND	?	ND	ND	?	?	Y	ND			?	CONCRETE-LINED BASIN RECEIVED COOLING WATER FROM REACTOR. BASIN BACKFILLED ONLY TO A DEPTH OF 4 FT.ABOVE FLOOR. SOIL CONTAMINATION SURROUNDING BASIN...WALLS ARE ALSO RADIOACTIVE. UPW ALSO OCCURRED. 1949-1965. TRITIUM.
Tank/Tile Field	G	1607-H-=H	1607-H4 Septic Tank	Y	ND	ND	ND	ND	ND					ND	Y			UNIT RECEIVED SANITARY WASTEWATER FROM BREAKHOUSE AND FIRE STATION(1940-1964).
Tank/Tile Field	G	1607-H-2=	1607-H2 Septic Tank	Y	ND	?	ND	?	ND	?	NS	NS	NS	ND	Y			UNIT RECEIVED SANITARY WASTEWATER FROM OFFICE AND MAINTENANCE BUILDINGS(1949-1965)
Tank/Tile Field	G	1607-H-3=	1607-H3 Septic Tank	Y	ND	ND	ND	ND	ND		NS	NS	NS	ND	Y			UNIT RECEIVED SANITARY WASTEWATER FROM PUMPHOUSE(1940-1964)

KEY:

Y= yes
ND= no data

= official number not assigned but identified by unit number

blank= no
I= incomplete data

8/26/87.

TABLE 2-5. 100KE/KW WASTE CONSTITUENTS MATRIX

100 KE/KW Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
Burial Ground	C	110-K	100-K Burial Ground 110 K	Y	ND	ND	ND	ND	Y	ND	Y	Y	Y	1.00E+04 M3 1.00E+06 KG			?	UNIT COMPRISED OF NUMEROUS PITS, TRENCHES, SILOS. USED FOR RADIOACTIVE SOLID WASTE DISPOSAL INCLUDING STAINLESS STEEL.
Burning Pit	L	100-KW	100-K Burning Pit	?	ND	?	?	?	ND	ND	ND	ND	ND	ND	?			UNIT WAS USED FOR DISPOSAL OF NON-RAD. MATERIALS SUCH AS PAINT WASTE, OFFICE WASTES, & CHEMICAL SOLVENTS FROM 00 TO 71. NO DATA ON THE AMOUNT OF WASTE DISPOSED OF.
Crib	O	115-KW-1	115-KW Condensate Crib	ND	ND	ND	ND	ND	ND	ND	Y	Y	Y	0.00E+00 L			?	RECEIVED CONDENSATE AND OTHER WASTE WATER FROM REACTOR GAS PURIFICATION PROCESS. TRITIUM PRESENT.
Crib	O	115-KE-1	115-KE Condensate Crib	ND	ND	ND	ND	ND	ND	ND			Y	0.00E+00 L			?	RECEIVED CONDENSATE AND OTHER WASTE WATER FROM REACTOR GAS PURIFICATION PROCESS. RETIRED IN 71 DOES NOT SEEMS TO HAVE RADIOACTIVE METALS. H-3 AND C-14 ONLY. SOME DATA VALUES.
French Drain	O	116-KW-2	100-KW Storage Basin Fr Drain	Y	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	SITE RECEIVED 105 KW STORAGE BASIN SUBDRAINAGE. RETIRED IN 70. NO INFO ON TYPE OR QUANTITY OF WASTE.
French Drain	O	116-KE-3	100-KE Storage Basin Fr Drain	Y	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	RECEIVED SUBDRAINAGE FROM 105 KE STORAGE BASIN. RETIRED IN 71. NO INFO ON TYPE OR QUANTITY OF WASTE.
Retention Basin	I	107-KE#	107-KE Retention Basin	Y	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	RECEIVED COOLING WTR FROM 105 REACTOR. NON RAD. INVENTORY IS IN THE SOIL AROUND THE UNIT.
Retention Basin	I	107-KW#	107-KW Retention Basin	Y	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	SAME AS ABOVE.
Tank	H	103-KE#	103-KE Liq. Rlwn Storage Tank	Y	Y			Y						1.00E+02 gal (cap)	Y			STORAGE OF LIQUID. NO ACTUAL QUANTITY AVAILABLE.
Tank	I	105-KE#	105-KE Emergency Diesel Fuel	Y	Y	Y	?							2.00E+03 gal (cap)	Y			STORAGE OF DIESEL FUEL. TANK IS NOW EMPTY.
Tank	I	166-KW#	166-KW Oil Storage Tank	Y	Y	Y	?							1.65E+06 gal (cap)	Y			1.65 M. GAL CAP. TANK USED FOR STORAGE OF OIL FROM 55 TO 70. 2000 GAL OF HEEL REMAINS IN TANK. (R3-6)
Tank	I	102-KW	102-K Emergency Cooling Flow	?	Y	Y	?							3.00E+04 gal (cap)	Y			USED FOR STORAGE OF DIESEL OIL FROM 55 TO 71. TANK IS EMPTY NOW.
Tank	H	103-KE1#	103-KE1 Sulfuric Acid Storage	Y	Y			Y		A				1.00E+04 gal (cap)	Y			SULFURIC ACID.
Tank	I	166-KE#	166-KE Oil Storage Tank	Y	Y	Y	?							1.65E+06 gal (cap)	Y			FUEL OIL.
Tank	H	103-KW2#	103-KW2 Sulfuric Acid Storage	Y	Y			Y		A				1.00E+04 gal (cap)	Y			SULFURIC ACID
Tank	H	103-KW1#	103-KW1 Sulfuric Acid Storage	Y	Y			Y		A				1.00E+04 gal (cap)	Y			SULFURIC ACID
Tank	H	103-KE2#	103-KE2 Sulfuric Acid Storage	Y	Y			Y		A				1.00E+04 gal (cap)	Y			SULFURIC ACID
Tank	H	103-KW#	103-KW Sodium Dichromate	Y	Y			Y						ND	Y			SODIUM DICHROMATE
Tank	I	1717-K#	1717-K Waste Oil Storage Tank	Y	Y	Y	?		?					ND	Y			MOTOR OIL
Tank	H	103-KE#	103-KE Sodium Dichromate Tank	Y	Y			Y						ND	Y			SODIUM DICHROMATE
Tank	I	1717-KW	1717-K Gas Storage Tank (3)	Y	Y	Y	Y							ND	Y			GASOLINE STORAGE TANK
Tank	I	105-KW#	105-KW Emergency Diesel Fuel	Y	Y	Y	?							2.00E+03 gal (cap)	Y			DIESEL FUEL
Trench	F	103-KE#3	103-KE Acid Filter Facility	Y	Y			Y		A				ND	Y			SULFURIC ACID SLUDGE-WATER SLURRY FROM ACID STORAGE TANKS. NO INFO ON QUANTITY DISPOSED.

KEY:

Y= yes
ND= no data

= official number not assigned but identified by unit number

blank= no
I= incomplete data

8/26/87.

TABLE 2-6. 100N WASTE CONSTITUENTS MATRIX

100 N Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
Burning Pit	L	120-N-1	100-N Burning Pit (120-N-1)	ND	ND	?	ND	?	?	ND	ND	ND	ND	ND	?			NO INFO ON WASTE TYPE DISPOSED OF. WASTE GENERALLY CONSISTED OF NUISANCE VEGETATION AND COMBUSTIBLE WASTE. COMPLETE COMBUSTION IS NOT EXPECTED IN ALL CASES. (1962-86)
French Drain	B	120-N-6	100-N Acid Tank Vent French	Y	Y			Y		A				ND	Y			CONDENSATE FROM SULFURIC TANKS AND LINES. 3 UNITS RECEIVED WASTE FROM 63 TO 87, AND 2 OTHERS FROM 82 TO 87.
French Drain	B	120-N-7	Acid Unloading Facility	Y	Y			Y		A				ND	Y			WASTE FROM RAILROAD CAR UNLOADING FACILITY. INTERMITTENT DISCHARGE OF SULFURIC ACID.
Line Leak	J	UN-116-N-22	104-N Diesel Oil Supply Line	Y	Y	Y	Y							1.00E+03 GAL	Y			EXTERNAL CORROSION OF TANK CAUSED RELEASE.
Line Leak	J	UN-116-N-23	104-N Diesel Oil Supply Line	Y	Y	Y	Y							2.00E+02 GAL	Y			DIESEL OIL LEAK IN 87.
Pit	B	120-N-3	163-N Neutralization Pit/Drain	Y	ND	ND	ND	Y	ND	Y				ND	Y			(CR3-20) RECEIVED CORROSIVE LIQUIDS SUCH AS NAOH & SULFURIC ACID pH NOT DETERMINED, FROM 12/63-3/87. INTERMITTENT DISCHARGES OF UNKNOWN QUANTITIES.
Tank/Drain Field	B	124-N-4	124-N-4 Septic Tank	ND	ND	ND	ND	ND	ND	ND				3.00E+04 GPD	Y			(CR3-12) RECEIVED SANITARY SEWAGE FROM 63 TO 87.
Tank/Drain Field	B	124-N-7	124-N-7 Septic Tank	ND	ND	ND	ND	ND	ND	ND				5.20E+03 GPD	Y			(CR3-18) RECEIVED SANITARY SEWAGE FROM 84 TO 87
Tank/Drain Field	B	124-N-8	124-N-8 Septic Tank	ND	ND	ND	ND	ND	ND	ND				9.00E+02 GPD	Y			(CR3-16) RECEIVED SANITARY SEWAGE FROM 69-87.
Tank/Drain Field	B	124-N-6	124-N-6 Septic Tank	ND	ND	ND	ND	ND	ND	ND				ND	Y			(CR3-14) RECEIVED UNKNOWN QUANTITY OF SANITARY SEWAGE FROM 79 TO 84.
Tank/Drain Field	B	124-N-5	124-N-5 Septic Tank	ND	ND	ND	ND	ND	ND	ND				3.00E+03 GPD	Y			(CR3-13) RECEIVED SANITARY SEWAGE FROM 81 TO 87.

KEY: Y= yes; ND= no data; N = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-7. 200 EAST WASTE CONSTITUENTS MATRIX

200 East Waste Constituent Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemical Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
Line	I	216-A 5&4	216-A 5&4 Control Structure		ND	ND	ND	ND	ND	ND	ND	Y	?	ND		ND	?	RADIOACTIVELY CONTAMINATED PIPING & LINING
burial ground	C	218-E 8	218-E 8, 200 East Construction	Y	ND	ND	ND	ND	ND	ND	Y	Y	Y	8.00E+04 CU FT		?		MIP/TRU WASTE, REPAIR AND CONSTRUCTION WASTES.
burial ground	C	218-E-13	218-E-13 Burial Ground		ND	ND	ND	ND	ND	ND	ND	ND	?	ND	ND	ND	?	CONTAMINATED CONCRETE
burial ground	C	218-E 6	218-E 6 Burial Ground	Y	ND	ND	ND	ND	ND	ND	ND	ND		ND		ND	?	CONTAMINATED WOODEN ITEMS; IRRIGATED ASHES
burial ground	C	218-E-2	218-E-2, 200 East Industrial		ND	ND	ND	ND	ND	ND	Y	Y	Y	3.10E+05 CU M		?		MIXED MIP/TRU
burial ground	C	218-E-5	218-E-5 Burial Ground		ND	ND	ND	Y	ND	ND	Y	Y	Y	1.10E+05 CU M		?		INDUSTRIAL DRY WASTE, UNCONTAMINATED RAILROAD CARS
burial ground	C	218 E-5H	218-E-5H, 200 East Industrial	Y	I	ND	ND	ND	ND	ND	Y	Y	Y	2.20E+05 CU M		?		FAILED EQUIPMENT AND INDUSTRIAL WASTES. WASTE BONES DAMAGED AND PUSHED INTO TRENCH.
burial ground	C	218 E-3	218-E 3 Burial Ground	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	
burial ground	C	218 E-4	218-E 4, 200 East/Minor No. 4	Y	ND	ND	ND	ND	ND	ND	Y	Y	Y	5.60E+04 CU FT		?		REPAIR AND CONSTRUCTION WASTES. AT ONE TIME CONTAMINATED EQUIPMENT STORED ABOVE GROUND. IT IS UNCLEAR WHETHER THOSE WASTES WERE DEMOLISHED.
burial ground	C	218 E-1	218-E-1, 200 East Dry Waste		ND	ND	ND	ND	Y	ND	Y	Y	Y	1.10E+05 CU FT		?		RECEIVED MIXED MIP/TRU DRY WASTES. FILLED WITH CINDERS AND TOPPED WITH GRAVEL.
burial ground	C	218-E 1/A	218-E 1/A, 200 East Dry Waste	Y	I	ND	ND	?	ND	A	Y	Y	Y	ND		Y		ACID SOAKED WASTES; DRY WASTES FROM 200E.
burial tunnel	D	218-E 14	218-E 14 Purex Tunnel No. 1			ND	ND	ND	ND	ND	Y	Y	Y	2.00E+04 CU FT			?	HEAVY CONTAMINATED MATERIALS STORED ON RAILROAD FLAT CARS IN TUNNEL. LARGE EQUIPMENT.
burial vault	B	216-E-9	216-E 9,Equip. Stor. Area No.9	Y	ND	ND	ND	ND	ND	ND	Y	ND	?	ND			?	REMOVABLE EQUIPMENT STORAGE; FISSION PRODUCT EQUIPMENT FROM URANIUM RECOVERY PROGRAM.
burial vaults (3)	K	218-E-7	218-E-7, 200 East/222-B Vaults	Y	I	ND	ND	ND	ND	ND	Y	Y	Y	6.00E+03 CU FT		?		LAB WASTES AND MIXED MIP/TRU WASTE IN ONE WOODEN AND TWO CONCRETE VAULTS.
burning pit	L		200 East Burning Pit			Y	Y	?	?	ND				2.50E+03 CU M	Y			CHEMICALS, SOLVENTS, PAINTS, CONSTRUCTION AND OFFICE WASTES. 1950-70.
crib	G	216-A 39	216-A 40 CRIB/TRENCH	Y		ND	ND	Y	ND	ND	Y	ND	Y	2.00E+01 LITERS		?		CRIB AND 2 TRENCHES RECEIVED FLOOR DRAINAGE FROM 241-AX-601-B DECONTAMINATION (SEAL PRESSURE LEAK) FILLED WITH GRAVEL AND BACKFILLED. 6/66.
crib	G	216-B 47	216-BY-5 CRAWLWAY/CRIB	Y	Y	?	ND	Y	Y	ND	Y	Y	Y	3.71E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. TRENCH BACKFILLED. 9/55-9/55.
crib	G	216 B 51	216-BY-9 CRIB	Y	I	ND	ND	Y	ND	ND	ND	ND	?	1.00E+05 LITERS	ND	ND	ND	RECEIVED FLUSH DRAINAGE FROM BC CRIB PIPELINE. SITE RETIRED IN 1/50.
crib	G	216 B-15	216-BC-2 Crib	Y	Y	Y	ND	Y	ND	ND	Y	Y	Y	6.32E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG.
crib	G	216-A 10	216-A-10 crib	Y	I	ND	ND	Y	ND	A	Y	Y	Y	2.90E+09 LITERS		Y		WHAT RECEIVED WASTES UNTIL 1967 (MARCH).
Crib	G	216-C-5	216-C-5 crib	Y		ND	ND	Y	ND	ND	Y	Y	Y	3.78E+04 LITERS		Y		201-C COLD RUN WASTE
crib	G	216-A-22	216-A 22 French Drain	Y	I	ND	ND	Y	ND	ND	ND	ND	?	1.00E+04 LITERS		?		SUMP WASTE FROM 203 A BLDG, HEATING COIL CONDENSATE, TRUCK LOADING DRAINAGE.
crib	G	216-B-14	216-B-14	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	8.71E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG.
crib	G	216-A-41	216-A-41 Crib	Y	I	ND	ND	Y	ND	A	ND	ND	?	1.00E+04 LITERS		?		296-A-13 STACK DRAINAGE (SLIGHTLY ACIDIC).
crib	G	216-C-6	241-CX Crib	Y		ND	ND	ND	ND	Y	Y	Y	Y	5.30E+05 LITERS		?		
crib	G	216-A-32	216-A-32	Y	I	ND	ND	ND	ND	ND	ND	ND	?	4.00E+03 LITERS		?		202-A CRANE MAINTENANCE FLOOR, SINK, AND SHOWER DRAINAGE.
Crib	G	216-C-4	216-C-4 crib	Y	Y	Y	ND	Y	ND	ND	Y	Y	Y	1.40E+05 LITERS		?		RECEIVED CONTAMINATED ORGANIC WASTES FROM 276-C BLDG.
crib	G	216-A 31	216-A 31 Crib	Y	I	Y	ND	Y	ND	B	Y	Y	Y	1.00E+04 LITERS		?		ORGANIC WASTES FROM 202 A BLDG.

KEY: Y: yes
ND: no data

B = official number not assigned but identified by unit number

blank: no
I: incomplete data

8/26/87.

TABLE 2-7. 200 EAST WASTE CONSTITUENTS MATRIX (CONTINUED)

200 East Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radionuclides	Residual Radioactivity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
diversion box	I	241-A-151	241-CR-151 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		
diversion box	I	241-C-151	241-C 151 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		CONTAMINATION FROM WAS REPORTED AS WA 216 E-68. BOX WAS FLUSHED AND SPRAYED WITH TRANSURAI-FILM TO PHYSICALLY FIX RADIATION CONTAMINATION.
diversion box	I	241-A 152	241-A 152 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-A 302-B
diversion box	I	241-B-152	241-B-152 diversion box	N	ND	ND	ND	ND	ND	ND	Y	Y	?	ND		Y		LEAKAGE REPORTED AS WPR-200 E-74 (WLSU WA-216-E-29). SOME SOIL REMOVED AND SOME CONTAMD.
diversion box	I	241-BYR-153	241-BYR-153 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		
diversion box	I	241-B-154	241-B-154 diversion box	N	ND	ND	ND	ND	Y	ND	Y	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-B 302 B. CLEANUP OPERATIONS CONTAMINATED SURROUNDING AREA. SOME SOILS REMOVED. REPORTED AS WPR-200 E-45. ANOTHER LEAKAGE REPORTED AS WPR-200-E-77, SPILL CONTAMD.
diversion box	I	241-C-152	241-C-152 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-301-C. CONTAMINATION INCIDENT REPORTED AS WPR-200-E-81. COVERED WITH GRAVEL.
diversion box	I	241-BX-155	241-BX-155 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-BX-302-C
diversion box	I	241-C-153	241-C-153 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-301-C
diversion box	I	241-BX-153	241-BX-153 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-BX-302-A
diversion box	I	241-BYR-152	241-BYR-152 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		
diversion box	I	241-BXR-152	241-BXR 152 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		
diversion box	I	241-BX-154	241-BX-154 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-BX-302-B
diversion box	I	241-B-153	241-B-153 diversion box	N	ND	ND	ND	ND	ND	ND	Y	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-301-C. CONTAMINATION REPORTED AS WPR-200 E-75 AND WPR-200-E-6. COVERED WITH GRAVEL.
diversion box	I	241-BYR-154	241-BYR-154 diversion box	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		
diversion box (?)	I	241-A-153	241-A-153 diversion box (?)	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		
diverter station	I	241-AY-152	241-AY-152 diverter station	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		
diverter station	I	241-AZ-151	241-AZ-151 diverter station	N	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		Y		ASSOCIATED W/ CATCH TANK 241-AZ-151
drain field	6		sanitary waste drain field (3)	Y	ND	Y	ND	ND	ND	ND			NS	2.70E+01 CU FT/H	T			LAB REAGENTS USED IN BLDG SUPPORTED BY THIS UNIT.
evaporator	N	242-B	242-B Evaporator (3)	Y	I	ND	ND	Y	ND	ND	Y	Y	?	7.17E+06 GAL.		Y		1ST GECON WASTE CYCLE WASTES. OPERATED IN VARIOUS CAPACITIES.
french drain	6	216-A-26A	216-A-26 French Drain	Y	I	ND	ND	Y	ND	ND	ND	ND	?	1.00E+05 LITERS		?		291-A FAN CONTROL AN FLOOR DRAINAGE
french drain	6	216-A-16	216-A-16 Dry Well	Y	I	ND	ND	Y	ND	ND	ND	ND	?	1.22E+05 LITERS		?		241-A-431 BLDG STACK & FLOOR DRAINAGE
french drain	6	216-A-17	216-A-17 Dry Well	Y	I	ND	ND	Y	ND	ND	ND	ND	?	6.00E+04 LITERS		?		241-A-431 BLDG STACK & FLOOR DRAINAGE
french drain	6	216-A-35	216-A-35 Dry Well	Y	I	ND	ND	Y	ND	ND	ND	ND	?	1.00E+04 LITERS			?	SEAL COOLING WATER FROM 202-A BLDG AIR SAMPLER VACUUM PUMPS.
french drain	6	216-A 33	216-A-33 Dry Well	Y	I	ND	ND	Y	ND	ND	ND	ND	?	ND			?	BEARING COOLANT FROM 291 A-1 STACK ELECTRIC EXHAUST. DATA STATES NO CHEMICALS.
French Drain	6	216-C-8	271-CR crib, 216-C-8 crib	Y	I	ND	ND	Y	ND	Y	ND	ND	?	1.00E+04 LITERS		?		271-CR BLDG ION EXCHANGE WASTE
french drain	6	216-A-12	216-A-12 French Drain	Y	I	ND	ND	Y	ND	ND	ND	ND	?	1.00E+05 LITERS		?		202-A BLDG STEAM TRAP PIT ED DRAINAGE
french drain	6	216-A-23A	216-A-23A French Drain	Y	I	ND	ND	Y	ND	ND	ND	ND	?	6.00E+03 LITERS		?		241-A-431 DEINTRAINER TANK CONDENSATE AND WATER FLUSH.
french drain	6	216-A-14	216-A-14 French Drain	Y	I	ND	ND	Y	ND	ND	ND	Y	ND	1.00E+05 LITERS		?		202-A VAC. CLEANER FILTER & BLOWER PIT DRAINAGE
french drain	6	216-A-23B	216-A 23B French Drain	Y	I	ND	ND	Y	ND	ND	ND	ND	?	6.00E+03		?		241-A 431 DEINTRAINER TANK CONDENSATE AND WATER

KEY:
Y: yes
ND: no data
N = official number not assigned but identified by unit number
Blank: no
I: incomplete data

8/26/87.

TABLE 2-7. 200 EAST WASTE CONSTITUENTS MATRIX (CONTINUED)

200 East Waste Constituent Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
														LITERS				FLUSH
trench drain	B	216-A-11	216-A 11 French Drain	Y	I	ND	ND	Y	ND	ND	ND		?	1.00E+05 LITERS		?		202-A BLDG TRAP PIT DRAINAGE 81 1/55-1972.
trench drain	B	216-A-15	216-A 15 French Drain	Y	I	ND	ND	Y	ND	A	ND		?	1.00E+07 LITERS		?		ACIDIC PILLEN AND BLOWER PIT DRAINAGE (202-A BLDG).
trench drain	B	216-A-13	216-A 13 French Drain	Y	I	ND	ND	Y	ND	ND	ND		?	1.00E+04 LITERS			?	202-A SEAL WATER FROM AIR SAMPLER VAC. PUMP
trench drain	B	216-B-13	291-B CRIB, 216 B-B CRIB	Y	I	ND	ND	Y	ND	?	ND	?	?	2.10E+04 LITERS		?		291-B-1 STACK DRAINAGE. 1945-76.
leaching pit	E	216-C-3	201-C Leaching Pit	Y	Y	ND	ND	Y	ND	A	Y	Y	Y	5.00E+06 LITERS		Y		ACID WASTE FROM 201-C, 215-C, 271-C. (NITRIC ACID) 1/53-3/54.
pit	D		200 Area Construction Waste	Y										ND	?			CONSTRUCTION DEBRIS 1945-55.
pit n7a	B	UPR-200-E-124	UPR-200-E-124, R-13 Pit	Y	ND	ND	ND	ND	ND	ND	ND	ND	Y	ND		?		R-13 PIT; CHECK 10-1 WASTE LINE (154 BX DIVERSION BOX).
receiving vault	I	241-CR#	241 CR receiving vault	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		?		ASSOCIATED W/ CATCH TANK 241-CR AND 241-C TANK FARM.
receiving vault	I	241-BXR#	241-BXR receiving vault	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		?		ASSOCIATED W/ CATCH TANK 241-BXR AND 241-BX TANK FARM.
reverse well	G	216-B-11-A & B	242-B-1 CRIB, 216-B-11 CRIB	Y	ND	ND	ND	?	ND	ND	Y	Y	Y	2.96E+07 LITERS		?		242-B EVAPORATOR PROCESS CONDENSATE
reverse well	G	216-B-4	216-B-4 FRENCH DRAIN/DRY WELL	Y	I	ND	ND	Y	ND	A	ND	Y	Y	1.00E+04 LITERS		Y		291-B STACK DRAINAGE, 292-B BLDG FLOOR DRAINAGE
spill site	J	UN 216-E-69	UN-216-E-69 Railroad Car Flush	Y	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		?		RAILROAD BURIAL CAR FLUSH WATER
spill site	C	UN-216-E-72	UN-216-E-72	ND	ND	ND	ND	ND	ND	ND	ND	ND	Y	ND		ND	ND	UNCOVERED BURIED WASTE
spill site n	J	UPR-200-E-44/103	UPR-200-E-44/103, BCS CRIB LIN	Y	ND	ND	ND	ND	ND	ND	ND	ND	Y	ND		ND	ND	BCS CRIB LINE LEAKING SOUTH OF B-17 CHANGE HOUSE
tank	I	241-BX-302-B	catch tank 241-BX 302-B	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ THE 241-BX-154 DIVERSION BOX
tank	I	241-A-302 B	catch tank 241-A-302-B	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED WITH 241-A-152 DIVERSION BOX
tank	I	241-BX-302-A	catch tank 241-BX-302 A	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ 241-BX-153 DIVERSION BOX
tank	I	241-AZ-151	catch tank 241 AZ 151	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ 241-AZ-151 DIVERTER STATION
tank	I	241-B-301-B	catch tank 241-B-301-B	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ 241-B-252 DIVERSION BOX
tank	I	241-CR#	catch tank 241-CR	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ 241-CR RECEIVING VAULT
tank	H	270-E#	270-E Condensate neutral.	ND	ND	ND	ND	ND	ND	Y	ND	ND	Y	ND		?		270-E CONDENSATE
tank	I	241-CX-72	241-CX-72 tank	ND	ND	ND	ND	ND	ND	ND	ND	Y	Y	ND			?	SOLID RADIOACTIVE WASTE
tank	I	241-BXR#	catch tank 241-BXR	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ 241-BXR RECEIVING VAULT
tank	I	241-301-C	CATCH TANK 241-301-C	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		
tank	I	241-B-361	241-B-361 settling tank	ND	ND	ND	ND	ND	ND	ND	ND	Y	Y	ND		?		SETTLED AND CONTAINMATED LIQUID
tank	I	241-BX-302-C	catch tank 241-BX-302-C	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ 241-BX-156 DIVERSION BOX
tank	I	241-CX-70	241-CX-70 tank	ND	ND	ND	ND	ND	ND	ND	ND	Y	Y	ND		?		RECEIVED RADIOACTIVELY CONTAMINATED SLUDGE
tank	I	241-B-302 B	catch tank 241 B-302-B	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		Y		ASSOCIATED W/ 241-B-154 DIVERSION BOX
tanks	I	241-AN#	241-AN tank farm	Y	ND	Y	ND	?	Y	A	Y	Y	?	ND		Y		PUREX ACID WASTE, CLADDING WASTE, ORGANIC WASH. CONTAMINATION REPORTED AS UPR-200-E-118,119.
tanks	I	241-BY#	241-BY tank farm	Y	ND	ND	ND	?	Y	ND	Y	Y	?	ND		Y		BISMUTH PHOSPHATE PROCESS, TRIBUTYL PHOSPHATE, PUREX, ETC. SALT WELLS WERE INSTALLED TO REMOVE LIQUIDS ASSOCIATED WITH SPILLS REPORTED AS UPR-200-E-134, UPR-200-E-135. ADDITIONAL RELEASE REPORTED AS UPR-200-E-130.
tanks	I	241-AN	241-A tank farm	Y	ND	Y	ND	?	Y	A	Y	Y	?	ND		Y		PUREX ACID WASTE, CLADDING WASTE, ORGANIC WASH. CONTAMINATION REPORTED AS UPR-200 E-125,126,48,47.
tanks	I	241-BX#	241-BX tank farm	Y	ND	ND	ND	?	Y	ND	Y	Y	?	ND		Y		BISMUTH PHOSPHATE PROCESS, ETC. CONTAMINATION REPORTED AS UPR-200-E-3,5,78,84,131,133.

KEY: Y= yes; ND= no data; # = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-7. 200 EAST WASTE CONSTITUENTS MATRIX (CONTINUED)

200 East Waste Constituent Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	MATRIX OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
tanks	E	241-B#	241-B tank farm	Y	ND	ND	ND	?	Y	ND	Y	Y	?	ND		Y		DISPOSED PHOSPHATE PROCESS, ETC. CONSTRUCTION OF A SALT WELL AND ASPHALTING WERE REPORTED IN UPR-200-E 127-130,140,183.
tanks	E	241-C#	241-C tank farm	Y	ND	Y	ND	Y	ND	ND	Y	Y	?	ND		Y		DISPOSED PHOSPHATE PROCESS, TRIBUTYL PHOS, MUREX, REDOX. CONSTRUCTION OF A SALT WELL AND SOIL REMOVAL WERE REPORTED ASSOCIATED "X" WITH REDOX. UPR-200-E-16,80,91,136,137 AND UN-216-E-91.
tanks	N	224-B#	224 B CONC. FACILITY (42 TANKS)	ND	Y	Y	ND	?	Y	ND	Y	Y	Y	ND		Y		INACTIVE PRODUCT TREATMENT UNIT WITH RAD. CONTAMINATION AND HAZ. CONST.'S INCLUDING PCB'S, MERCURY, AND CLEANERS. WASTE RECEIPT PRIOR TO 1976.
tanks	N	205 AA	205 A SILICA GEL FACILITY (9 tanks)	Y	ND	ND	ND	ND	ND	ND	ND	Y	Y	ND		?		INACTIVE RAD. MATERIALS PROCESSING UNIT. WASTE RECEIPT PRIOR TO 1976.
trench	E	216-A-10	216-A 10 Excavation	Y	I	ND	ND	Y	ND	ND	Y	Y	Y	4.00E+02 LITERS			?	DEPLETED URANIUM WASTE FROM 202-A COLD STARTUP. 12/56. PARTIALLY BACKFILLED
trench	E	216-B-30	216-BX-4 trench	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	1.43E+06 LITERS		?		FIRST CYCLE SUPERNATANT WASTE FROM 221-B BLDG.
trench	E	216-B-20	216-BC-14 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	5.05E+06 LITERS		?		URANIUM RECOVERY WASTE (TBP SOLVENT RECOVERY) FROM 221-U. CYANIDE.
trench	E	216-B-53 N	216-B 53 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	1.51E+04 LITERS		?		BLDG 321 WASTES (HANFORD LABORATORIES OPERATIONS).
trench	E	216-B-31	216-BC-10 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.74E+06 LITERS		?		URANIUM RECOVERY WASTE (TBP SOLVENT RECOVERY) FROM 221-U. CYANIDE.
trench	E	216-B-33	216-BC-20 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.74E+06 LITERS		?		URANIUM RECOVERY WASTE (TBP SOLVENT RECOVERY) FROM 221-U. CYANIDE.
trench	E	216-B-22	216-BC-5 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.74E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-A 19	216-A 19 Grave/Sump/last hole	Y		ND	ND	Y	ND	ND	Y	Y	Y	1.10E+00 LITERS		?		RECEIVED 241-A-431 BLDG CONTACT CONDENSER H2O, 202-A BLDG COLD START-UP U WASTE.
Trench	E	216-B-42	241-BX-8 Grave,216-BX-8 Trench	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	1.50E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. TRENCH BACKFILLED. CYANIDE.
trench	E	216-B-54	216-B-54 trench	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	9.99E+05 LITERS		?		BLDG 321 WASTES (HANFORD LABORATORIES OPERATIONS).
trench	E	216-B-52	216-B-52 trench	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	8.53E+06 LITERS		?		URANIUM RECOVERY WASTE (TBP SOLVENT RECOVERY) FROM 221-U. CYANIDE.
trench	E	216-B-34	216-BC-21 Trench	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.87E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. TRENCH BACKFILLED. CYANIDE.
trench	E	216-B-20	216-BC-7 Trench	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.68E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-27	216-BC-14 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.42E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-53A	216-B-53A Trench	ND	ND	ND	ND	ND	ND	ND	Y	Y	Y	5.49E+05 LITERS		?		WASTES FROM 300 AREA OPERATIONS OF THE HANFORD LABORATORIES.
trench	E	216-B-35	216-BX 1 Trench	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	1.06E+06 LITERS		?		FIRST CYCLE SUPERNATANT WASTE FROM 221-B BLDG.
trench	E	216-B-23	216-BC-10 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.52E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-37	216-BX-5 TRENCH	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	4.51E+06 LITERS		?		FIRST CYCLE BOTTOM SUPERNATANT WASTE FROM THE WASTE EVAP. AND 242-B. EVAP.
Trench	E	216-B-41	241-BX-7 Grave,216-BX-7 Trench	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	1.94E+06 LITERS		?		FIRST CYCLE SUPERNATANT WASTE FROM 221-B BLDG.
trench	E	216-B-30	216-BC-17 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.70E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-24	216-BC-11 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.70E+06 LITERS		?		TBP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-A-20	216-A-20 GRAVE/SUMP/LAST HOLE	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	9.61E+05		?		RECEIVED 241-A-431 BLDG CONTACT CONDENSER WATER.

KEY: Y= yes
ND= no data

N = official number not assigned but identified by unit number

blank= no
I= incomplete data

8/26/87.

TABLE 2-7. 200 EAST WASTE CONSTITUENTS MATRIX (CONTINUED)

200 East Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio nuclides	Residual Radio-Activity	Waste Volume Disposed	MATRIX OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
														LITERS				202-A BLDG COLD START-UP URANIUM WASTE.
trench	E	216-B-25	216-BC 12, 216 B-24	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	3.76E+06 LITERS		?		TOP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-29	216-BC-16 Trench	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.84E+06 LITERS		?		TOP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-36	216-BC 13 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	5.88E+06 LITERS		?		TOP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-32	216-BC-19 TRENCH	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.77E+06 LITERS		?		TOP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-40	241-BK 6 Grave/Trench	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	1.64E+06 LITERS		?		FIRST CYCLE SUPERNATANT WASTE FROM 221-B BLDG. TRENCH BACKFILLED.
trench	C	216-E-2A	REG. EQUIP. STORAGE SITE # 2A			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ONE DRY WASTE TRENCH AND ABOVE GROUND EQUIPMENT STORAGE. SITE RETIRED & STABILIZED. SERVICE DATES UNKNOWN.
trench	E	216-B-39	241-BK-5 Grave,216-BK-5 Trench	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	1.54E+06 LITERS		?		FIRST CYCLE SUPERNATANT WASTE FROM 221-B BLDG.
trench	E	216-B-21	216-BC-8 Trench	Y	Y	ND	ND	Y	ND	ND	Y	Y	Y	4.67E+06 LITERS		?		TOP SUPERNATANT WASTE FROM 221-U BLDG. CYANIDE.
trench	E	216-B-36	216-BK-2 Trench/Grave	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	1.94E+06 LITERS		?		FIRST CYCLE SUPERNATANT WASTE FROM 221-B BLDG. TRENCH BACKFILLED.
vault	K	241-CK-72 ?	241-CK-72 Vault	ND	ND	ND	ND	ND	ND	ND	ND	Y	?	ND			?	SOLID RADIOACTIVE WASTE. USED PRIOR TO 1976. DECOMMISSIONED IN SITU IN 1986.
waste line	J	UPR-200-E 80/1	R-3 waste line	Y		ND	ND	ND	ND	ND	Y	ND	?	ND		ND	ND	R-3 WASTE LINE LEAKAGE (METAL WASTE FROM BLDG 221-B).
waste line	J	UPR-200-E-?	UPR-200-E-?	Y		ND	ND	ND	ND	ND	ND	ND	?	5.00E+03 GAL.		ND	ND	CELL WASH H2O LEAKED FROM WASTE LINE BETWEEN 221-B BLDG & 241-B-361. CONTAMINATION COVERED AND POSTED "UNDERGROUND CONTAMINATION"

KEY: Y= yes; ND= no data; # = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-8. 200 WEST AREA WASTE CONSTITUENTS MATRIX

200 WEST AREA WASTE CONTAMINATION MATRIX

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS: Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE: Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
basin	C	203-S	203-S basin at 203-S uranium	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND	ND	ND	ND	
basin	C	204-S	204-S basin at the uranium	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND	ND	ND	ND	
box	K	2904-S-160	2904 S-160 Control Structure	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND	ND	ND	ND	
burial ground	C	218-W-1A	Industrial Burial Ground No. 1	ND	ND	ND	ND	ND	ND	ND			Y	ND			?	
burial ground	B/C	218-W-11	Solid waste burial and regul-	ND	ND	ND	ND	?	?		?	?	?	ND			?	ABOVE GROUND STORAGE AREA, TRENCHES OF MAIN CONCERN
burial ground	C		Non Rad Burial Ground	ND	ND	ND	ND	?	?	ND				ND	Y			
burial ground	C	218-W-9	218-W-9	ND	ND	ND	ND	ND	Y	ND	?	?	?	ND		?		
burial ground	C	218-W-02A	218-W-02A burial ground	ND	ND	ND	ND	?	?	ND	Y	Y	?	8.0E+05		Y		
burial ground	C	218-W-4B	218-W-4B and UPR-200-W-72	ND	ND	ND	ND	?	Y	ND	Y	Y	Y	6.3E5 FT3		Y		DRY WASTE CONT. AND & POSSIBLY OTHER SOLID WASTE; INCLUDES UPR-200-W-72; LAND WASTE DISPOSED.
burial ground	C	218-W-1	218-W-1	ND	ND	ND	ND	ND	?	ND	Y	Y	Y	2.5E5 FT3			?	DRY WASTE CONT. AND & POSSIBLY OTHER SOLID WASTE
burial ground	C	218-W-1A	Industrial Waste Burial Ground	ND	ND	ND	ND	?	?	ND	Y	Y	Y	4.0E10 FT			?	DRY WASTE CONT. AND & POSSIBLY OTHER SOLID WASTE
burial ground	C	218-W-2	218-W-2	ND	ND	ND	ND	ND	ND	ND	Y	Y	Y	2.9E5 FT3			?	DRY WASTE CONT. AND & POSSIBLY OTHER SOLID WASTE
burial ground	C	218-W-3	218-W-3	ND	ND	ND	ND	ND	ND	ND	Y	Y	Y	3.9E5 FT3	ND	ND	ND	DRY WASTE CONT. AND & POSSIBLY OTHER SOLID WASTE
compartment	I	UPR-200-W-137	UPR-200-W-137	ND	I	?	ND	?	?	ND	ND	ND	?	ND		?		NEED MORE INFO - COMPARTMENT
crib	G	216-T-10	216-T-10 crib	Y	Y			Y			Y	Y	Y	1.0E6 LITR		?		FIRST CYCLE SCAVENGED WASTE
Crib	G	231-Z-6	231-W-4 Crib, 216-W-4,	Y	I			Y		B	Y	Y	Y	9.0E4 LITR		Y		
crib	G	216-T-29	216-T-29	Y	Y			Y	ND	A	ND	ND	?	7.4E4 LITR		?		
crib	G	216-S-23	216-S-23 crib	Y	I	ND	ND	Y		B	Y	Y	Y	3.4E7 LITR		Y		STATED NEUTRAL\BASIC BUT NITRIC ACID SAMP UPP
crib	G	216-Z-12	216-Z-12	Y	Y	?		?	?	B	Y	Y	Y	2.01E8 LI		?		
crib	G	216-T-36	216-T-36	ND	Y			Y	?	B	Y	Y	Y	5.22E5 LI		Y		
Crib	G	216-Z-3	216-Z-3 culvert, 231 S 03	ND	Y	Y		Y	ND	ND	Y	Y	?	9.69E3 LI		Y		
crib	G	216-T-35	216-T-35	Y	I	?	ND	Y	?	ND	Y	Y	Y	5.7E6 LITR		Y		
crib	G	216-T-27	216-T-27	Y	I	?	ND	Y	?	B	Y	Y	Y	7.2E6 LITR		Y		
crib	G	216-T-34	216-T-34	Y	I	?	ND	Y	?	B	Y	Y	Y	1.7E7 LITR		Y		
crib	G	216-T-32	216-T-32	I	Y			Y	ND	B	Y	Y	Y	2.97E7 LI		Y		NEED MORE INFO BTWN 69 & 2
crib	G	216-T-33	216-T-33	Y*	I	ND	ND	Y	ND	B	Y	Y	Y	1.9E6 LITR		Y		BLCONT. WASTE FROM 276S-T
crib	G	216-S-13	216-S-13 crib	Y	Y	Y	Y	Y	?	B	Y	Y	Y	5E6 LITR		Y		
Crib	G	216-Z-16	cribs 216-Z-16	Y	ND	ND	ND	ND	ND	B		Y	?	1.02E8 LI			?	WASTE NEUTRAL\BASIC BUT NO CHEM DISCHARGE TO SITE
crib	G	216-U-10	216-U-10 crib	Y	I	ND	ND	ND	ND	ND	Y	Y	?	1.2E11		?		ALDRICH (86) FOR RAD. DATA
crib	G	216-T-6	216-T-6 crib	Y	Y	ND	ND	Y	ND	B	Y	Y	Y	4.5E7 LITR		Y		
crib	G	216-T-26	216-T-26	Y	Y	?	ND	Y	ND	B	Y	Y	Y	1.2E7 LITR		Y		
crib	G	216-Z-5	216-Z-5, 231-W-1-2 cribs	Y	Y	ND	ND	Y	ND		Y	Y	Y	3.0E7 LITR		Y		CARBON TET
crib	G	216-S-22	216-S-22 crib	Y	I			Y	ND	A	Y	Y	?	90400 LITR		Y		~0.5M NNO3
Cribs - 3	G	216-U-8	216-MR-1, 2, 3 Cribs, 216-U-9	Y	Y			Y	?	A	Y	Y	Y	3.7E8 LI		Y		
Cribs -5	G	216-Z-18	cribs - 5 parallel	ND	Y	Y	Y	Y	ND	A		Y	Y	3.0E6 LI		Y		CARBON TET
ditch	F	216-T-4-2 (D)	216-T-4-2 (D)	Y	I	Y	ND	Y	?		?	?	?	ND		Y		
Ditch	E	216-Z-17	216-Z-17 Ditch or Trench	Y	ND	ND	ND	?	?	B		Y	Y	3.6TET LI		?		TRENCH-WASTE IS NEUT\BASIC BUT NO CHEM DISCHARGE TO SITE
ditch	F	UPR-200-W-139	UPR-200-W-139	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	[illegible]		?		
ditch	F	216-Z-19	216-Z-19 ditch	Y	ND	ND	ND	?	?	?	Y	Y	Y	1.2E11 LI		?		AREA 200 LIQUID DISCH REPT FOR RAD DATA
Ditch	F	216-U-9	216-U-6 U-Swamp 5	Y	ND	ND	ND	?	?	?	Y	Y	Y	ND		?		REF TO POND 216-U-10, INCLUDES UPR-200-W-10.

KEY: Y= yes; ND= no data; # = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-8. 200 WEST AREA WASTE CONSTITUENTS MATRIX (CONTINUED)

200 WEST AREA WASTE CONTAMINATION MATRIX

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
Ditch	F	216-Z-11	216-Z-1 ditch, Z plant ditch	Y	NO	NO	NO	?	?	NO		Y	Y	NO		?		DIT TO POND 216-U 10
Ditch	F	216-Z-1 CD	Drain Ditch to U-Swamp, Z	Y	NO	NO	NO	?	?	NO		Y	Y	NO		?		
ditch	F	216-T-4-1 CD	216-T-4 1 CD	Y	NO	NO	NO	?	?	NO	Y	?	Y	4.9E10 Li		?		RENAMED FROM SWAMP 216-T- DITCH UNCLASSIFIED
diversion box	I	241-TH-153	241-TH-153 incl. UPR	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		INCLUDES UPR 200-W-99, 126.
diversion box	I	241-UR-152	241-UR-152 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		VERY GENERAL NEED MORE INFO
diversion box	I	241-UR-154	241-UR-154 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		DIVERSION BOX - PROCESS,SOURCE, STRUC + TYPE
diversion box	I	241-U-153	241-U-153 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		DIVERSION BOX - PROCESS,SOURCE, STRUC + TYPE
diversion box	I	241-U-252	241-U-252 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-SX-151	241-SX-152 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		INCLUDES UPR 200-W-114
diversion box	I	241-UR-153	241-UR-153 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-SX-152	241-SX-151 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		INCLUDES UPR 200-W-114
diversion box	I	241-T-152	241-T-152 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		INCLUDES UPR 200-W-7
diversion box	I	241-TY-153	241-TY-153 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-S-151	241-S-151 (waste transfer)	Y	I	NO	NO	Y	Y	NO	NO	Y	Y	5.0E06 L/YR		Y		1950-87 PASS THROUGH; INCLUDES UPR 200-W-20, 51, 74; WATER HOLD FOR CONTAMINATION CLEANUP
diversion box	I	241-TXR-156	241-TXR-156 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-T-151	241-T-151 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		INCLUDES UPR 200-W-7
diversion box	I	241-TXR-151	241-TXR-151 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-TR-152	241-TR-152 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-TXR-244	241-TXR-244 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-S-152	241-S-152 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		MAY INCLUDE UPR 200-W-52
diversion box	I	241-TXR-152	241-TXR-152 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-TR-153	241-TR-153 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-S-152	241-S-152 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		Y		
diversion box	I	241-TXR-153	241-TXR-153 (waste transfer)	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO		NO		
dry well	B	241-SX-402	dry well at 241-SX-402	NO	NO	NO	NO	NO	NO	NO	NO	NO	?	NO	NO	NO	NO	DRYWELL IN THE BUILDING
dry well	B	241-SX-401	dry well at 241-SX-401	NO	NO	NO	NO	NO	NO	NO	NO	NO	?	NO	NO	NO	NO	DRYWELL IN THE BUILDING
filter monitor	B	2710-S4	2710-S pond filter monitor	NO	NO	NO	NO	NO	NO	NO	NO	NO	Y	NO	NO	NO	NO	APP. E FOR RELEASE + ASSESSMENT INFO
french drain	B	216-U-7	216-U-7	Y	I			Y	NO	NO		NO	?	/QUALITY		?		
french drain	B	216-T-31	216-T-31	NO	NO	NO	NO	NO	NO	NO		NO	NO	NO	NO	NO	NO	WASTE ENDANGER DISPOSAL IN 200W DRYWASTE DARK GROUND
French Drain	B	216-Z-8	216-Z-8 Crib, 234-8 Reception	NO	Y	Y		Y	Y	NO		Y	Y	9950 LITRS		Y		
ground contam.	B	UPR-200-W-135	UPR-200-W-135	NO	NO	NO	NO	NO	NO	NO	NO	NO	?	NO	NO	NO	NO	
ground spill	J	UPR-200-W-117	UPR-200-W-117	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO	NO	NO	NO	CONTAMINATION CLEANED TO BACKGROUND LEVELS
ground spill	J	UPR-200-W-69	UPR-200-W-69	NO	NO	NO	NO	NO	NO	NO	NO	NO	?	NO	NO	NO	NO	
incinerator	H	232-Z4	232-Z waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
pit	E	UPR-200-W-30	UPR-200-W-30	Y	NO	NO	NO	?	?	NO	Y	?	Y	NO		?		
pit	L		200 West burning pit	NO	NO	?	?	?	?	?				NO	?			
pit	E	216-T-20	Disposal Trench/Pit	Y	Y			Y		N	Y	Y	?	1.0E4 Li		Y		SAME AS 216-T-37, P 514 RR
pond	E	216-S-16	216-S-16	Y	I	NO	NO	Y	?	N	?		?	NO		?		
pond	E	216-U-10	216-U-10 pond	Y	NO	NO	NO	?	?	NO	Y	Y	?	1.2E11 Li		?		INCLUDES UPR 200-W-107
pond	E	216-S-11	216-S-11 pond	Y	I	?	NO	?	?	NO	Y	Y	Y	3.2E10 Li		Y		

KEY: Y= yes
NO= no data

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8/26/87.

TABLE 2-8. 200 WEST AREA WASTE CONSTITUENTS MATRIX (CONTINUED)

200 WEST AREA WASTE CONTAMINATION MATRIX

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
pond	E	216-T-4A	216-T-4A	Y	ND	?	ND	?	?	?	Y	Y	?	4.25E10L		?		WASTE ENRAMED DISPOSED IN 218-W-2A TRENCH ?
pond	E	216-S-19	216-S-19 pond	Y	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	DOE RL 86
process vent lines	J	UPR-200-W-102	UPR-200-W-102	Y	ND	ND	ND	?	?	ND	ND	Y	Y	ND		?		DRUMS W/ SOIL CONTAINING 296 PU DISPOSL LOCAT UNKNOWN
sewer	H		REDOX chemical sewer at 203-S,	ND	ND	ND	ND	ND	ND	ND	Y	Y	?	ND		?		REDOX CHEMICAL SEWER; NON SOLUTION, OTHER WASTES NOT SPECIFIED.
surface impoundment	E	207-S	207-S retention basin (3)	Y	ND	ND	ND	?	?	ND	ND	ND	Y	ND		?		CONCRETE BASIN BACKFILLED - SOIL & HERBICIDE
tank	I	241-S	241-S tank farm	Y	I	?		?	?	ND	Y	Y	Y	ND		?		INCLUDES UPR-200-W-80,81; CYANIDES, METALS, ORGANICS, INORGANICS
tank	I	241-T	241-T tank farm	Y	I	?		?	?	ND	Y	Y	Y	ND		?		INCLUDES UPR-200-W-140; CYANIDES, METALS, ORGANICS, INORGANICS.
tank	H	241-SX-402	241-SX-402 condenser shield-	ND	ND	ND	ND	?	?	ND	Y	Y	?	ND		?		INCLUDES 2 TANKS AND A DRY WELL. LOCATED IN 241-SX TANK FARM.
tank	E	276-UA	276-U solvent handling	ND	ND	Y	Y	ND	ND	ND	Y	Y	?	ND	ND		ND	BASIN OF 3 TANKS & PIPE; CYANIDES, METALS, ORGANICS, INORGANICS.
tank	I	276-S-142	underground tank 276 S 142	Y	I	Y	Y	Y			?	?	Y	12.7E3 GA		Y		2C1 - ORIGINAL
tank	I	241-U-361	241-U-361 settling tank	ND	ND	ND	ND	ND	ND	ND	?	Y	Y	27.5E3 GA		?		CONTAMINATED LIQUID AND SLUDGE
tank	I	241-SX	241-SX tank farm	Y	I	?		?	?	ND	Y	Y	Y	ND		?		INCLUDES UPR-200-W-79, 80, 114, 80, 81; CYANIDES, METALS, ORGANICS, INORGANICS.
tank	I	241-TY-302-B	catch tank 241-TY-302-B at	ND	ND	ND	ND	ND	ND	NEI	ND	ND	ND	ND		?		DIVERSION BOX - PROCESS,SOURCE, STRUC + TYPE
tank	I	241-TX-302-A	catch tank 241-TX-302-A at	ND	ND	ND	ND	ND	ND	NEI	ND	ND	ND	ND		?		DIVERSION BOX - PROCESS,SOURCE, STRUC + TYPE
tank	I	241-TX-302-B	catch tank 241-TX-302-B at	ND	ND	ND	ND	ND	ND	NEI	ND	ND	ND	ND		?		DIVERSION BOX - PROCESS,SOURCE, STRUC + TYPE
tank	I	241-U-301	catch tank 241-U-301 at	ND	ND	ND	ND	ND	ND	NEI	ND	ND	ND	ND		?		CATCH TANKS TABLE 1
tank	I	241-301-B	catch tank 241-301-B at tank	ND	ND	ND	ND	ND	ND	NEI	ND	ND	ND	ND		?		
tank	I	240-S-302	catch tank 240-S-302 at	Y	I	ND	ND	Y		NEI		Y	?	5E4 G/YR		?		FROM 1950 - 1987
tank	I	241-TXR	241-TX tank farm	Y	I	?		?	?	NEI	Y	Y	Y	ND		?		INCLUDES UPR-200-W-149, 100; CYANIDES, METALS, ORGANICS, INORGANICS.
tank	I	276-S-141	underground tank 276-S-141	ND	Y	Y	Y	Y			?	?	Y	10E3 GAL		Y		2C1 - ORIGINAL
tank	I	241-TYR	241-TY tank farm	Y	I	?		?	?	NEI	Y	Y	Y	ND		?		INCLUDES UPR-200-W-150, 153, 151, 152; CYANIDES, METALS, ORGANICS, INORGANICS.
tank	I	241-T-361	241-T-361 Settling Tank	ND	ND	ND	ND	ND	ND	NEI	?	Y	Y	20E3 GAL		?		CONTAMINATED LIQUID AND SLUDGE
tank	I	241-Z-361	241-Z-361 settling tank	ND	ND	ND	ND	ND	ND	NEI	?	Y	Y	32E3 GAL		?		
tank	I	241-SX-302	catch tank 241-SX-302 at	ND	ND	ND	ND	ND	ND	NEI	ND	ND	ND	ND		?		
tank	H	241-SX-401	241-SX-401 condenser shield-	ND	ND	ND	ND	?	?	NEI	ND	ND	?	ND		?		INCLUDES 2 TANKS AND A DRY WELL. IN 241-SX TANK FARM.
tank	I	241-TY-302 A	catch tank 241-TY-302-A at	ND	ND	ND	ND	ND	ND	NEI	ND	ND	ND	ND		?		
tank	I	241-UR	241-U tank farm	Y	I	?		?	?	NEI	Y	Y	Y	ND		?		INCLUDES UPR 200-W-154, 155, 156, 157; CYANIDES, METALS, ORGANICS, INORGANICS.
tank(s)	H	242-TA	242-T Evaporator (batch then	Y	I	ND	ND	Y	?	fl	Y	Y	?	3.37E+07 GAL		?		GALLONS; INCLUDES UPR-200-W-18.
tanks	H	276-SA	276-S Solvent Handling Facility	Y	ND	?	?	ND	ND	NEI	?	?	Y	ND		Y		
Tile Field	G	216-Z-1A	234-5 tile field, 216-Z-7;	Y	I	ND	ND	Y	ND	fl	Y	Y	?	1.E6 LIT		?		
trench	E	UPR-200-W-110	UPR-200-W-110	ND	I	ND	ND	ND	Y	NEI	ND	Y	?	ND			?	
trench	E	216-S-12	216-S-12	Y	Y			Y	ND	NEI	Y	Y	?	6.01E4 LI		?		
trench	E	216-S-8	216-S-8	Y	I	ND	ND	Y	ND	NEI	Y	Y	Y	167 LITR		Y		
Trench	E	216-T-11	Equipment Decontamination	ND	ND	ND	ND	ND	ND	NEI	ND	ND		ND	ND	ND	ND	ENRAMED, TRANSF TO 216 T-13, ND AND OR CHEM BUILDUP
trench	E	216-S-14	216-S-14	Y	Y	Y	Y	ND	ND	NEI	ND	ND	?	ND		Y		REMOVE (CONTAM.) NO DATA ON RAD COMPONENT

KEY: Y= yes; NDA= no data; H = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-8. 200 WEST AREA WASTE CONSTITUENTS MATRIX (CONTINUED)

200 WEST AREA WASTE CONTAMINATION MATRIX

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radionuclides	Residual Radioactivity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
trench	E	216-T-12	216-T-12	Y	ND	ND	ND	?	?	B	Y	Y	Y	567 LITR		?		SLUDGE REMOVED FROM RETENTION POND 207-T
trench	E	216-T-10	216-T-10	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	EXHUMED- TRANSFER TO 216-T-13
trench	E	216-T-14	216-T-14	Y	Y			Y		B	Y	Y	Y	165 LITR		Y		SAME CHEM AS IN 216-T-10,16
trench	E	216-T-9	216-T-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	EXHUMED, TRANSFER TO 216-T-13. NO HAZ OR CHEM BUILDUP
trench	E	216-T-16	216-T-16	Y	Y			Y		B	Y	Y	Y	165 LITR		Y		COMMENTS ON 216-T-14
Trench	E	216-T-22	241-TX-2 Trench, 216-TX-2 Grav	Y	Y			Y		B	Y	Y	Y	1.5365 LI		Y		SAME CHEM COMP AS 216-T-24
trench	E	216-T-21	241-TX-1 trench, 216-TX-1 grav	Y	Y			Y		B	Y	Y	Y	4.6E%LIT		Y		
trench	E	216-T-5	216-T-5	Y	Y			Y	Y	B	Y	Y	Y	2.665 LIT		Y		
trench	E	216-T-25	216-T-25	Y	Y			Y		B	Y	Y	Y	1.2E7 LIT		Y		
Trench	E	216-T-24	241-TX-4 Trench, 216-TX-4 Grav	Y	Y			Y	Y	B	Y	Y	Y	1.5365 LI		Y		COMMENTS ON 216-T22
trench	C	UPR-200-W-111	UPR-200 W-111	Y	ND	ND	ND	?	?	A	ND	Y	?	27 YDS		?		SLUDGE FROM RETENTION BASIN 207-U (WAST TRENCH?)
Trench	E	216-T-23	241-TX-3 Trench, 216 TX-3 Grav	Y	Y			Y		B	Y	Y	Y	1.4065 LI		Y		
trench	E	216-T-13	216-T-13	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	EXHUMED, NO INFO WHERE TRANSFER TO?
trench	E	216-U-6	216-U Cold U Trench 81	Y	I	ND	ND	Y	Y	ND	Y	Y	Y	2.2565 LI		Y		COMMENTS ON 216-U-8
trench	E	216-T-17	216-T-17	Y	Y			Y		B	Y	Y	Y	7.0065LIT		Y		
trench	E	216-Z-4	216-Z-4	Y	I	ND	ND	Y	Y	B	Y	Y	Y	1.1E%LIT		Y		
trench	E	216-S-10	216-S-10	ND	ND	ND	ND	ND	ND	ND	Y	Y		ND	ND	ND	ND	
trench	E	UPR-200-W-112	UPR-200-W-112	Y	I	ND	ND	?	?	A	ND	Y	?	ND		?		SLUDGE FROM RETENTION BASIN 207-U (WAST TRENCH?)
Trench	E	216-Z-9	216-Z-9 Cavern, 234-5 Reuplow	Y	Y	Y		Y	Y	A	Y	Y	?	4.1E6LIT		Y		ORGANICS INCLUDING CARBON TETRACHLORIDE, TBP, OHEP
trench	E	216-T-15	216-T-15	Y	Y			Y		B	Y	Y	Y	165 LITR		Y		COMMENTS ON 216-T-14
Trench	E	216-U-8	221-U Cold U Trench 82	Y	I	ND	ND	Y		ND	Y	Y	Y	2.2565 LI		Y		SAME CHEMICAL AMOUNT AS 216-U-6
Trenches	E	216-U-13	241-UR Steam Cleaning Pit,	ND	ND	ND	ND	Y	ND	A	Y	Y	?	ND		?		SITE EXHUMED, WASTE TRANSF TO 216-T 13, 200W DUMP GROUND
vault	K	218-W-6	218-W-6	Y	I	?	ND	?	?	ND	Y	Y	Y	2.4E9 FT3		?		LABORATORY WASTES
vault	K	218-W-7	218-W-7	Y	ND	ND	ND	?	?	ND	Y	Y	Y	ND		?		
vault	K	205-S0	205-S vault at the uranium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
vault	K	244-UR0	244-UR vault	ND	ND	ND	ND	?	?	ND	ND	ND	Y	ND		?		INCLUDES UPR-200-W-24; INCLUDES CONCRETE BASIN WITH STAINLESS STEEL TANKS.
vault	K	241-WR0	241-WR vault	ND	ND	ND	ND	ND	ND	ND	ND	ND	Y	ND		Y		INCLUDES CONCRETE BASIN WITH STAINLESS STEEL TANKS.
waste line	J	UPR-200-W-2	UPR-200-W-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	?	ND		?		
waste line	J	UPR-200-W-113	UPR-200-W-113	ND	ND	ND	ND	Y	ND	A	ND	ND	?	ND		?		NITRIC ACID SPILL & OTHER LEAK
weir box	I	2904-S-171	2904-S-171 weir box	ND	ND	ND	ND	ND	ND	ND	ND	ND	Y	ND	ND	ND	ND	
weir box	I	2904-S-170	2904-S-170 weir box	ND	ND	ND	ND	ND	ND	ND	ND	ND	Y	ND	ND	ND	ND	
weir box	I	216-S-172	216-S-172 weir box	ND	ND	ND	ND	ND	ND	ND	ND	ND	Y	ND	ND	ND	ND	

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blank= no
I= incomplete data

8/26/87.

TABLE 2-9. 200 NORTH WASTE CONSTITUENTS MATRIX

200 North Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS: Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE: Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
Trench	E	216-N-3	212-N 2 trench, 212-N-3 trench (9)	V				?	NS		V			7.57E+06 liters			V	basin water and sludge from 212-N building; boron presumed; fuel storage
Pond	E	216-N-1	212-N Sump, 216-N-1 Sump, 216-N-1 covered Pond (9)	V				?	NS		V			9.5E+00 liters			V	basin overflow from 212-N building; fuel storage boron presumed
Trench	E	216-N-2	216-N-1 trench, 216-N-2 trench (9)					?	NS		V			7.57E+06 liters			V	basin water and sludge; fuel storage; boron presumed
Pond	E	216-N-4	212-P sump, 216-N-4 sump (9)	V				?	NS		V			9.46E+00 liters			V	basin water and sludge from 212-N building; boron presumed
Trench	E	216-N-5	212-P trench, 216-N-5 trench (9)	V				?	NS		V			7.57E+06 liters			V	basin water and sludge from 212-N building; fuel storage; boron presumed
Pond	E	216-N-6	212-R Sump, 216-N-6 Sump (9)	V				?	NS		V			9.46E+00 liters			V	overflow from 212-R basin; fuel storage; boron presumed
Trench	E	216-N-7	212-R trench, 212-N-7 trench (9)	V				?	NS		V			7.57E+06 liters			V	basin water and sludge cleanout waste from 212-R basin; fuel storage; boron presumed

KEY: V= yes; NS= no data; N = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-10. 300 AREA WASTE CONSTITUENTS MATRIX

300 Area Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS: Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	MATRIX OF WASTE: Solid/Haz. Waste	Mixed Waste	Rad. Only	Comments
acid spill	J		Uranium/Acid Waste (Bldg 313)	Y	Y			Y	Y	A	?	Y	?	ND		Y		Wastewater. Nitric and sulfuric acid with uranium in solution. Waste etch acid: nitric, hydrofluoric, and chromic acids with uranium, copper, and zirconium metals in solution.
crib	B	316-4	300 North Crib	Y	Y	Y	Y	Y		ND	ND	Y	?	2.00E+05 lit		Y		Water contaminated with hexone-bearing uranium wastes and other uranium bearing wastes from 321 building.
drain field	B		331 Life Sciences Laboratory	ND	ND	ND	ND	ND	ND	ND				6.66E-01 gal/hr	Y			Sanitary wastewater.
drain field	B		Retired 315 Sanitary Drain	ND	ND	ND	ND	ND	ND	ND				ND	Y			Sanitary wastewater from office buildings.
drain field	B		Retired 335/336 Sanitary	ND	ND	ND	ND	ND	ND	ND				ND	Y			Sanitary wastewater from office buildings.
gravel pit	E		300 Area Interim Filter	Y	I	ND	ND	?	ND	ND				6.50E+05 gal	Y			Water and nonhazardous alum from backwashing filters used to filter water for sanitary and process use. Analysis shows backwash to be nonhazardous; test results not provided in report.
pipe trench system	J	UPR-300-31/40	Pipe Trench System, 311	ND	Y			Y	Y	A	ND	Y	?	ND		Y		Spill of uranium bearing acid waste containing nitric, sulfuric, hydrofluoric, and chromic acids with copper, uranium, and zirconium in solution.
pond	E		Retired Filter Backwash Pond	Y	Y			Y						2.00E+07 gal/yr	Y			Water and nonhazardous alum from backwashing filters. Backwash analysis is nonhazardous.
sewer pipe	H		Retired Liq. Waste Sewer	Y	Y	?	?	Y	?	A/B	ND	ND	Y	ND		?		Radioactive waste from fuel fabrication and research and development laboratories: laboratory chemicals, decontamination solutions, acids and bases, and fuel fabrication aqueous solutions.
tank	H		334 Tank Farm Waste Acid Tank	Y	Y	ND	ND	Y	ND	A	ND	Y	?	ND		Y		Waste acids from fuel fabrication process containing nonrecoverable uranium. Previously used for incoming chemical storage (unspecified).
tanks	H		325 Tanks (3)	ND	Y	ND	ND	Y	ND	A	ND	Y	?	ND		Y		Uranium contaminated water and acid solutions from reprocessing research and development. Small volume of liquid may remain in one tank.
testing unit	B		In Situ Vitrification Test	ND	I	ND	ND	ND	ND	ND	Y	Y		ND			?	Vitrification test on wastes containing radionuclides. Contaminated soil removed to background levels.
transfer line	J	UPR-300-1	Transfer Line Leak	Y	ND	ND	ND	?	ND		Y	?	?	ND			?	Waste transfer line from retention basins to crib waste system.
trench	B		331 Life Sci. Lab. (1964-1974)	Y	ND	ND	ND	ND	ND	ND				8.33E+00 gal/hr	Y			Sanitary wastewater from 331 Life Sciences Lab.
trench	B		331 Life Sci. Lab. (1966-1968)	Y	ND	ND	ND	ND	ND	ND				9.00E+00 gal/hr	Y			Sanitary wastewater from 331 Life Sciences Lab.
underground tanks	I		Methanol Storage (313 bldg)	Y	Y	Y	Y							ND	Y			Aqueous solution of methanol (0.7%). 600 gal remain in tank.
underground tanks	I		Methanol Stor. (311 Tank Farm)	Y	Y	Y	Y							ND	Y			Aqueous solution of methanol (up to 40) used to clean aluminum. 10,000 gal remain.
underground tanks	I		309 TM Tanks (3)	Y	I	ND	ND	ND	ND	ND	?	?	Y	4.00E+03 to 5.00E+03 gal (cap)		?		Aqueous nonhazardous radioactive wastes from plutonium recycle test reactor. Tanks are empty. Residual radioactive contamination remains.

KEY: Y= yes
ND= no data

a = official number not assigned but identified by unit number

blank= no
I= incomplete data

8/26/87.

TABLE 2-11. 400 AREA WASTE CONSTITUENTS MATRIX

400 AREA Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS: Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE: Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
french drains	B		French Drain South of 4722-C	Y	Y	?	?	?	?					2.00E+03 gal/yr	Y			slater paint
french drains	B		400 Retired French Drains	ND	ND	ND	ND	ND	ND	ND				ND	Y			sandblaster from construction component cleaning
ponds	E		400 Area Retired Sanitary Pond	Y	ND	ND	ND	ND	ND	ND				1.20E+04 gal/day	Y			
tank	B		Retired Septic Tanks (3)	ND	ND	ND	ND	ND	ND	ND				ND	Y			Sanitary wastes from offices. Verify if aboveground or belowground.
trench	E		400 Area Retired Sand Trench		ND	ND	ND	?	?	ND				ND	Y			cooling tower blowdown

KEY: Y= yes; ND= no data; B = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-12. 600 WASTE CONSTITUENTS MATRIX

600 Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
burial ground	C	618-11	300 Hyo Burial Ground	ND	ND	ND	ND	ND	ND		Y	Y	?	ND		?		INCLUDES ACCIDENTAL RELEASE UPR-600-6-10. INCLUDES RADIOCHEMISTRY WASTES.
burial ground	C		J.R. Jones No. 2 (3)	ND	ND	ND	ND	ND	ND					ND	Y (a)			SITE EXHUMED; MOVED TO BURIAL GROUND IN 1971.
burial ground	C	618-10	300 North SW Burial Ground	Y	ND	ND	ND	ND	ND		Y	Y	Y	ND			?	FIRE OCCURED AT 618-10 BURIAL GROUND. CONTAMINATION SPREAD 300 YARDS OUTSIDE BURIAL GROUND.
burial ground	C		Army Munitions Burial Site	Y	ND	ND	ND	ND	ND					ND	Y			SITE EXHUMED; CONTENTS TRANSPORTED TO YAKIMA FIRING RANGE FOR DESTRUCTION.
burial ground	C	USDA-2, 4-D	USDA-2, 4-D burial ground	Y	Y	Y			Y	P				50 YD3	Y			900 GALLONS OF 2,4-D LEACHED INTO 50 YD3 OF SOIL. 10 LEACHING TANKS FLATTENED AND BURIED THERE.
burning pit	L	618-5	Burial Ground No. 5	Y	I	ND	ND	ND	ND	ND	ND	Y	?	ND			?	URANIUM-BEARING TRASH AND NON-RADIOACTIVE TRASH.
crib	B	P-11	116-F-6 Crib	Y	ND	ND	ND	ND	ND		ND	Y		ND		?		SITE EXHUMED.
crib	B	213-J and K	Gable Mountain Cribs	ND	ND	ND	ND	ND	ND		ND	ND	ND			?		UNIDENTIFIED RADIOACTIVE LIQUIDS.
crib	B		Pickling Acid Crib (5)	Y	Y	NS	NS	Y	?	A				ND	Y			NITRIC AND HYDROFLUORIC ACID TO PICKLE GALVANIZED PIPING FOR CONSTRUCTION.
landfill	C		Hanford Trailer Camp (5)	Y	I	?	ND	?	?	ND				ND	Y			DOMESTIC WASTES USED IN CONSTRUCTION OF HANFORD FACILITIES. COULD EXPECT METALS, SOME CHEMICALS, AND GENERAL REFUSE.
landfill	C		Horn Rapids Disposal	Y	I	Y	Y	Y	?	ND				ND	Y			PAPER, OFFICE, AND MINOR CONSTRUCTION WASTES (SOLVENTS, PAINT CANS, OILS)
landfill	C		Sodium Dichromate Barrel	Y	Y			Y	Y					ND	Y			SODIUM DICHROMATE
landfill	C		White Bluffs City Landfill	Y	I	?	?	?	?	?				ND	Y			COMMERCIAL AND DOMESTIC WASTES TYPICAL OF PERIOD 1850-1943. CAN EXPECT BROAD SPECTRUM OF CHEMICAL WASTES.
landfill	C		J.R. Jones No. 1 (3)	Y	I	ND	ND	ND	ND	ND				ND	Y (a)			WOOD SCRAPS, CONCRETE, MISCELLANEOUS CONSTRUCTION WASTES.
landfill	C		City of Hanford Landfill	Y	I	?	?	?	?	?				ND	Y			SAME AS WHITE BLUFFS CITY LANDFILL.
landfill	C		Midway Landfill No. 1 (3)	Y	I	?	?	?	?	?				ND	Y			HOUSEHOLD REFUSE. CAN EXPECT BROAD RANGE OF CHEMICALS.
landfill	C		East White Bluffs City Landfill	?	I	?	?	?	?	?				ND	Y			SAME AS WHITE BLUFFS CITY LANDFILL.
landfill	C		Midway Landfill No. 2 (3)	Y	I	?	?	?	?	?					Y			HOUSEHOLD REFUSE. MAY INCLUDE SPENT SOLVENTS, EMPTY HERBICIDE CONTAINERS, AND CAPACITORS (PCBs?).
pile	C	618-4	Burial Ground No. 4	ND	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		ND	ND	INCLUDES UPR-600-15.
pond	C	618-12	North Process Pond Scraping Disposal Area	Y	I	ND	ND	ND	ND	ND	ND	Y	?	ND		ND	ND	URANIUM-CONTAMINATED SOIL FROM 316-2 AND FROM 321 BUILDING.
tank	I	6652-6H	6652-6 ALE Field Storage	ND	ND	ND	ND	ND	ND	ND				ND	Y			SANITARY SEWAGE FROM "NAVY FACILITIES."
tank	I		Army Bunkers Septic Tank (3)	ND	ND	ND	ND	ND	ND	ND				ND	Y			SOURCES NOT SPECIFIED. NAV/ARMY MAY BE SOLELY SANITARY WASTE.
tank	I	6652-CH	6652-C Space Science Lab.	ND	I	ND	ND	ND	ND	ND				ND	Y			SANITARY SEWAGE FROM "NAVY FACILITIES."
trench	B	618-6	Burial Ground No. 6	Y	ND	ND	ND	ND	ND	ND	ND	Y				ND	ND	URANIUM WASTE (SOLID).
trench	C	618-3	Burial Ground No. 3	Y	ND	ND	ND	ND	ND	ND	ND	Y	?	ND			?	CONTAMINATED BUILDING MATERIAL.
trench	C	618-9	300 West Burial Ground	Y	I	Y	?	ND	ND	ND	ND	Y	?	8.0E3 gal		Y		DRUMS OF URANIUM-CONTAMINATED ORGANIC SOLVENT.
	C	618-8	Early Waste Burial Ground	Y	ND	ND	ND	ND	ND	ND	ND	Y	?	ND		?		URANIUM CONTAMINATION. IN FROM REACTOR FUELS MANUFACTURING.
trench	C	618-7	Burial Ground No. 7	Y	I	ND	ND	ND	Y	N	Y	Y	?	ND		Y		MATERIALS FROM FUEL ELEMENT MANUFACTURING.

KEY:

Y= yes
ND= no data

N = official number not assigned but identified by unit number

blank= no
I= incomplete data

8/26/87.

TABLE 2-12. 600 WASTE CONSTITUENTS MATRIX (CONTINUED)

600 Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
trench	C		Original Central Landfill CSD	Y	I	?	ND	?	?	ND				ND	?	?		GENERAL OFFICE WASTES, GLASS, ELECTRICAL, AND SOME METAL WASTES.
trench	C	610-8	SW Burial Ground No. 2	Y	I	ND	ND	ND	ND	ND	Y	Y	Y	ND			?	URANIUM-CONTAMINATED, EQUIPMENT AND MATERIALS; INCLUDES URANIUM MACHINE CUTTINGS.
trench and pits	C	610-1	SW Burial Ground No. 1	Y	I	?	ND	?	?	ND	Y	Y	Y	ND		?		FUEL FABRICATION AND LAB WASTES CSD.
waste pile	B	610-10	303 Area Contaminated Soil	Y	I	ND	ND	ND	ND	ND	ND	?	?	ND			?	TOP SOIL FROM 303 AREA.

KEY: Y= yes; ND= no data; # = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-13. 700 AREA WASTE CONSTITUENTS MATRIX

700 AREA Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	NATURE OF WASTE Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
tank	1		Underground Waste Solv Tank		Y	Y			?					5.00E+02 gal	Y			toxic, EP toxic, combustible solution

KEY: Y= yes; NO= no data; # = official number not assigned but identified by unit number; blank= no; I= incomplete data

8/26/87.

TABLE 2-14. 1100 AREA WASTE CONSTITUENTS MATRIX

1100 AREA: Waste Constituents Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Waste Source Identified	Chemicals Identified	CHEMICAL COMPONENTS: Organics	Volatiles	Inorganics	Metals	pH	Fission Products	Other Radio-nuclides	Residual Radio-Activity	Waste Volume Disposed	MATURE OF WASTE: Solid/Haz. Waste	Mixed Waste	Rad. Only	COMMENTS
ground disposal	J	UPR-1100-2	disposal onto railroad tracks	Y	I	Y	Y	?	Y					1.00E+02 gal/yr	Y	,		paint thinners and solvents
pit	E	UPR-1100-[illegible]	sand pit	Y	Y				Y	R				ND	Y			battery acid
pit	E	UPR-1100-3	sand pit	Y	I	Y	Y	ND	ND	ND				ND	Y			centifrooge, degreaser solvents, wash water from engine cleaning
tank	I	UPR-1100-4	underground disposal tank	Y	Y	Y	,							ND	Y			centifrooge in unknown quantity

KEY: Y= yes
ND= no data

= official number not assigned but identified by unit number

blank= no
I= incomplete data

8/26/87.

KEY TO TABLES 2-15 TO 2-28

The three-digit codes show in Column two of the tables represents the following:

First digit - Need for Action code

- 1 - Remediation
- 2 - Verify No Release
- 3 - Verify No Hazardous Constituents
- 4 - Verify No Residual Contamination

Second digit - Type Type Code

- A - aboveground covered landfill
- B - aboveground uncovered landfill
- C - belowground covered landfill
- D - belowground landfill
- E - surface impoundments
- F - ditches
- G - underground dispersion systems
- H - aboveground tank
- I - underground tank
- J - spills
- K - underground vault
- L - burning pit
- M - incinerator
- N - process sewer
- O - other

Third digit - Waste Types

- Q - Solid Waste/Hazardous Wastes
- M - Mixed Radioactive/Chemical Wastes
- R - Radioactive Waste Only

TABLE 2-15. 100B/C RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

100 B/C Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	NEED FOR ACTION: Remediation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
Burial Ground	2CR	110-B-1	105-B Burial Ground 110-B-1	1973	SS	NS	NS	ND	ND			X				GENERAL REACTOR AND METALLIC WASTES BURIED IN TRENCHES/SPLINE SILOS
Burial Ground	2CR	110-C-1	105-C Burial Ground 110-C-1	1969	P-SS	NS	NS	NS	ND			X				MISC. SOLID WASTE(MIXED WASTE)
Burial Ground	4CR	110-B-7	111-B Solid Waste Burial Site	1960	P-SS	ND	ND	ND	ND					X		MISC. SOLID WASTES/DECONTAMINATION MATERIALS
Burial Ground	3CR	110-B-3	Construction Burial Ground 02	1960	P-SS	NS	NS	ND	NS				X			REACTOR-REMOVED SOLID WASTES
Burial Ground	9CR	110-B-4	105-B Spacer Burial Ground	1960	NS	NS	NS	NS	NS						X	DISPOSAL OF FUEL SPACERS; STAINLESS STEEL UNLIKELY TO DECOMPOSE - RADIOACTIVITY WOULD REMAIN IN SPACER.
Burial Ground	4CR	110-B-6	108-B Solid Waste Burial Ground	1953	P-SS	ND	NS	ND	NS					X		TRITIUM BURIED IN CONCRETE PIPES. LIGHT METAL CAPS OVER PIPES.
Burial Ground	3CR	110-B-2	Construction Burial Ground 01	1956	P-SS	NS	NS	ND	NS				X			ANY WASTES FROM BASIN REPAIR AND CONSTRUCTION. COVERED WITH SOIL.
Burial Ground	4CR	110-B-5	Ball 3H Burial Ground 110-B-5	1953	P-SS	NS	NS	ND	ND					X		CONTAMINATED THIMBLES, PLUGS, ETC. FROM BLDG. 105-B. COVERED WITH 5 FT. OF SOIL.
Burning Pit	2LO	100B/C#	100 B/C Burning Pit	1960	S	ND	NS	NS	P			X				COMBUSTIBLE MATERIALS; PAINT WASTE, CHEMICAL SOLVENTS; COVERED OVER IN 1970.
Crib	4SH	116-B-5	108-B Crib 116-B-5 (3)	1967	SS	P	P	ND	NS					X		
Crib	4SH	116-B-6-1	111-B Crib 01 116-B-6-1	1960	SS	P	P	ND	ND					X		PAST RELEASE OF LIQUID RADIOACTIVE WASTES TO SOIL
Crib	4SH	117-B#	117-B Crib	1960	SS	P	P	ND	ND					X		RELEASED FROM RADIATION ZONE STATUS. POTENTIAL CHEMICAL CONTAMINATION NOT ADDRESSED.
Crib	4SH	117-C#	117-C Crib	1969	SS	P	P	NS	NS					X		DRAINAGE FROM CONFINEMENT SYSTEM, SAMPLED IN 1978 - CONTAM. BELOW BACKGROUND. POTENTIAL CHEM. CONTAMINATION NOT ADDRESSED.
Crib	4SH	116-B-6-2	111-B Crib 02 116-B-6-2	1953	SS	P	P	NS	NS					X		NOT USED IN 34 YEARS.
Crib	4SH	116-B-3	105-B Pluto Crib 116-B-3	1952	SS	P	P	NS	NS					X		NOT USED IN 35 YEARS.
Crib Sandfilter	4SH	116-C-2-2	105-C Pluto Crib Sandfilter	1969	SS	P	P	NS	NS	Y				X		CONCRETE BOX WITH OPEN BOTTOM COVERED WITH SAND. COVERED WITH CONCRETE LIDS.
Dry Well	4SH	116-B-10	108-B Dry Well, Quench Tank	1960	SS	P	P	ND	P	Y				X		DRAIN TILE MOUNTED ON CONCRETE PAD.
French Drain	4SH	116-B-9	104-B-2 French Drain	1954	SS	P	P	ND	ND					X		
Pit	5EB	104-B#	104-B Powerhouse Ash Pit (3)	1969	P-SS	P	P	NS	NS						X	COAL ASH SLURRIED TO DISPOSAL PIT. TESTS RE NOT EP TOXIC. ASSUMES >1 REPRESENTATIVE SAMPLE TAKEN OF WASTES AND SOIL.
Retention Basin	1ER	107-B#	107-B Retention Basin	1960	D-SS	P	P	ND	P	Y	X					CONTAMINATED CONCRETE RECEIVING BASINS AND SURROUNDING SOIL. RELEASED TO THE COLUMBIA RIVER. PAST LEAKAGE FROM EFFLUENT LINES AND BASIN BREAK. BACKFILLED WITH SOIL. ADD OF RAD. INVENTORY IN NEARBY SOIL.
Sump Tanks	1ER	107-C#	107-C Retention Basin	1969	D-SS	P	P	ND	ND	Y	X					CONTAMINATED TANKS AND SURROUNDING SOIL. RELEASED TO THE COLUMBIA RIVER. ADD RAD. INVENTORY IN SOILS AROUND BASIN. LARGE LEAKS (5-10,000 GAL/MOD. TANKS BACKFILLED WITH SOIL TO 4 FEET.
Sump	2EB	105-B#	105-B Battery Acid Sump (3)	1969	P-SS	ND	ND	NS	NS			X				CONCRETE SUMP. CLEANED AND NEUTRALIZED 1986. ANY CRACKS? LEAKAGE?
Tank	5ER	110-C-2	105-C Ball Storage Tank	1969	P	ND	NS	ND	NS	P					X	IRRADIATED BORON STEEL BALLS PRESENTLY BURIED IN UNDERGROUND TANKS. NEED TO SET SCHEDULE FOR WHEN WASTE IS RECEIVED AND SUITABLE FOR REMOVAL.
Tank/Tile Field	3EB	1607-03#	1607-03 Septic Tank (3)	1974	SS	P	P	P	ND				X			INCLUDES TILE FIELD. IF NO HAZARDOUS CONSTITUENTS, THEN NO FURTHER ACTION REQUIRED.
Tank/Tile Field	3EB	1607-00#	1607-00 Septic Tank (3)	1969	SS	P	P	P	ND				X			SAME AS 1607-03.
Tank/Tile Field	3EB	1607-07#	1607-07 Septic Tank (3)	1969	SS	P	P	P	ND				X			SAME AS 1607-03.
Tank/Tile Field	3EB	1607-01#	1607-01 Septic Tank (3)	1960	SS	P	P	P	ND				X			FIRE STATION MAY HAVE BEEN SOURCE OF CHEMICALS. OTHERWISE, SAME 1607-03.
Trench	4CR	116-B-2	105-B Storage Basin Trench	1946	S,SS	P	P	NS	P	NS				X		WASTEWATER FROM FUEL ELEMENT STORAGE BASIN. PAST RELEASE TO SOIL. FILLED IN WITH 6-10 FEET OF SOIL IN 1946.

KEY:

= official number not assigned but identified by unit number

D= documented
P= suspected

ND= no data
NS= not suspected

SS= subsurface soil
S= surface soil

P= past air release
C= current air release

F= future air release
N= yes

Blank= no

8/26/87.

TABLE 2-16. RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

100 D/DR Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
Basin Trench	4EX	116-DR-3	100-DR Storage Basin Trench	1986	P-SS	P	P	NS	P					X		DISPOSAL OF CONTAMINATED SLUDGE AND WATER ..STOPPED IN 1969. ANY RESIDUAL SOIL-BOUND CONTAMINATION?
Basin Trench	4CX	116-D-1A	100-D Storage Basin Trench 01	1982	P-SS	P	P	NS	P					X		COVERED WITH 6 FT OF SOIL.
Burial Ground	3CX	110-D-3	100 D Burial Ground 03 110-D-3	1973	P-SS	ND	ND	ND	ND			X				DISPOSAL OF IRRADIATED SOLID WASTE... DISCONTINUED IN 1973.
Burial Ground	3CX	110-D-4	Construction Burial Ground	1967	P-SS	ND	ND	ND	ND			X				DISPOSAL CONTAMINATED REACTOR BLDG. COMPONENTS AND HARDWARE. NEED TO DETERMINE IF RELEASE OF RADIOACTIVE ELEMENTS TO SOIL IS STILL OCCURING.
Burial Ground	3CX	110-D-1	100 D Burial Ground 01 110-D-1	1967	P-SS	ND	NS	NS	NS			X				DISPOSAL OF IRRIDATED SOLID WASTE...NEED TO DETERMINE IF MATERIAL IS STILL RADIOACTIVE OR METALS LEACHING. WHAT OTHER MATERIALS PRESENT?
Burial Ground	3CX	110-D-2	100 D Burial Ground 02 110-D-2	1970	P-SS	ND	NS	ND	ND			X				DISPOSAL OF IRRIDATED SOLID WASTE...NEED TO DETERMINE IF MATERIAL IS STILL RADIOACTIVE OR METALS LEACHING. WHAT OTHER MATERIALS PRESENT?
Burial Ground	3CX	110-D-5	Bell 3M Burial Ground 110-D-5	1964	P-SS	ND	NS	ND	ND			X				BURIAL OF THEMBLES FROM REACTOR BLDG. NEED TO DETERMINE IF MATERIALS ARE STILL RADIOACTIVE OR IF METALS LEACHING.
Burial Ground	3CX	110-DR-1	105-DR Gas Loop Burial Ground	1964	P-SS	ND	NS	ND	ND			X				BURIAL OF IRRIDATED METAL ASSEMBLIES. NEED TO DETERMINE IF MATERIALS ARE STILL RADIOACTIVE OR METAL RELEASE TO ENVIRONMENT.
Burning Pit	4LX	100-D/DRX	100 D/DR Burning Pit	1967	P-S,SS	ND	NS	ND	P,CP					X		DISPOSAL OF PAINT WASTES, SOLVENTS, AND OTHER CHEMICALS. NEED TO DETERMINE IF CHEMICAL CONTAMINANTS ARE STILL PRESENT.
Crib	4DX	117-DX	117-D Crib	1967	V-SS	P	P	ND	NS					X		DISPOSAL OF DRAINAGE FROM CONFINEMENT SYSTEM. SHOULD ALSO EVALUATE IF CHEMICAL CONTAMINANTS ARE STILL PRESENT. FILLED WITH GRAVEL, COVERED TO GRADE WITH CLEAN SOIL.
Crib	4DX	116-DR-4	105-DR Plute Crib 116-DR-4	1953	V-SS	P	P	NS	NS					X		DISPOSAL OF EFFLUENT FROM TUBES CONTAINING FAILED FUEL ELEMENTS. NEED TO DETERMINE IF RESIDUAL RADIOACTIVITY REMAINS. SAMPLING SHOULD ALSO BE CONDUCTED FOR CHEMICAL CONTAMINANTS. COVERED TO GRADE WITH CLEAN SOIL.
Crib	4DX	116-DR-0	117-DR Crib	1964	V-SS	P	P	ND	NS					X		DISPOSAL OF DRAINAGE FROM CONFINEMENT SEAL PITS. NEED TO DETERMINE IF RESIDUAL RADIOACTIVITY REMAINS. ALSO,..DID CRIB RECEIVE CHEMICAL CONTAMINANTS WHICH REMAIN IN SURROUNDING SOIL?
Crib	4DX	116-D-2	100-D Plute Crib 116-D-2	1986	V-SS	P	P	ND	NS					X		DISPOSAL OF INORGANIC CHEMICALS AND WASTES FROM FAILED FUEL ELEMENTS. NEED TO EVALUATE PRESENCE OF RESIDUAL CONTAMINATION (CHEM/RAD).
French Drain	4DX	116-D-3	100-D Crib 01 116-D-3	1967	V-SS	P	P	P	NS					X		DISPOSAL OF WASTES FROM CONTAMINATED MAINTENANCE SHOP AND CASK DECONTAMINATION PAD. NEED TO EVALUATE IF CHEMICAL AND RADIOACTIVE MATERIALS REMAIN AT SITE.
French Drain	4DX	116-D-4	100-D Crib 02 116-D-4	1987	V-SS	P	P	P	NS					X		DISPOSAL OF WASTES FROM CONTAMINATED MAINTENANCE SHOP AND CASK DECONTAMINATION PAD. NEED TO EVALUATE IF CHEMICAL AND RADIOACTIVE MATERIALS REMAIN AT SITE.
French Drain	4DX	116-D-6	100-D Cushion Corridor French Drain	1967	V-SS	P	P	ND	ND					X		DISPOSAL OF DOMESTIC WATER FROM CHANGING ROOM, AND EFFLUENT FROM MASK DECONTAMINATION STATION. NEED TO EXAMINE THE DRAIN/SITE FOR RESIDUAL RADIOACTIVITY AND CHEMICAL CONTAMINATION.
Pumping Station	3DX	1600-DRX	1600-DR Waste Water Pumping	1964	P	ND	ND	NS	ND	P		X				INACTIVE AND EMPTY. PUMPED TO EFFLUENT LINES TO COLUMBIA RIVER. NO DATA ON WHET LEAKAGE IF ANY.
Pumping Station	9DX	1600-DX	1600-D Waste Water Pumping	1968	P	NS	ND	NS	ND						X	FACILITY DEMOLISHED IN SITU BY 100 AREA DECOMMISSIONING PROGRAM.
Retention Basin	1CX	107-DX	107-D Retention Basin	1967	D-S,SS	P	P	ND	PP,C	V	X					FOR RADIATION INVENTORY IN SURROUNDING SOIL. CONCRETE WALLS. CONTAMINATED/ RADIOACTIVE BASIN WALLS AND SURROUNDING SOIL. UPS EARLY IN 1950S CONTAMINATED EFFLUENT REACHED SURFACE.

KEY: X = official number not assigned but identified by unit number; D= documented; P= suspected; ND= no data; NS= not suspected; SS= subsurface soil; S= surface soil; P= past air release; C= current air release; F= future air release; V= yes; Blank= no

8/26/87.

TABLE 2-17. 100F RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

100 F Release Potential and Need For Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
Burial Ground	4X8	110-F-4	115-F Pit 110-F-4	1949	P-SS	NS	NS	NS	NS					X		COVERED WITH 6 FT. SOIL IN 1949. SILICA GEL MAY HAVE DECOMPOSED.
Burial Ground	2X8	110-F-3	Burial Ground 02 110-F-3	1952	P-SS	NS	NS	NS	NS			X				
Burial Ground	2X8	110-F-1	Burial Ground 01 110-F-1	1968	P-SS	NS	NS	NS	NS			X				
Burial Ground	2X8	110-F-2	Burial Ground 02 110-F-2	1968	P-SS	NS	NS	NS	NS			X				
Burial Ground	2X8	110-F-6	PNL Solid Waste Burial Ground	1973	P-SS	NS	NS	P	NO			X				PROXIMATE TO 110-F-1. NATURE OF CHEMICALS NOT AVAILABLE.
Burial Ground	5X8	110-F-5	PNL Southst Repository 110-F-5	1976	P-SS	NS	NS	NS	NS						X	NEED TO DETERMINE SOIL COVER DEPTH.
Burial Vault	1X8	110-F-7	100F Miscellaneous Hardware	1968	NO	NO	NO	NO	NO	Y	X					CONCRETE VAULT WITH WOODEN COVER. TEMPORARY WASTE STORAGE. WASTE STILL PRESENT AFTER 20 YRS. NEED TO REMOVE WASTES.
Burning Pit	4X8	100-F#	100-F Burning Pits 02	1968	SS	P	NO		P P					X		SITE NOT USED IN 20 YEARS.
Crib	4X8	116-F-4	105-F Plute Crib 116-F-4 (D)	1952	D-SS	P	P	NO	NO					X		COVERED TO GRADE WITH SOIL IN 1952. CHEMICALS NOT ADDRESSED.
Crib	4X8	116-F-6	Bail Washer Crib 116-F-6	1964	D-SS	P	P	NO	NO					X		CHEMICALS NOT ADDRESSED.
French Drain	4X8	116-F-12	140-F French Drain 116-F-12	1964	D-SS	P	P	NO	NO					X		
French Drain	4X8	116-F-11	105-F Cushion Corridor French	1968	D-SS	P	P	NO	NO					X		
French Drain	3X8	116-F-13	170S-F Experimental Garden	1976	D-SS	P	P	NO	NO				X			
French Drain	4X8	116-F-7	117-F Crib 116-F-7	1968	D-SS	P	P	NO	NO					X		
Pit	1X8	104-F#	104-F Powerhouse Ash Pit (D)	1968	S,SS	P	P	NO	NO						X	ASH TESTS AS NOT EP TOXIC. ASSUME >1 REPRESENTATIV SAMPLE TAKEN OF ASH AND SOIL.
Pumping Station	2X8	1608-F#	1608-F Wastewater Pumping	1965	P	NO	NO	NO	P P			X				INACTIVE AND EMPTY.
Retention Basin	1X2	107-F#	107-F Retention Basin	1968	S,SS	P	P		P P	Y	X					CONCRETE BASIN. BACKFILLED TO 5 FT. SOIL PILED TO COVER WALLS. RELEASES OCCURRED DURING USE. POS RADIATION INVENTORY IN SOILS.
Tank/Tile Field	3X8	1607-F6n	1607-F6 Septic Tank	1973	SS	P	P	P	NO				X			IF NO HAZ. CONSTIT., THEN NO FURTHER ACTION.
Tank/Tile Field	3X8	1607-F1N	1607-F1 Septic Tank	1968	SS	P	P	P	NO				X			IF NO HAZ. CONSTIT., THEN NO FURTHER ACTION.
Tank/Tile Field	3X8	1607-F5n	1607-F5 Septic Tank	1968	SS	P	P	P	NO				X			IF NO HAZ. CONSTIT., THEN NO FURTHER ACTION.
Tank/Tile Field	3X8	1607-F3n	1607-F3 Septic Tank	1968	SS	P	P	P	NO				X			IF NO HAZ. CONSTIT., THEN NO FURTHER ACTION.
Tank/Tile Field	3X8	1607-F4n	1607-F4 Septic Tank	1968	SS	P	P	P	NO				X			IF NO HAZ. CONSTIT., THEN NO FURTHER ACTION.

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C= current air release

F= future air release
X= yes

Blank= no

8/26/87.

TABLE 2-18. 100H RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

100 H Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
Burial Ground	2CA	110-H 2	H-1 Loop Burial Area, 100 H	1965	P-SS	ND	ND	ND	ND	Y		X				CONCRETE VAULTS RECEIVED RADIOACTIVE STEEL TUBES, AND PIPES. NEED TO EVALUATE RESIDUAL RADIOACTIVITY. INCLUDES TWO CONCRETE VAULTS.
Burial Ground	2CA	110-H-3	Construction Burial Ground	1957	P-SS	ND	ND	ND	ND			X				BURIAL GROUND RECEIVED CONTAMINATED HARDWARE. NEED TO EVALUATE RESIDUAL RADIOACTIVITY. COVERED WITH 6 FT. SOIL.
Burial Ground	2CA	110-H 4	Bell 3X Burial Ground 110 H 4	1953	P-SS	ND	ND	ND	ND			X				BURIAL GROUND RECEIVED IRRADIATED SOLID WASTE. NEED TO EXAMINE RESIDUAL RADIOACTIVITY.
Burial Ground	2CA	110-H-1	100 H Burial Ground #1 110-H-1	1965	P-SS	ND	ND	ND	ND			X				BURIAL GROUND RECEIVED REACTOR COMPONENTS, AND HARDWARE.
Burning Pit	4CA	100-H2A	100-H2 Burning Pit for Residue	1965	P-S	ND	ND	ND	P P					X		BURNING/DISPOSAL OF PAINT AND OFFICE WASTES, AND CHEMICAL SOLVENTS. NEED TO EXAMINE RESIDUAL SOIL CONTAMINATION.
Burning Pit	4CA	100 HA	100 H Burning Pit	1965	D-S	P	P	ND	P P					X		BURNING/DISPOSAL OF PAINT AND OFFICE WASTES, AND CHEMICAL SOLVENTS. NEED TO EXAMINE RESIDUAL SOIL CONTAMINATION.
Crib	4CA	117-HA	Crib 117-H	1965	D-SS	P	P	ND	ND					X		CRIB RECEIVED DRAINAGE FROM CONTAINMENT SUMP PITS. MONITORING IN 1970 INDICATED NO RADIO-ACTIVITY ABOVE BACKGROUND. MUST EVALUATE HOWEVER, IF CHEMICAL CONTAMINATION REMAINS IN SURROUNDING SOIL. REMOVED FROM RADIATION ZONE STATUS.
Crib	4CA	116-H-4	105-H Pluto Crib 116 H 4 (4)	1952	D-SS	P	P	ND	ND					X		CRIB EXAMINED IN 1960 AND MOVED TO 110-H-5 BURIAL GROUND. USED FOR ONLY 2 YEARS THEN COVERED WITH SOIL.
Pit	2CA	110-H 5	105-H Thimble Pit 110-H-5	1961	P-SS	P	P	ND	ND			X				BURIAL GROUND RECEIVED THIMBLE ASSEMBLY AND PLUTO CRIB. NEED TO DETERMINE IF THERE IS RESIDUAL RADIOACTIVITY/CHEMICALS.
Pit	3CA	104-HA	104-H Powerhouse Ash Pit (3)	1965	D-SS	P	P	ND	ND				X			COAL ASH SLUICED WITH RAW RIVER WATER. ASH DID NOT EXCEED EP TOX. LIMITS. STILL NEED TO EVALUATE IF OTHER CHEMICAL CONTAMINANTS REMAIN IN SOIL. ASSUME >1 REPRESENTATIVE SAMPLE TAKEN OF WASTE AND SOIL.
Pumping Station	2BA	1608 HA	1608-H Waste Water Pumping	1965	ND	ND	ND	ND	ND	P		X				PUMPING UNIT RECEIVED REACTOR WASTE AND DECON. CHEMICALS. PRESENTLY INACTIVE AND EMPTY, BUT MUST EVALUATE RESIDUAL RADIOACTIVITY. DID UNIT LEAK?
Retention Basin	4CA	107-HA	100-H Retention Basin 107-H	1965	D-S,SS	P	P	ND	P	Y	X					RECEIVING BASIN AND SURROUNDING SOIL MAY RADIOACTIVE. EXPOSURE POTENTIAL SIGNIFICANT. SITE DECONTAMINATION/DECOMMISSIONING IS NECESSARY. FOR RADIATION INVENTORY IN SOIL. LEAKAGE IN PAST UP TO 5000-10000 GPM.
Tank/Tile Field	3CA	1607 H-4A	1607-H4 Septic Tank	1960	D-SS	P	P	P	ND				X			SEPTIC TANK RECEIVED SANITARY WASTEWATER FROM DARKHOUSE AND FIRE STATION. NEED TO EXAMINE IF HAZARDOUS CHEMICALS ARE PRESENT IN SURROUNDING SOIL.
Tank/Tile Field	3CA	1607 H-2A	1607 H2 Septic Tank	1965	D-SS	P	P	P	ND				X			RECEIVED SANITARY WASTEWATER FROM OFFICE AND MAINTENANCE BUILDINGS. NEED TO DETERMINE IF HAZARDOUS CHEMICALS PRESENT IN SURROUNDING SOIL.
Tank/Tile Field	3BA	1607-H-3A	1607-H3 Septic Tank	1965	D-SS	P	P	P	ND				X			RECEIVED SANITARY WASTEWATER FROM PUMPHOUSE. NEED TO DETERMINE IF HAZARDOUS CHEMICALS PRESENT IN SURROUNDING SOIL.

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8/26/87.

TABLE 2-19. 100KE/KW RELEASE POTENTIAL AND NEED FOR ACTION MATRIX (CONTINUED)

100 KE/KW Release Potential and Need for Action Matrix

	Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
Tank		210	105-KHB	105-KH Emergency Diesel Fuel	70	ND	ND			ND			N				NO INFO ON THE PRESENT STATUS OF THE TANK. NEED TO VERIFY FOR NO RESIDUAL CONTAMINATION IN THE TANK OR RELEASE TO GROUND.
Trench		1F0	100-KE&D	103-KE Filter Water Facility	70	SS	P					N					NO INFO ON QUANTITY OF WASTE DISPOSED OF. HOWEVER ACID SLUDGE-WATER SLURRY MAY STILL REMAIN AT THE BOTTOM OF THE TRENCH AND IN THE SURROUNDING SOIL. REMEDIATION IS RECOMMENDED.

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8/26/87.

TABLE 2-20. 100N RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

100 N Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	NEED FOR ACTION: Remediation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
Burning Pit	ILB	120-N-1	100-N Burning Pit (120-N-1)	06	S, P SS	ND	ND		P,C,F		N					WASTE CONSTITUENTS ARE NOT DEFINED AND USED FOR MORE THAN 20 YEARS.
French Drain	300	120-N-6	100-N Acid Tank Vent French	07	SS	P	P				N					WASTE IS CORROSIVE. LAST USED IN 87. ALTHOUGH DISCHARGE IS ABOUT 1 GAL EACH TIME, HOWEVER, NO INFO ON THE TOTAL NUMBER OF DISCHARGES. ASSUME SULFATE FORMATION AND PH ALTERATION IN SOIL. OTHER DISCHARGES? TO BE CHARACTERIZED 5/87.
French Drain	300	120-N-7	Acid Unloading Facility	07	SS	P	P				N					SAME AS ABOVE
Line Leak	1JB	UN-116-N-22	104-N Diesel Oil Supply Line	06	D,SS	D	P				N					PIPE LEAK DISCHARGING DIESEL OIL. SHOW UP IN GROUNDWATER WELL SAMPLE. OCCURRED IN '86. ON PUMPING HAS BEEN PERFORMED.
Line Leak	1JB	UN-116-N-23	104-N Diesel Oil Supply Line	07	D,SS	D	P				N					CONTAMINATION APPEARS IN GND WTR SAMPLE. ON PUMPING HAS BEEN PERFORMED. NEED PERMANENT REMEDIATION. LEAK CAUSED BY CORROSION. LEAK LOCATED AND EXAMMED.
Pit	300	120-N-3	163-N Neutralization Pit/Drain	07	SS	P	P	P			N					WASTE IS DISPOSED FOR 24 YEARS. CORROSIVE SOLUTIONS THAT SHOULD REACT TO FORM SULFATES AND OTHER SALTS. WASTE SHOULD STILL BE IN THE GROUND. PH ALTERATION.
Tank/Drain Field	300	124-N-4	124-N-4 Septic Tank	07	SS	P	P	P					N			FOR SEPTIC TANKS AND DRAIN FIELDS, IT IS ASSUMED THAT WASTE IS MOSTLY SEWAGE TYPE. NEED ONLY TO CONFIRM THAT THERE IS NO HAZARDOUS OR RADIOACTIVE CONTAMINATION. IF THIS IS TRUE, THEN NO FURTHER ACTION IS REQUIRED.
Tank/Drain Field	300	124-N-7	124-N-7 Septic Tank	07	SS	P	P	P					N			SAME AS ABOVE
Tank/Drain Field	300	124-N-8	124-N-8 Septic Tank	07	SS	P	P	P					N			SAME AS ABOVE
Tank/Drain Field	300	124-N-6	124-N-6 Septic Tank	04	SS	P	P	P					N			SAME AS ABOVE
Tank/Drain Field	300	124-N-5	124-N-5 Septic Tank	07	SS	P	P	P					N			SAME AS ABOVE

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S= surface soil

P= past air release
C= current air release

F= future air release
N= yes

Blank= no

8/26/87.

TABLE 2-21. 200 EAST RELEASE POTENTIAL AND ACTION MATRIX

200 East Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	NEED FOR ACTION: Remediation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
bw	1E	216-A-524	216-A-524 Control Structure	1976	PS,SS	ND	NS	NS	NS	V	X					REMEDIATE CONTAMINATED STRUCTURES AND VERIFY IF RELEASE(S) HAS OCCURRED
burial ground	4C	218-E-8	218-E-8, 200 East Construction	1959	P-SS	ND	NS	P	PP					X		RETIRED AND BACKFILLED.
burial ground	4C	218-E-13	WA-218-E-13 Burial Ground	1966	P-SS	NS	NS	NS	PP					X		
burial ground	4C	218-E-6	218-E-6 Burial Ground	1955	P-SS	ND	NS	NS	NS					X		SITE ENHANCED.
burial ground	4C	218-E-2	218-E-2, 200 East Industrial	1953	P-SS	ND	NS	NS	PP					X		RETIRED AND STABILIZED (HEPA); COVERS IN NOTED. CONTAMINATED TUMBLEWEEDS.
burial ground	4C	218-E-5	218-E-5 Burial Ground	1986	PSS	NS	NS	ND	NS					X		SITE BACKFILLED AND STABILIZED IN 1979. SOME SINKING OF SURFACE.
burial ground	4C	218-E-9A	200 East Industrial Waste U-A	1989	PSS	ND	NS	ND	PP					X		NO DATA ON COMPOSITION OF THE BURIAL BOXES. SITE RECEIVED D-2 COLUMN FROM PUREX K CELL.
burial ground	4C	218-E-3	218-E-3 Burial Ground	1994	NS	NS	NS	NS	PP					X		SITE HAS BEEN ENHANCED, VERIFY THAT THERE IS NO CHEMICAL OR RAD. RESIDUALS REMAINING
burial ground	4C	218-E-4	218-E-4, 200 East/Miner No. 2	1986	PS,PS	NS	NS	P	PP					X		CONTAMINATED EQUIP. STORED ABOVE-GROUND MAY HAVE CONTAMINATED SURFACE SOILS & AIR. REPAIR AND CONSTRUCTION WASTES MAY CONTAIN ORGANICS (EG., PAINTS AND SOLVENTS)
burial ground	4C	218-E-1	218-E-1, 200 East Dry Waste	1953	D-SS	ND	NS	NS	PP					X		
burial ground	4CR	218-E-12A	218-E-12A, 200 East Dry Waste	1967	PS,SS	ND	NS	P	PP					X		WASTE WAS VISIBLE AT SURFACE IN THE PAST. CONTAINS ACID SCALED WASTES AND DRY WASTES FROM 200E AREA. BACKFILLED, COVERED WITH PUREX PLANT ASH & GRAVEL.
burial tunnel	2D	218-E-14	218-E-14 PUREX TUNNEL NO. 1	1964	ND	NS	NS	NS	ND	V		X				DETERMINE NEED TO REMOVE WASTES.
burial vault	2D	216-E-9	216-E-9, 200 East Regulated	1999	P-S	NS	NS	NS	ND			X				REGULATED EQUIPMENT STORAGE.
burial vaults (3)	4C	218-E-7	218-E-7, 200 East/222-B	1982	D-SS	ND	ND	P	NS	V				X		UNSPECIFIED LAB WASTES AND MIXED HEP/TRU WASTES. 2 WOODEN VAULTS AND 1 CONCRETE VAULT. WOODEN VAULTS WERE OPEN AT BOTTOM.
burning pit	4LB		200 East Burning Pit	1970	P-SS	ND	NS	NS	D-P					X		A VARIETY OF NON-RAD. WASTES BURNED INCLUDING PAINTS AND SOLVENTS. NO REMEDIATION OR MONITORING NOTED.
crib	4B	216-A-39	216-A-40 CRIB/TRENCH	1966	D-SS,S	NS	NS	NS	D-P					X		BACKFILLED.
crib	1B	216-B-47	216-BV-5 CAVERN/CRIB	1986	D-SS	P	ND	NS	NS		X					COVERED WITH PLASTIC AND SAND.
crib	4B	216-B-51	216-BV-9 CRIB	1990	D-SS	ND	NS	NS	NS					X		NAS WOOD COVER WITH VENT HOLES.
crib	1B	216-B-15	216-BC-2 Crib	1987	D-SS,S	P	NS	NS	NS		X					CRIB MAY COLLAPSE. CONTAMINATED RABBIT DROPPINGS (RADIOACTIVE) ON SURFACE.
crib	1BR	216-A-10	216-A-10 crib	1987	D-SS	P	NS	NS	NS		X					UNIT USED TO DISPOSE MIXED WASTES UNTIL 3/87 ACIDITY MOBILIZING Sr WHICH HAS BEEN DETECTED IN GROUNDWATER.
crib	4BR	216-C-5	216-C-5 crib	1986	D-SS	ND	NS	NS	NS					X		
crib	4B	216-A-22	216-A-22 French Drain	1980	D-SS	NS	NS	NS	NS					X		BACKFILLED.
crib	1B	216-B-14	216-B-14	1986	D-SS,S	P	ND	NS	NS		X					CRIB STRUCTURE MAY COLLAPSE. RECEIVED GREATEST AMOUNT OF RADIOACTIVITY OF ANY SITE AT HANFORD.
crib	4B	216-A-41	216-A-41 Crib	1974	D-SS	NS	NS	NS	NS					X		BACKFILLED.
crib	4B	216-A-32	216-A-32	1972	D-SS	NS	NS	NS	NS					X		202-A CRANE MAINTENANCE FLOOR, SINK, AND SHOWER DRAINAGE. NO KNOWN CONSTITUENTS BUT RAD. WASTE MAY HAVE BEEN DISPOSED. BACKFILLED.
crib	4B	216-C-4	216-C-4 crib	1965	D-SS	ND	NS	P	NS					X		CONTAMINATED ORGANIC WASTES.
crib	4B	216-A-31	216-A-32 Crib	1966	D-SS	NS	NS	P	NS					X		ORGANIC WASTES FROM 202-B.
crib	1BR	216-B-10B	216-B-10B	1973	D-SS	ND	NS	NS	NS		X					CRIB STRUCTURE MAY COLLAPSE.
crib	4B	216-B-60	216-B-60 Crib	1967	D-SS	NS	NS	NS	NS					X		CRIBS WERE SEALED WITH CONCRETE AND SITE IS COVERED BY 225-B ENCAPSULATION FACILITY.
crib	4B	216-A-3	216-A-3 CAVERN	1967	D-SS	P	ND	NS	NS					X		SILICA GEL REGENERATION WASTE, MAY STORAGE PIT DRAINAGE AND 303-A PUMPHOUSE LIQUID WASTE.
crib	4BR	216-C-6	216-C-6	1964	D-SS	P	ND	NS	NS					X		

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8/26/87.

TABLE 2-21. 200 EAST RELEASE POTENTIAL AND ACTION MATRIX (CONTINUED)

200 East Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
crib	16	216-B-19	216-BC-6 Crib	1957	D-SS,S	P	ND	NS	NS		X					CRIB STRUCTURE NOW COLLAPSE. CONTAMINATED DROPPINGS ALONG SURFACE.
crib	16	216-B-8	241-B-3 CRIB	1952	D-SS	P	ND	NS	NS		X					CRIB STRUCTURE NOW COLLAPSE.
crib	16	216-B-10	216-BC-5 Crib	1956	D-S,SS	P	NS	NS	P-P		X					LARGE VOLUME OVER SHORT PERIOD RESULTED IN CAVE-IN WAS THEN FILLED w/ cement. CRIB COLLAPSE EXPECTED TO OCCUR. CONTAMINATED DROPPINGS ALONG SURFACE.
crib	16	216-A-1	216-A-1 Cavern	1955	D-SS	ND	NS	NS	NS		X					BACKFILLED.
crib	16	216-A-2	216-A-2 Cavern	1963	D-SS	P	NS	P	NS		X					ORGANIC WASTE from 242-A (PUREX); NOW NONE DEGRADED. AROUND CONTAMINATION FOUND 15 TO 35 FT BELOW SURFACE. 1966 STUDY FOUND LONG-LIVED RADIONUCLIDES AT 150-250 FT ABOVE WATERTABLE. CONTAM DROPPINGS ON SURFACE.
crib	4G	216-B-57	216-B-57 Crib	1973	D-SS	P	ND	NS	NS					X		
crib	16	216-B-17	216-BC-4 Crib	1956	D-SS,SS	P	ND	NS	NS		X					CRIB STRUCTURE NOW COLLAPSE. CONTAMINATED DROPPING ON SURFACE.
cribs - 3	16	216-B-12	216-ER-1, 2, 3 cribs, 216-ER	1973	D-SS,S	D	ND	NS	P-P		X					THREE CRIBS, ONE COLLAPSED AND WAS BACKFILLED. COVERED WITH PLASTIC AND STABILIZED. GROUNDWATER SAMPLES IN 1974 SHOWED CONTAMINATION.
crib/tile field	1G	216-W-9	216-B-361, 241-B-361	1951	D-SS	P	ND	NS	NS		X					CRIB STRUCTURE NOW COLLAPSE.
crib/trench	4E	216-B-58	216-B-58 TRENCH, 216-B-59 CRIB	1967	D-SS,S	ND	NS	NS	P-P					X		LABORATORY WASTES.
ditch	4E	216-A-34	216-A-34 Crib	1957	D-SS	ND	ND	NS	ND					X		CONTACT CONDENSER COOLING WATER; SITE BACKFILLED.
ditch	1E	216-B-2-1	216-B-2, B DITCH	1963	D-SS,S	P	ND	NS	P-P		X					WASTES WERE INCLUDED CHEMICAL SEWER. WAS CONTAMINATED BY A COIL FAILURE IN 221-B BLDG. DITCH Cleaned W/ CLEAN FILL & PLASTIC WEED ROOT BARRIER. DITCH AREA SCRAPED BEFORE COVERED. LAST 1000 FT IS COMMON WITH 216-B-2-2 DITCH (PARALLEL, CLOSE)
ditch	4E	216-B-3-2	216-B-2-2E, B SWAMP DITCH	1970	D-SS,S	P	ND	NS	P-P					X		DITCH WAS BACKFILLED WITH CLEAN SOIL, COVERED WITH 10 MILS. PLASTIC SHEETING, SOIL AND GRAVEL. MAJOR CONTAMINATION INCIDENT IN 1970.
ditch and pond	4E	216-B-3-1	216-B-2, B SWAMP DITCH	1964	D-SS,S	P	ND	NS	P-P					X		DITCH WAS BACKFILLED AND COVERED W/ PLASTIC ROOT BARRIER, SAND & GRAVEL. DITCH FEEDS SWAMP.
diversion box	4EN	241-B-151	241-B-151 diversion box	1984	D-SS,S		NS	NS	P-P	Y				X		LEAKAGE RESULTED IN SOME SOIL BEING REMOVED AND ADDITION OF NEW SOIL COVER. VERIFY IF ANY CONTAMINATION REMAINS.
diversion box	21N	241-C-252	241-C-252 diversion box	1985	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-C-154	241-C-154 diversion box	1985	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-AY-152	241-AY-152 diversion box	1985	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-AR-152	241-AR-152 diversion box	1984	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-CR-152	241-CR-152 diversion box	1985	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-CR-153	241-CR-153 diversion box	1985	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-BXR-151	241-BXR-153 diversion box	1984	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-BYR-151	241-BYR-151 diversion box	1984	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-B-252	241-B-252 diversion box	1984	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-CR-151	241-CR-151 diversion box	ND	P-SS	P	NS	NS	ND	Y		X				
diversion box	21N	241-C-151	241-C-151 diversion box	1985	D-SS,S	P	NS	NS	D-P	P		X				IN 1985 A SPILL RESULTED IN THIS UNIT BEING FLUSHED AND SPRAYED W/ TURCO FAUXI-FIX TO PHYSICALLY FIX CONTAMINATION. VERIFY THAT NO FURTHER RELEASE HAS OR WILL OCCUR.
diversion box	21N	241-A-152	241-A-152 diversion box	1980	P-SS	P	NS	NS	ND	Y		X				
diversion box	4EN	241-B-152	241-B-152 diversion box	1984	D-SS,S	P	NS	NS	P-P	Y				X		LEAKAGE RESULTED IN SOME SOIL BEING REMOVED AND ADDITION OF NEW SOIL COVER. VERIFY IF ANY CONTAMINATION REMAINS.
diversion box	11N	241-BYR-153	241-BYR-153 diversion box	1984	P-SS	P	NS	NS	ND	Y		X				
diversion box	4EN	241-B-154	241-B-154 diversion box	1984	D-SS,S	P	NS	NS	P-P	Y				X		LEAKAGE RESULTED IN SOME SOIL BEING REMOVED AND ADDITION OF NEW SOIL COVER. VERIFY IF ANY

KEY: N = official number not assigned but identified by unit number; D= documented; P= suspected; ND= no data; NS= not suspected; SS= subsurface soil; S= surface soil; P= past air release; C= current air release; F= future air release; Blank= no; X= yes

8/26/87.

TABLE 2-21. 200 EAST RELEASE POTENTIAL AND ACTION MATRIX (CONTINUED)

200 East Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	NEED FOR ACTION: Remediation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
																CONTAMINATION REMAINS.
diversion box	1IN	241-C-152	241-C-152 diversion box	1985	D-SS	?	NS	NS	?-P	Y	N					CONTAMINATION REPORTED BUT NO REMEDIATION NOTED.
diversion box	2IN	241-BX-195	241-BX-195 diversion box	1984	?-SS	?	NS	NS	NO	Y		N				
diversion box	2IN	241-C-153	241-C-153 diversion box	1985	?-SS	?	NS	NS	NO	Y		N				
diversion box	2IN	241-BX-153	241-BX-153 diversion box	1983	?-SS	?	NS	NS	NO	Y		N				
diversion box	2IN	241-BYR-152	241-BYR-152 diversion box	1984	?-SS	?	NS	NS	NO	Y		N				
diversion box	2IN	241-BXR-152	241-BXR-152 diversion box	1984	?-SS	?	NS	NS	NO	Y		N				
diversion box	2IN	241-BX-154	241-BX-154 diversion box	1985	?-SS	?	NS	NS	NO	Y		N				
diversion box	1IN	241-B-153	241-B-153 diversion box	NO	D-SS,S	?	NS	NS	?-P	Y	N					CONTAMINATION REPORTED BUT NO REMEDIATION NOTED.
diversion box	2IN	241-BYR-154	241-BYR-154 diversion box	1984	?-SS	?	NS	NS	NO	Y		N				
diversion box	2IN	241-A-153	241-A-153 diversion box (?)	1985	?-SS	?	NS	NS	NO	Y		N				
diverter station	2IN	241-AW-152	241-AW-152 diverter station	NO	?-SS	?	NS	NS	NO	Y		N				
diverter station	2IN	241-AZ-151	241-AZ-151 diverter station	NO	?-SS	?	NS	NS	NO	Y		N				
drain field	3U		sanitary waste drain field	1963	D-SS	NO	NS	NO	NS				N			LABORATORY REAGENTS USED IN FACILITY SUPPORTED BY THIS UNIT. VERIFY THAT UNIT RECEIVED NO HAZARDOUS CONSTITUENTS.
evaporator	4AN	242-BN	242-B Evaporator	1987	NO	NO	NS	NS	?-P,C	Y	N					NO DECONTAMINATION OF UNIT NOTED.
french drain	3U	216-A-26B	216-A-26 French Drain	1965	D-SS	NS	NS	NS	NS		N					DRAIN ENCASEMENT REMOVED IN 1965.
french drain	4U	216-A-16	216-A-16 Dry Well	1969	D-SS	NO	NS	NS	NS					N		
french drain	4U	216-A-17	216-A-17 Dry Well	1969	D-SS	NS	NS	NS	NS					N		
french drain	4U	216-A-35	216-A-35 Dry Well	1966	D-SS	NS	NS	NS	NS					N		
french drain	4U	216-A-33	216-A-33 Dry Well	1964	SS	NO	NO	NS	NS					N		
French Drain	4U	216-C-8	271-CR crib, 216-C-8 crib	1965	D-SS	NS	NS	NS	NS					N		
french drain	4U	216-A-12	216-A-12 French Drain	1972	D-SS	NO	NS	NS	NS					N		
french drain	4U	216-A-23B	216-A-23B French Drain	1969	D-SS	NS	NS	NS	NS					N		
french drain	4U	216-A-14	216-A-14 French Drain	1972	D-SS	NS	NS	NS	NS					N		
french drain	4U	216-A-23B	216-A-23B French Drain	1969	D-SS	NS	NS	NS	NS					N		
french drain	4U	216-A-11	216-A-11 French Drain	1972	D-SS	NO	NS	NS	NS					N		
french drain	4U	216-A-15	216-A-15 French Drain	1972	D-SS	NO	NO	NS	NS					N		
french drain	4U	216-A-13	216-A-13 French Drain	1962	D-SS	NS	NS	NS	NS					N		
french drain	4U	216-B-13	216-B-13	1976	D-SS	NO	NS	NS	NS					N		FILLED WITH CRUSHED LIMESTONE.
leaching pit	4EN	216-C-3	216-C-3, 281-C Leaching Pit	1984	D-SS	NO	NS	NS	NS					N		
pit	3U		200 Area Construction Waste	1985	NS	NS	NS	NS	NS				N			GRAVEL PIT USED FOR CONSTRUCTION DEBRIS DISPOSAL.
pit	1U	UPR-200-E-85/124	UPR-200-E-85/124, R-13 Pit	1972	D-SS,S	NO	NS	NS	NO		N					RPD. CONTAMINATION NOTED BUT NO INDICATION THAT REMEDIATION WAS COMPLETED. NO CHEMICAL DATA.
receiving vault	2I	244-CRX	244-CR receiving vault	NO	NO	NO	NS	NS	NS	?		N				
receiving vault	2I	244-BXRX	244-BXR receiving vault	1985	NO	NO	NS	NS	NS	?		N				
reverse well	4U	216-B-11-A/B	216-B-11 CRIB, 242-B-1 CRIB	1984	D-SS	?	NO	NS	NS					N		
reverse well	4UN	216-B-4	216-B-4	1949	D-SS	NS	NS	NS	NS					N		
spill site	1J	UN-216-E-69	UN-216-E-69 Railroad Car Flush	1984	D-S,SS	NO	NO	NS	?-P		N					DETERMINE CONSTITUENTS OF CONCERN & REMEDIATE
spill site	1C	UN-216-E-72	UN-216-E-72 (UNCOVERED WASTE)	1985	D-SS,S	NO	NO	NO	?-P		N					CONTAMINATION SOURCE WAS STABILIZED WITH TUNGS FRAME-FILM IN PLACE. DETERMINE IF ADDITIONAL ACTION IS REQUIRED & WHAT WASTES WAS.
spill site	2J	UPR-200-E-44/103	UPR-200-E-44/103/123 BCS LINE	1972	D-SS,S	NO	NS	NS	?-P,C		N					CRIB LINE LEAKAGE RESULTED IN A CAVE-IN. NO REMEDIATION OF CONTAMINATED AREA IS NOTED.
tank	1IN	241-BX-302-B	catch tank 241-BX-302-B	1985	NO	NO	NS	NS	NS	Y	N					

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8/26/87.

TABLE 2-21. 200 EAST RELEASE POTENTIAL AND ACTION MATRIX (CONTINUED)

200 East Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	Remediation	NEED FOR ACTION: Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
tank	IIR	241-A-302-B	catch tank 241-A-302-B	ND	ND	ND	NS	NS	NS	Y	X					
tank	IIR	241-BX-302-A	catch tank 241-BX-302-A	1986	ND	ND	NS	NS	NS	Y	X					
tank	IIR	241-AZ-151	catch tank 241-AZ-151	ND	ND	ND	NS	NS	NS	Y	X					
tank	IIR	241-B-301-B	catch tank 241-B-301-B	1984	ND	ND	NS	NS	NS	Y	X					
tank	IIR	244-CRn	catch tank 244-CR	ND	ND	ND	NS	NS	NS	Y	X					
tank	IH	270-E9	270-E Condensate neutral.	1976	ND	NS	NS	NS	ND	Y	X					TANK CONTAINS 3,000 GAL. OF CONTAMINATED SLUDGE.
tank	II	241-CX-72	241-CX-72 Tank	1976	ND	ND	NS	NS	NS	Y	X					UNIT WAS DECOMMISSIONED IN SITU IN 1986. VERIFY THAT NO RESIDUAL CONTAMINATION REMAINS. ASSUME TANK CONTAINED LIQUID NOT SOLID WASTE.
tank	IIR	244-BXRn	catch tank 244-BXR	ND	ND	ND	NS	NS	NS	Y	X					
tank	IIR	241-B-301-C	catch tank 241-B-301-C	ND	ND	ND	NS	NS	NS	Y	X					
tank	II	241-B-361	241-B-361 settling tank	1976	ND	ND	NS	NS	NS	Y	X					TANK CONTAINS AN ESTIMATED 32,000 GAL. OF SLUDGE. CONCRETE CONSTRUCTION. WASTE SHOULD BE REMOVED.
tank	IIR	241-BX-302-C	catch tank 241-BX-302-C	1985	ND	ND	NS	NS	NS	Y	X					
tank	II	241-CX-70	241-CX-70 tank	1976	ND	ND	NS	NS	NS	Y	X					STAINLESS STEEL TANK CONTAINS 4.75 FT. OF SLUDGE. INCLUDED IN THE STRONTIUM SEMIWORKS DECOMMISSIONING PROJECT. WASTE SHOULD BE REMOVED.
tank	IIR	241-B-302-B	catch tank 241-B-302-B	1985	ND	ND	NS	NS	NS	Y	X					
tanks	IIR	241-AWR	241-AW tank farm	1977	D-SS,S	P	NA	NS	NS	Y	X					INCLUDES UPR-200-E-115,119. AT LEAST ONE TANK IS LEAKER.
tanks	IIR	241-BYR	241-BY tank farm	1977	D-SS,S	P	NA	NS	NS	Y	X					AN UNDETERMINED NUMBER OF SALT WELLS HAVE BEEN INSTALLED TO REMOVE SPILLED LIQUIDS. INCLUDES UPR-200-E-118,134,136. TANKS HAVE LEAKED.
tanks	IIR	241-AR	241-A tank farm	1977	D-SS,S	P	NA	NS	NS	Y	X					INCLUDES UPR-200-E-125,126,48,47. TANKS LEAKED >1500 GALLONS.
tanks	IIR	241-BXR	241-BX tank farm	1980	D-SS,S	P	NA	NS	NS	Y	X					INCLUDES UPR-200-E-3,4,76,89,131,133. TANKS LEAKED >10,000 GALLONS.
tanks	IIR	241-BR	241-B tank farm	1977	D-SS,S	ND	NS	NS	NS	Y	X					AN UNDETERMINED NUMBER OF SALT WELLS HAVE BEEN INSTALLED TO REMOVE SPILLED LIQUIDS. ASPHALTING OF SURFACES IS ALSO REPORTED. INCLUDES UPR-200-E-127,130,108,109.
tanks	IIR	241-CR	241-C tank farm	1979	D-SS,S	NA	NS	NS	NS	Y	X					CONSTRUCTION OF A SALT WELL AND SOIL REMOVAL ARE REPORTED. INCLUDES UPR-200-E-16,90,91,136,137 AND UN-216-E-91. TANKS LEAKED >20,000 GAL.
tank	IHR	224-BR	224-B CONC. FACILITY	1976	ND	ND	ND	NS	ND	Y	X					INACTIVE PRODUCT TREATMENT UNIT.
tanks	IH	205-A	205-A SILICA GEL FACILITY	1976	ND	ND	ND	NS	ND	Y	X					INACTIVE RAD. MATERIALS PROCESSING UNIT.
trench	4E	216-A-10	216-A-10 Excavation	1956	D-SS	ND	NS	NS	P-F					X		TRENCH PARTIALLY BACKFILLED.
trench	4E	216-B-30	216-BX-4 Trench	1954	D-SS	P	ND	NS	P-F					X		TRENCH BACKFILLED.
trench	4E	216-B-28	216-BC-14 TRENCH	1957	D-SS,S	P	ND	NS	P-F					X		TRENCH BACKFILLED AND BLACKTOPPED. CONTAMINATION NEAR SURFACE. BLACKTOP CRACKED. HERBICIDES APPLIED
trench	4E	216-B-53B	216-B-53 TRENCH	1963	D-SS,S	ND	ND	NS	P-F					X		TRENCH BACKFILLED INCLUDING SAND W/ GRAVEL COVER. HERBICIDE APPLIED.
trench	4E	216-B-31	216-BC-18 TRENCH	1957	D-SS	P	ND	NS	P-F					X		TRENCH BACKFILLED WITH SAND AND GRAVEL. HERBICIDE APPLIED.
trench	4E	216-B-35	216-BC-20 TRENCH	1957	D-SS	P	ND	NS	P-F					X		TRENCH BACKFILLED WITH SAND AND GRAVEL. HERBICIDE APPLIED.
trench	4E	216-B-22	216-BC-9	1956	D-SS	P	ND	NS	P-F					X		TRENCH BACKFILLED W/ GRAVEL, HERBICIDES APPLIED.
trench	4E	216-A-19	216-A-19 Grave/Sump/Test hole	1956	D-SS	P	ND	NS	P-F					X		TRENCH BACKFILLED.
Trench	4E	216-B-42	241-BX-8 Grave,216-BX-8 Trench	1955	D-SS	ND	NS	NS	P-F					X		TRENCH BACKFILLED.
trench	4E	216-B-54	216-B-54 Trench	1965	D-SS	ND	NS	NS	P-F					X		TRENCH BACKFILLED INCLUDING SAND W/ GRAVEL COVER. HERBICIDE APPLIED.
trench	4E	216-B-52	216-B-52 Trench	1980	D-SS	P	ND	NS	P-F					X		TRENCH BACKFILLED INCLUDING SAND W/ GRAVEL COVER. HERBICIDE APPLIED.

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- SS= subsurface soil
- S= surface soil
- P= past air release
- C= current air release
- F= future air release
- N= yes
- Blank= no

8/26/87.

TABLE 2-21. 200 EAST RELEASE POTENTIAL AND ACTION MATRIX (CONTINUED)

200 East Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	Release Potential: Soil	Release Potential: Ground Water	Release Potential: Surface Water	Release Potential: Sub-surface Gas	Release Potential: Air	Residual Radio-active Structures	Remedi-ation	Verify No Release	Need for Action: Verify No Hazardous Constituents	Need for Action: Verify No Residual Contamination	Need for Action: No Further Action Required	Comments
trench	4C	216-B-34	216-BC-21 Trench	1957	D-SS	?	ND	NS	? P					X		TRENCH BACKFILLED INCLUDING SAND W/ GRAVEL COVER. HERBICIDE APPLIED.
trench	4C	216-B-28	216-BC-7 Trench	1957	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED W/ GRAVEL. HERBICIDE APPLIED.
trench	4C	216-B-27	216-BC-14 TRENCH	1957	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED WITH SAND & GRAVEL COVER, HERBICIDES APPLIED.
trench	4C	216-B-53A	216-B-53A Trench	1965	D-SS	ND	NS	NS	?-P					X		TRENCH BACKFILLED WITH SAND & GRAVEL COVER, HERBICIDES APPLIED. CONTAIN PIPING FROM TRENCHES BURIED BETWEEN 216-B-29 AND 216-B-53A.
trench	4C	216-B-38	216-BX-1 Trench	1954	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED.
trench	4C	216-B-29	216-BC-18 TRENCH	1956	D-SS	ND	NS	NS	?-P					X		TRENCH BACKFILLED WITH SAND & GRAVEL COVER. HERBICIDES APPLIED.
trench	4C	216-B-37	216-BX-3 Trench	1954	D-SS	ND	NS	NS	?-P					X		TRENCH BACKFILLED.
Trench	4C	216-B-41	241-BX-7 Grave,216-BX-7 Trench	1954	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED.
trench	4C	216-B-30	216-BC-17 TRENCH	1957	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED WITH SAND & GRAVEL COVER. HERBICIDES APPLIED.
trench	4C	216-B-24	216-BC-11	1956	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED WITH SAND & GRAVEL COVER. HERBICIDES APPLIED.
trench	4C	216-A-20	216-A-20 Grave/Sump/Test hole	1956	D-SS	ND	NS	NS	?-P					X		TRENCH BACKFILLED.
trench	4C	216-B-25	216-BC-12, 216-B-24	1956	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED WITH SAND AND GRAVEL COVER. HERBICIDE APPLIED. CONTAMINATED PIPING FROM TRENCHES BURIED BETWEEN 216-B-25 & 216-B-53A.
trench	4C	216-B-29	216-BC-16 Trench	1957	D-SS	?	ND	NS	?-P					X		SAME
trench	4C	216-B-26	216-BC-13 TRENCH	1957	D-SS	?	ND	NS	?-P					X		SAME
trench	4C	216-B-32	216-BC-19	1957	D-SS	?	ND	NS	?-P					X		SAME
Trench	4C	216-B-40	241-BX-6 Grave/Trench	1954	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED.
trench	4C	210-E-3A	Reg. Equipment Storage	ND	D-SS	?	NS	NS	?-P					X		TRENCH BACKFILLED BUT HAS SINK HOLES.
Trench	4C	216-B-39	241-BX-8 GRAVE,216-BX-5 TRENCH	1954	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED.
trench	4C	216-B-21	216-BC-8 Trench	1956	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED WITH GRAVEL. HERBICIDES APPLIED.
trench	4C	216-B-36	216-BX-2 Trench/Grave	1954	D-SS	?	ND	NS	?-P					X		TRENCH BACKFILLED.
vault	4C	241-CX-72	241-CX-72 Vault & Tank	1976	ND	ND	NS	NS	NS	Y				X		DECOMMISSIONED IN 1976.
waste line	4J	UPR-200-E-98/1	R-3 waste line	ND	D-SS,S	ND	ND	NS	?-P					X		MOST OF THE CONTAMINATED SOIL REMOVED.
waste line	4J	UPR-200-E-7	Waste Line	1954	D-SS,S	ND	ND	NS	?-P					X		AREA COVERED AND POSTED AS CONTAMINATION ZONE.

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8/26/87.

TABLE 2-22. 200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
basin	SC	203-S	76	203 S basin at 203-S uranium	SS	?				?			N			SITE IS BELOW GROUND WITH BUILDING ROOF; 2 FT SOIL. GROUNDWATER VERY LOW, LITTLE CHANCE FOR MIGRATION.
basin	SC	204-S	76	204-S basin at the uranium	SS	?				?			N			SAME AS ABOVE
box	SC	2904-S-160	76	2904-S 160 Control Structure	SS	?				Y	N					SOIL IS CONTAMINATED
Burial Ground	RCR	218-W-1A	54	Industrial Burial Ground No. 1	?-SS,S	NO	NO	NO	NO	Y				N		
Burial Ground	RCR	218-W-11	60	Solid waste burial and regul	SS,S	NS	NS	NS	P		N					AMERICIUM HAS BEEN WITHDRAWN FROM BURIAL TRENCH. PART OF GROUP ASSOCIATED WITH 218-W-4A.
Burial Ground	SLR		50	Non Rad Burial Ground	?	NS	NS	NS	NS				N		N	SCRAP METAL POSSESSES ASBESTOS
burial ground	RCR	218-W-9	54	218-W-9	? SS	NS	NS	NS	NS			N				NATURE OF WASTE NOT KNOWN. SITE HAS BEEN STABILI. HOWEVER, TECHN. NOT KNOWN.
burial ground	RCR	218-W-02A	85	218-W-02A burial ground	? SS	NS	NS	NS	NS			N				SUSPECT OF HW AND RW MIGRATION, IF SITE NOT PROP. COMPLETLY. INCLUDES CONTAMINATED SOIL FROM 216-T-4-1 POND.
burial ground	RCR	218-W-4A	60	218-W-4A, UPR-200-W-72	SS,S	NS			P,C,F		N					PART OF SITE COVERED WITH 10 MIL PLASTIC TOPPED WITH 30 INCHES GRAVEL AND SAND. SUNKEN HOLES FOUND AND FILLED IN. WASTES WITHIN 30 INCHES OF SURFACE (4 FT REQUIRED).
burial ground	RCR	218-W-1	52	218-W-1	? SS	?					N					WASTES WITHIN 10 INCHES OF SURFACE; CONTAMINATED WEEDS. ASSOCIATED WITH 218 W-4A.
Burial Ground	RCR	218-W-1A	54	Industrial Waste Burial Ground	? SS	?						N				BOXES HOLDING WASTES IN GROUND HAVE COLLAPSED. METHOD OF STABILIZATION NOT SPECIFIED.
burial ground	RCR	218-W-2	56	218-W-2	? SS	?					N					WASTES WITHIN 10 INCHES OF SURFACE. ASSOCIATED WITH 218-W-4A.
burial ground	RC	218-W-3	61	218-W-3	? SS	?					N					WASTES SUSPECTED TO BE WITHIN 10 INCHES OF SURFACE. ASSOC WITH 218-W-4A.
compartment	218	UPR-200-W 137	60	UPR 200-W 137	? SS	?						N				NO ACTION TAKEN
Crib	216A	216-T-17	53	216-T-17 Crib	D-SS	?	NS	NS	NS	?				N		
Crib	16A	216-Z-6	45	231-W-4 trib, 216 W-4,	D SS	?				?	N					SITE HAS BEEN RETIRED FOR OVER A LONG TIME. BUT CRIB STRUCTURE BELIEVED READY TO COLLAPSE. CONTAMINATION MAY REACH GROUND WATER BY MIN (?). SINCE RELEASE TO SOIL IS CERTAIN, THERE IS A NEED FOR VERIFYING THAT THERE IS NO RESIDUAL CONTAM., AND IF THERE IS, REMEDIATION IS NEEDED.
crib	16A	216-T-29	64	216-T-29	SS	?				?				N		SAME AS ABOVE
crib	16A	216-S-23	72	216-S-23 crib	SS	?				?				N		SAME AS ABOVE
crib	16A	216-Z-12	73	216 Z-12	SS	?				?				N		80 FOOT SAMPLE SHOWED TRACE REMOV.
crib	16A	216-T-36	69	216-T-36	SS	?				?				N		
Crib	16A	216-Z-3	59	216-Z-3 culvert, 231-S 03 and	SS	?				?				N		
crib	16A	216-T-35	67	216-T-35	SS	?				?				N		
crib	16A	216-T-27	65	216-T-27	SS	?				?	N					CONTAMINATION OF 120 FT; SURFACE CONTAMINATION REMOVED.
crib	16A	216-T-34	67	216-T-34	SS	?				?				N		SAME AS ABOVE; UNLOADING STATION NEAR CRIB SHOWS CONTAMINATION.
crib	16A	216-T-32	62	216-T-32	SS	?				?	N					CONTAMINATION FROM 35 TO 235 FEET; CRIB STRUCTURE BELIEVED READY TO COLLAPSE.
crib	16A	216-T-33	63	216-T-33	SS					?	N					WASTE MAY HAVE REMAINED IN CRIB OR CRIB LINE.
crib	16A	216-S-13	72	216-S-13 crib	SS	?				?	N					CRIB STRUCTURE BELIEVED READY TO COLLAPSE.
crib	16A	216-T-32		216-T-32	SS	?				?				N		
Crib	16A	216-Z-16	77	crib: 216-Z-16	SS	?				?				N		
crib	16A	216-W-10	87	216-W-10 crib	SS,S	?			P,C,F	?	N					SINCE THE WASTE IS NEW AND CONTAINS CHEMICALS

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8/26/87.

TABLE 2-22. 200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX (CONTINUED)

200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	NEED FOR ACTION: Remediation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
																EXPLOSIVE TRANSPORTATION MAY BE SUSPECTED AS NON RELEASE
crib	[illegible]	216-T-6	51	216 T-6 crib	SS	?				?				X		SEE COMMENTS ON SITE 216-2-6 (EXCEPT CRIB STRUCTURE).
crib	[illegible]	216-T-26	56	216 T-26	SS	?				?	X					CONTAMINATION DETECTED TO 120 FT. LATERAL WASTE SPREAD BELIEVED TO HAVE OCCURRED.
crib	[illegible]	216-Z-5	47	216 Z-5, 231-W-1 Z cribs	SS,S	?				?	X					STRUCTURE BELIEVED READY TO COLLAPSE. WASTE MAY REMAIN WITHIN CRIB DUE TO PLUGGING BY SLUDGE.
crib	[illegible]	216-S-22	67	216-S-22 crib	SS	?				?				X		
Cribs 3	[illegible]	216-U-8	60	216 UR-1, 2, 3 Cribs, 216 U-5	SS	?				?	X					STRUCTURE BELIEVED READY TO COLLAPSE. PAST SINK HOLE PROBLEM. PART OF GROUP ASSOCIATED WITH 216-Z-6.
Cribs 5	[illegible]	216-Z-10	73	cribs - 5 parallel	SS	?				?	X					SAME AS ABOVE. PSB CANDOM TEST.
ditch	[illegible]	216-T-4 2 (D)	72	216 T-4-2 (D)	SS	?	NS	?	P					X		POSSIBLE LOCAL AREA CONTAMINATION. ALSO, VEGETATION UPTAKE COULD BE ANOTHER RELEASE POTENTIAL.
Ditch	[illegible]	216-Z 17	60	216 Z-17 Ditch or Trench	SS	?	NS							X		SAME AS ABOVE, PART OF GROUP ASSOC WITH 216-Z-6.
ditch	[illegible]	UPR-200-W 139	53	UPR 200-W-139	U,S,SS	?			P		X					
ditch	[illegible]	216-Z-19	81	216 Z-19 ditch	SS,S	?		NS	P,C		X					
Ditch	[illegible]	216-U-9	54	216 U-6 U-Swamp 5	SS,S	?		NS	P		X					CONSIDER AGE OF UNIT. SAME AS ABOVE, PART OF GROUP ASSOC WITH 216-Z-19.
Ditch	[illegible]	216-Z-11	71	216 Z-1 ditch, Z plant ditch	SS	?					X					SAME AS ABOVE, PART OF GROUP ASSOC WITH 216-Z-19.
Ditch	[illegible]	216-Z-1 (D)	99	Drain Ditch to U-Swamp, Z	SS	?					X					SAME AS ABOVE, PART OF GROUP ASSOC WITH 216-Z-19.
ditch	[illegible]	216-T-4 1 (D)	72	216 T-4-1 (D)	SS	?					X					RESIDUAL CONTAMINATION POSES PLANT UPTAKE PROBLEM.
diversion box	[illegible]	241-TX-153	82	241-TX-153 incl. UPR	?-SS,S	?	NS		P	?	X					
diversion box	[illegible]	241-UR-152	83	241-UR-152 (waste transfer)	? SS	?				?		X				DIVERSION BOXES ARE ASSUMED TO BE OF CONCRETE BOX STRUCTURES WITH INLET AND OUTLET PIPING, BURIED IN THE GROUND. LEAKS CAN OCCUR FROM THE PIPING, AND THE BOX STRUCTURE. MAIN CONCERN IS LEAKAGE FROM THE UNIT TO SUBSURFACE SOIL, EVENTUALLY TO GROUNDWATER. SINCE THEY ARE WEATHER COVERED VEGETATION UPTAKE MAY NOT BE A POTENTIAL RELEASE PATH. REL: VERIFY NO RELEASE FOR ALL BX THEN EXCEPT THOSE THAT ARE CONFIRMED LEAKER. THESE WILL EITHER REQUIRE REMEDIATION OR CONFIRMATION FOR NO RESID. CONTAMINATION. (COMMENT 1)
diversion box	[illegible]	241-UR-154	82	241 UR-154 (waste transfer)	? SS	?				?		X				SEE COMMENT (1)
diversion box	[illegible]	241-U-153	81	241-U-153 (waste transfer)	? SS	?				?		X				SEE COMMENT (1)
diversion box	[illegible]	241-U-252	83	241-U-252 (waste transfer)	? SS	?				?		X				SEE COMMENT (1)
diversion box	[illegible]	241-SX-151	83	241-SX 152 (waste transfer)	U,SS	?	NS	NS	NS	?	X					UPR-200-W-80,81,114. CONTAMINATION STILL REMAIN. NEED REMEDIAL ACTION
diversion box	[illegible]	241 UR-153	83	241 UR-153 (waste transfer)	? SS	?	NS			?		X				SEE COMMENT (1)
diversion box	[illegible]	241-SX-152	81	241 SX-151 (waste transfer)	U,SS	?	NS	NS	NS	?	X					UPR-200-W-80,81,114. SEE COMMENTS ON 241-SX-151
diversion box	[illegible]	241-T-152	83	241-T-152 (waste transfer)	U,SS	?				?	X					UPR-200-W-7. SEE COMMENTS ON 241-SX-151
diversion box	[illegible]	241-TY-153	83	241-TY-153 (waste transfer)	? SS	?				?		X				SEE COMMENT (1)
diversion box	[illegible]	240-S-151	87	240-S-151 (waste transfer)	U,SS,S	?				?	X					UPR-200-W-20,31,40. SEE COMMENTS ON 241-SX-151
diversion box	[illegible]	241-TXR-155	80	241-TXR-155 (waste transfer)	? SS	?				?		X				SEE COMMENT (1)
diversion box	[illegible]	241-T-151	80	241-T-151 (waste transfer)	U,SS	?				?	X					UPR-200-W-7. SEE COMMENTS ON 241-SX-151
diversion box	[illegible]	241-TXR-151	80	241-TXR-151 (waste transfer)	? SS	?				?		X				SEE COMMENT (1)
diversion box	[illegible]	241-TR-152	82	241-TR-152 (waste transfer)	? SS	?				?	X					SEE COMMENT (1), PART OF GROUP ASSOC W/ 241-T-152.
diversion box	[illegible]	241-TXR-244	81	241-TXR-244 (waste transfer)	? SS	?				?		X				SEE COMMENT (1)

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SS= subsurface soil
S= surface soil
P= past air release
C= current air release
F= future air release
X= yes
Blank= no

8/26/87.

TABLE 2-22. 200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX (CONTINUED)

200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
diversion box	1IR	240-S-152	80	240-S-152 (waste transfer)	D,SS	?				Y	N					WPR-200-W-80,81. SEE COMMENTS ON 241-SY-151
diversion box	2IR	241-TXR-152	80	241-TXR-152 (waste transfer)	? SS	?				Y		N				SEE COMMENT (1)
diversion box	3IR	241-TY-151	81	241-TY-151 (waste transfer)	? SS	?				Y		N				SEE COMMENT (1)
diversion box	1IR	241-TR-153	83	241-TR-153 (waste transfer)	? SS	?				Y	N					SEE COMMENT (1), PART OF GROUP ASSOC W/ 241-T-152.
diversion box	1IR	241-S-152	80	241-S-152 (waste transfer)	D,SS	?				Y	N					WPR-200-W-82. SEE COMMENTS ON 241-SY-151
diversion box	2IR	241-TXR-153	80	241-TXR-153 (waste transfer)	? SS	?				Y		N				SEE COMMENT (1)
dry well	3D	241-SX-402	76	dry well at 241-SX-402	SS	?							N			DRY WELL INSIDE BUILDING. WASTE MIGHT NOT MIGRATE
dry well	3D	241-SX-401	76	dry well at 241-SX-401	SS	?							N			SAME AS ABOVE
filter monitor	4D	2710-S4	76	2710-S sand filter monitor	ND	ND			ND					N		WHAT CONTAIN CONTAMINATED SOLID WASTE. NEED MORE INFO TO DECIDE REMEDIAL ACTION
french drain	4DR	216-U-7	57	216-U-7	SS	?								N		
french drain	4D	216-T-31	59	216-T-31	SS,S	?								N		WASTE REMOVED. NEED TO CONFIRM NO RES. RAD.
French Drain	2DR	216-Z-8	62	216-Z-8 Crib, 234-5 Recuplex	SS	?						N				CONTAMINATED SOIL/GRAVEL REMOVED.
ground contam.	3D	WPR-200-W-136	84	WPR-200-W-136	D,S,SS	?			P,C,F		N					SITE WAS CONTAMINATED. NO INFO ON PRESENT COND. ASSUME SITE STILL CONTAMINATED. REMEDIATION NEEDED
ground spill	5J	WPR-200-W-117	80	WPR-200-W-117	D,S,SS	NS			P						N	RAD. DECAYED TO BACKGROUND LEVEL. LIGHED AND PARTICULATE MATTER DROPPED FROM BUILDING CRKS.
ground spill	1J	WPR-200-W-69	73	WPR-200-W-69	D,S,SS	?			P,C,F		N					SEE COMMENT ON WPR-200-W-136
incinerator	2H	232-Z4		232-Z waste incineration	? S	NS			P	Y		N				VERIFY NO RELEASE FROM BUILDING. CONTAMINATION OF SOIL AND DESPERSE THROUGH HER DAY BE POSSIBLE.
pit	4DR	216-U-15	57	216-U-15, 300-W dumping	SS	?								N		SITE WAS DEEN RETIRED FOR A LONG TIME. BACKFILLED IMMEDIATELY AFTER ONE USE. LATER CORINGS SHOWED NO MIGRATION CONTAMINATION. NEED TO VERIFY THE NO RESIDUAL CONTAMINATION TO DETERMINE WHETHER OR NOT REMEDIATION IS NEEDED.
pit	4LA		ND	200 West burning pit	? S	ND	ND	ND	P					N		NO INFO AVAIL. FOR THIS UNIT
pit	4DR	216-T-20	52	disposal trench/pit	SS		NS	NS	NS					N		
pit	4DR	WPR-200-W-30	84	WPR-200-W-30 covered pit	SS	?								N		WASTE BURIED IN THE PIT IS SUSPECTED TO MIGRATE. HOWEVER, IT WAS SUCH A LONG TIME AGO THAT VERIFICATION FOR RESIDUAL CONTAMINATION IS NEEDED BEFORE MAKING DECISION FOR REMEDIATION.
pond	4DR	216-S-16	52	216-S-16	SS	?								N		POND WAS DEACTIVATED A LONG TIME AGO. BACKFILLED WITH SOIL. HOWEVER, NEED TO VERIFY THE EXTENT OF RESIDUAL CONTAMINATION TO DETERMINE WHETHER OR NOT REMEDIATION IS NEEDED.
pond	3DR	216-U-10	66	216-U-10 pond	D,S,SS	?			P		N					WPR-200-W-107. POND OVERFLOWED. NEED TO REMEDIATE SITE.
pond	4DR	216-S-11	66	216-S-11 pond	D,S,SS	?								N		SEE COMMENTS FOR 216-S-16 POND ONLY ONE POND COVERED).
pond	4DR	216-T-4R	72	216-T-4R	? SS	?								N		SITE WAS DEEN CRAWED. NEED TO VERIFY THAT THERE IS NO RESIDUAL CONTAMINATION
pond	3C	216-S-19	84	216-S-19 pond	? SS	?					N					SITE IS NEWLY DEACTIVATED. RELEASE IS EXPECTED TO REMAIN IN THE SOIL, AND PROBABLY NONE TO GRO WATER
proc. tdk vent lines	1JR	WPR-200-W-102	72	WPR-200-W-102	D,S,SS	NS					N					SITE IS MARKED FOR UNKNOWN. CONTAMINATION. 139 DRUMS OF SOIL REMOVED.
sewer	3DR			REDOX chemical sewer at 203-S.	? SS						N					CHEMICAL SEWER SYSTEMS GENERALLY REQUIRE REMEDIATION.
surface impoundment	4DR	207-S4	84	207-S retention basin CXO	? SS	NS				Y				N		CONCRETE BASIN. NEED TO DETERMINE IF LEAKED OR SPILLED. RESIDUAL CONTAMINATION REMAINS. ONLY BACKFILLED.

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8/26/87.

TABLE 2-22. 200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX (CONTINUED)

200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	NEED FOR ACTION: Remediation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
tank	11N	241-S-D	80	241-S tank farm	D-SS	Y			P	Y	X					UNDERGROUND TANK FARMS AND CATCH TANKS STILL CONTAIN WASTE. THEY MAY NOT RELEASE WASTE AT PRESENT. EVENTUALLY WASTE WILL LEAK FROM THE CONTAINERS (AS SHOWN BY RELATED UNPLANNED RELEASE EVENTS). RECOMMEND UNDERGROUND STORAGE TANKS BE REMEDIATED NOW TO RESOLVE PAST RELEASE & TO AVOID FUTURE PROBLEMS. STABILIZATION INVOLVING WASTE CRYSTALLIZATION AND LIQUID REMOVAL IS UNDERWAY. (SEE COMMENT 2)
tank	11N	241-T-A	79	241-T tank farm	D,SS	Y				Y	X					UPR-200-W-140. SEE COMMENT (2). LEAKED > 115,000 GAL.
tank	20N	241-SX-402	76	241-SX-402 condenser shield	Y SS					Y		X				SEE COMMENT (2).
tank	20N	276-U8	76	276-U solvent handling	Y SS					Y		X				SEE COMMENT (2)
tank	21N	276-S-142	69	underground tank 276-S-142	Y					Y		X				TANKS TESTED IN 1976. NO RELEASE SHOULD BE VERIFIED AND CONTENTS REMOVED.
tank	21N	241-U-361	76	241-U-361 settling tank	Y SS					Y		X				CONCRETE TANK. WASTES REMAIN.
tank	11N	241-SX	79	241-SX tank farm	D,SS,S	Y			P,C,F	Y	X					UPR-200-W-49,50,114. SEE COMMENT (2) LEAKED > 100,000 GAL.
tank	11N	241-TY-302 B	81	catch tank 241-TY-302-B at	Y SS	Y				Y	X					SEE COMMENT (2)
tank	11N	241-TX-302 A	82	catch tank 241-TX-302-A at	Y SS	Y				Y	X					SEE COMMENT (2)
tank	11N	241-TX-302-B	82	catch tank 241-TX-302-B at	Y SS	Y				Y	X					SEE COMMENT (2)
tank	11N	241-U-301	ND	catch tank 241-U-301 at	Y SS	Y				Y	X					SEE COMMENT (2)
tank	11N	241-301 B	83	catch tank 241-301-B at tank	Y SS	Y				Y	X					SEE COMMENT (2)
tank	11N	240-S-302	87	catch tank 240-S-302 at	Y,SS,S	Y				Y	X					SEE COMMENT (2)
tank	11N	241-TX8	79	241-TX tank farm	D,SS,S	Y			C,F	Y	X					UPR-200-W-97,100. SEE COMMENT (2) LEAKED < 2,500 GAL.
tank	21N	276-S-141	69	underground tank 276-S-141	Y					Y		X				TANKS TESTED IN 1976. NO RELEASE SHOULD BE VERIFIED AND CONTENTS REMOVED.
tank	11N	241-TY8	73	241-TY tank farm	D,SS	Y				Y	X					UPR-200-W-150,151,152,153. SEE COMMENT (2) LEAKED > 60,000 GAL. DIATOMACEOUS EARTH ADDED TO STABILIZE ONE TANK.
tank	21N	241-T-361	76	241-T-361 Settling Tank	Y SS					Y		X				CONCRETE TANK. WASTES REMAIN.
tank	21N	241-Z-361	76	241-Z-361 settling tank	Y SS					Y		X				CONCRETE TANK WITH STEEL LINER. WASTES REMAIN.
tank	11	241-SX-302	83	catch tank 241-SX-302 at	Y SS	Y				Y	X					SEE COMMENT (2)
tank	20N	241-SX-401	76	241-SX-401 condenser shield-	Y SS					Y		X				SEE COMMENT (2)
tank	11N	241-TY-302-A	81	catch tank 241-TY-302-A at	Y SS	Y				Y	X					SEE COMMENT (2)
tank	11N	241-U8	80	241-U tank farm	D,SS	Y				Y	X					UPR-200-W-154,155,156,157. SEE COMMENT (2) LEAKED > 94,000 GAL. DIATOMACEOUS EARTH ADDED TO STABILIZE ONE TANK.
tank(s)	20N	242-T8	85	242-T Evaporator Batch Then	Y				P	Y		X				RESIDUAL WASTES, IF ANY, SHOULD BE DISPOSED. EVENT RELATED TO UNIT 241-U.
tanks	10N	276-S8	76	tanks in 276-S Solvent Facilit	ND	ND			ND		X					NO INFO ON THIS UNIT. REMEDIAL ACTION MAY BE NEEDED FOR REMOVAL OF THE TANKS.
Tile Field	16N	216-Z-1A	69	234-5 tile field, 216-Z-7;	SS	Y					X					CONTAMINATION DETECTED TO 31 FEET.
trench	2CR	UPR-200-W-110	71	UPR-200-W-110	D-SS	Y	NS	NS	NS			X				BACKFILLED TRENCH CONTAINING CONTAMINATED SOIL. VEGETATION UPTAKE COULD BE A POTENTIAL RELEASE
trench	4CR	216-S-12	84	216-S-12	Y SS	Y								X		FOR WASTE THAT WAS DISPOSED IN TRENCHES, MOST WERE NOT OF LIQUID FORM. MOST OF THESE TRENCHES WERE FILLED A LONG TIME AGO. WASTE WAS PROBABLY REMOVED IN THE SOIL AND REACHED GROUNDWATER. THEREFORE, IT IS RECOMMENDED TO VERIFY FOR RESIDUAL CONTAMINATION

KEY: N = official number not assigned but identified by unit number; D= documented; P= suspected; ND= no data; NS= not suspected; SS= subsurface soil; S= surface soil; P= past air release; C= current air release; F= future air release; X= yes; Blank= no

8/26/87.

TABLE 2-22. 200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX (CONTINUED)

(10) WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radioactive Structures	NEED FOR ACTION: Remediation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
																(1) DETERMINE WHETHER OR NOT REMEDIATION IS REQUIRED. (COMMENT 3) UNIT WAS WEEN BACKFILLED.
trench	4EN	216-S-8	82	216-S-8	D SS	?	NS	NS	NS					X		SEE COMMENT (3) UNIT WAS BEEN BACKFILLED.
trench	4E	216-T-11	84	Equipment Decontamination	P SS	?								X		WASTE HAS BEEN EXHUMED; REMOVED FROM RADIATION ZONE STATUS.
trench	4EN	216-S-14	52	216-S-14	P SS	?								X		SEE COMMENT (3)
trench	4EN	216-T-12	54	216-T-12	P SS	?								X		SEE COMMENT (3); BACKFILLED.
trench	4E	216-T-10	84	216-T-10	P SS	?								X		EXHUMED AND RELEASED FROM RADIATION ZONE STATUS.
trench	1EN	216-T-14	84	216-T-14	P SS	?					X					CONTAMINATION FOUND AT 30 FEET; HERBICIDES APPLIED TO SURFACE.
trench	4E	216-T-9	84	216-T-9	P SS	?								X		EXHUMED AND RELEASED FROM RADIATION ZONE STATUS.
trench	1EN	216-T-16	54	216-T-16	P SS	?					X					CONTAMINATION FOUND AT 30 FEET. BACKFILLED; HERBICIDES APPLIED TO SURFACE.
trench	1EN	216-T-22	54	241-TX-2 trench, 216 TX-2 Grave	P SS	?					X					SEE COMMENT (3); BACKFILLED, ASSOC WITH 216-T-21.
trench	1EN	216-T-21	84	241-TX-1 trench, 216 TX-1 grave	P SS	?					X					SEE COMMENT (3); BACKFILLED; SURFACE TREATED WITH HERBICIDES. SELF-CONTAMINATION AT 35,55 AND 100 FEET.
trench	4EN	216-T-5	55	216-T-5	P SS	?								X		SEE COMMENT (3)
trench	1EN	216-T-25	54	216-T-25	P SS	?					X					SEE COMMENT (3); BACKFILLED; SURFACE TREATED WITH HERBICIDES. ASSOCIATED WITH 216-T-21.
trench	1EN	216-T-24	84	241-TX-4 Trench, 216 TX-4 Grave	P SS	?					X					SEE COMMENT (3); BACKFILLED; SURFACE TREATED WITH HERBICIDES. ASSOCIATED WITH 216-T-21.
trench	2EN	UPR-200-W-111		UPR-200-W-111	P SS	?						X				SLUDGE FROM RETENTION BASIN 207-U WAS PLACED IN THIS TRENCH AND COVER WITH 4" OF CLEAN SOIL. VEGETATION UPTAKE COULD BE A POTENTIAL RELEASE
trench	1EN	216-T-23	84	241-TX-3 Trench, 216 TX-3 Grave	P SS	?					X					NEED REMEDIATION SINCE PART OF GROUP ASSOCIATED WITH 216-T-21
trench	4E	216-T-13	72	216-T-13	P SS	?								X		WASTE HAS BEEN BACKFILLED AND RELEASED FROM RADIATION ZONE STATUS.
trench	4EN	216-U-6	82	216-U Cold U trench 81	P SS	?								X		SEE COMMENT (3); HAS BEEN BACKFILLED.
trench	1EN	216-T-17	84	216-T-17	P SS	?					X					SEE COMMENT (3); HERBICIDES APPLIED TO SURFACE. PART OF GROUP ASSOCIATED WITH 216-T-14, 216-T-16.
trench	1EN	216-Z-4	45	216-Z-4, 231-W-3	P SS	?					X					SEE COMMENT (3); HAS BEEN UNCOVERED. PART OF GROUP ASSOCIATED WITH 216-Z-6.
trench	4E	216-S-10	54	216-S-10	P SS	?								X		SEE COMMENT (3); EXHUMED AND REMOVED FROM RADIATION ZONE STATUS.
trench	2EN	UPR-200-W-112		UPR-200-W-112	P SS	?						X				SEE COMMENT ON UPR-200-W-111.
trench	1EN	216-Z-9	62	216-Z-9 Cavern, 234-5 Recuplex	P SS	?					X					EST. 95% PU ACTIVITY IN FIRST 12" OF SOIL; CHEMICAL CONTAMINATION NOT ADDRESSED; MIXING OF PLUTONIUM PROPOSED IN 1970'S.
trench	1EN	216-T-15	84	216-T-15	P SS	?					X					SEE COMMENT (3); HERBICIDES APPLIED TO SURFACE. PART OF GROUP ASSOCIATED WITH 216-T-14, 216-T-16.
trench	4EN	216-U-8	52	221-U Cold U trench 82	P SS	?								X		SEE COMMENT (3)
trenches	4EN	216-U-13	86	241-UR Steam Cleaning Pit,	P SS	?								X		SEE COMMENT (3)
vault	2EN	218-W-8	82	218-W-8	P SS					Y		X				VAULTS THAT CONTAIN SOLID WASTE ARE NOT EXPECTED TO RELEASE WASTE TO THE ENVIRONMENT, UNLESS THERE IS BREACH OF THE CONTAINER. RECOMMEND TO VERIFICATION OF NO RELEASE FROM THESE UNITS. IF THE STRUCTURES ARE WELL ENGINEERED FOR PERMANENT WASTE STORAGE (WITH NO POSSIBLE FUTURE WASTE RELEASE), THEN NO FURTHER ACTION IS REQUIRED.

KEY: # = official number not assigned but identified by unit number; D= documented; ?= suspected; NO= no data; NS= not suspected; SS= subsurface soil; S= surface soil; P= past air release; C= current air release; F= future air release; N= yes; Blank= no

8/26/87.

TABLE 2-22. 200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX (CONTINUED)

200 WEST AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
																(COMMENT 4) HOWEVER, THIS UNIT WAS MADE OF WOODEN PLANKS. THERE IS A POSSIBILITY THAT THE WOOD HAS DECAYED AWAY, AND RELEASE OF WASTE TO SOIL IS EXPECTED. SUBJECT TO SINK HOLE FORMATION.
vault	2GX	218-W-7	60	218 W-7	? SS	Y				Y		X				SEE COMMENT (4)
vault	2K	205-S	76	205-S vault at the uranium	ND					?		X				SEE COMMENT (4)
vault	4GX	244 WRX	76	244 WX vault	S	NS				Y				X		SEE COMMENT (4)
vault	2GX	241 WRX	76	241 WX vault	ND	NS				Y		X				SEE COMMENT (4)
waste line	4JX	UPR-200-W-2	47	UPR 200-W-2	D,S,SS				? P					X		NEED TO VERIFY FOR RESIDUAL CONTAMINATION TO DETERMINE WHETHER OR NOT REMEDIATION IS REQUIRED
waste line	4JX	UPR-200-W-113	MID 50'S	UPR 200-W-113	D,S,SS				? P					X		SAME AS ABOVE
weir box	11	2904-S-171	76	2904-S-171 weir box	? S,SS				? P	Y	X					SINCE THE WEIR BOX EXTENDS ABOVE GROUND, WITH SLUICE GATE, THERE IS A POTENTIAL FOR RELEASE TO AIR. IT IS ASSUMED THAT THIS UNIT IS NOT ENGINEERED FOR PERMANENT WASTE STORAGE. THUS, IT IS RECOMMENDED FOR REMEDIATION. LIQUID WASTE IS ALSO SUSPECTED TO BE PRESENT IN THE UNIT.
weir box	11	2904-S-170	76	2904-S-170 weir box	? S,SS				? P	Y	X					SAME AS ABOVE
weir box	11	216-S-172	76	216-S-172 weir box	? S,SS				? P	Y	X					SAME AS ABOVE, EXCEPT ONLY SOLID WASTE.

KEY: B - official number not assigned but identified by unit number; D: documented; ?: suspected; ND: no data; NS: not suspected; SS: subsurface soil; S: surface soil; P: past air release; C: current air release; F: future air release; N: yes; Blank: no

8/26/87.

TABLE 2-23. 200 NORTH RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

200 North Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	Remedi-ation	Verify No Release	NEED FOR ACTION: Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
Trench	4LR	216-N-3	212-N-2 trench, 212-N-3 (?)	1952	D-SS	?	NS	NS	NS					X		Piping removed. Trench backfilled. Chemical contamination not addressed but site was last used 35 years ago.
Pond	4LR	216-N-1	212-N Sump, 216-N-1 Sump, 216-N-1 covered Pond (?)	1952	D-SS	?	NS	NS	NS					X		Removed from radiation zone status. Chemical contamination not addressed but site was last used 35 years ago
Trench	4LR	216-N-2	216-N-1 Trench, 216-N-2 trench (?)	1947	D-SS	?	NS	NS	NS					X		Piping removed. Trench backfilled. Chemical contamination not addressed but site was last used 40 years ago.
Pond	NLR	216-N-4	212-P Sump, 216-N-2, 216-N-4 sump (?)	1952	D-SS	?	NS	NS	NS		X					Pond is covered. Contamination detected in subsurface soil (4 ft. deep). Chemical contamination not addressed but site last used 35 years ago.
Trench	4LR	216-N-5	212-P trench, 216-N-5 trench (?)	1952	D-SS	?	NS	NS	NS					X		Piping removed. Trench backfilled. Chemical contamination not addressed but site was last used 35 years ago.
Pond	NLR	216-N-6	212-R Sump, 216-N-6 Sump (?)	1952	D-SS	?	NS	NS	NS		X					Pond is covered. Contamination detected in subsurface soil (4 ft. deep). Chemical contamination not addressed but site last used 35 years ago.
Trench	4LR	216-N-7	212-R trench, 212-N-7 trench (?)	1952	D-SS	?	NS	NS	NS					X		Trench backfilled. Chemical contamination not addressed but site last used 35 years ago.

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D= documented
?= suspected

NS= no data
NS= not suspected

SS= subsurface soil
S= surface soil

P= past air release
C= current air release

F= future air release
N= yes

Blank= no

8/26/87.

TABLE 2-24. RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

300 ARAR Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
acid spill	13N		1985?	Uranium/Acid Waste (Bldg. 313)	?-S,SS	?	ND		ND		X					PROCESS SEWER LINE LEAKING FOR UNKNOWN TIME. PROCESS LEAKAGE DEMECTED TO THIS LINE.
crib	16N	316-4	1956	300 North Crib	SS	?	?	?	ND		X					USED TANKS.
drain field	36N		1974	331 Life Sciences Laboratory	SS	?	?	?	ND	Y			X			
drain field	38N		1970	Retired 315 Sanitary Drain	SS	?	?	?	ND				X			
drain field	36N		1970	Retired 335/336 Sanitary	SS	?	?	?	ND				X			
gravel pit	9EN		1987	300 Area Interim Filter	S,SS	?	?								X	NONHAZARDOUS FILTER BACKWASH.
pipe trench system	13N	UPR-300-31/40	1974?	Pipe Trench System, 311	S,SS	?	?	NS	NS	Y	X					SEVERE EROSION OF BOTTOM OF TRENCH; MULTIPLE DRAIN CONNECTIONS BROKEN. PREVIOUS SPILLS BELIEVED TO HAVE OCCURED. MADE TRENCH AND PIPING REPAIRS. TRENCH FLOOR REMAINS CONTAMINATED. URANIUM FOUND IN SOIL.
pond	9EN		1987	Retired Filter Backwash Pond	SS	?	?			Y					X	NONHAZARDOUS WASTE.
sewer pipe	2NN		1975	Retired Liq. Waste Sewer	?-SS	ND	ND	ND	ND							PIPES DRAINED AND LEFT IN PLACE. PIPING IS STAINLESS STEEL AND CONTAINS RESIDUAL RADIATION CONTAMINATION. SYSTEM REPLACED.
tank	2NN		1986	334 Tank Farm Waste Acid Tank	?-S,SS	ND	ND			Y		X				LINER FAILURE CAUSED TANK LEAKAGE. DISCHARGED TO PROCESS SEWER TO WHICH NaOH ADDED TO NEUTRALIZE. PREVIOUS CHEMICAL USAGE NOT KNOWN.
tanks	2NN		1960	323 Tanks (4)	ND	ND	ND	ND	ND	Y		X				TANKS ENCASED IN CONCRETE VAULT. 3 OF 4 TANKS EMPTY OR FILLED WITH SAND.
testing unit	9CN		1986	In Situ Vitrification Test	S	ND	NS	NS	? P						X	DECONTAMINATION TO BACKGROUND RADIATION LEVELS. NO CHEMICALS APPEAR USED.
transfer line	4JN	UPR-300-1	1970	Transfer Line Leak	S,SS	?	ND	NS	?P,C					X		TOP 2 FT OF SOIL REMOVED. FURTHER REMOVAL POSSIBLE THREAT TO ADJACENT STRUCTURES.
trench	3NN		1974	331 Life Sci Lab (1964-1974)	SS	?	ND	?	ND				X			
trench	3NN		1969	331 Life Sci Lab (1966-1969)	SS	?	ND	?	ND				X			
underground tanks	11N		1971	Methanol Storage (313 bldg)	?-S	ND	ND	ND	ND		X					REMOVE WASTES
underground tanks	11N		1971	Methanol Stor. (311 Tank Farm)	?-S	ND	ND	ND	ND		X					REMOVE WASTES
underground tanks	21N		1973	309 TN Tanks (3)	ND	ND	ND	ND	ND	Y		X				UNIT NOW EMPTY. CARBON STEEL PIPE RETAINS RADIATION CONTAMINATION. TANKS IN CONCRETE UNDERGROUND VAULT.

KEY:

S = official number not assigned but identified by unit number

D= documented
?= suspected

ND= no data
NS= not suspected

SS= subsurface soil
S= surface soil

P= past air release
C= current air release

F= future air release
N= yes

Blank= no

8/26/87.

TABLE 2-25. 400 AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

400 AREA Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
french drains	360		French Drain South of 4722-C	1985	D-SS	NS	NS	NS	NS						X	Sample from french drain was nonhazardous. Inlet points are nonhazardous.
french drains	360		400 Retired French Drains	ND	D-SS	ND	ND	ND	ND				X			Type of washing operations not identified.
ponds	360		400 Area Retired Sanitary Pond	1979	D-S/SS	?	NS	ND	ND				X			Source of wastes feeding to treatment plant not identified. Basis for non-hazardous sludge designation not identified.
tank	360		Retired Septic Tanks (3)	1983	ND	NS	NS	ND	ND				X			Received wastes from offices. Was laboratories?
trench	360		400 Area Retired Sand Trench	ND	D-SS	ND	NS	NS	NS				X			Constituents of cooling tower blowdown not identified. Could contain metals or inorganics

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8/26/87.

TABLE 2-26. 600 RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

600 Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	COMMENTS
burial ground	2CR	618-11	1967	200 Mile Burial Ground	D-S	P	NS	ND	P,C?	NS		X				PIPE/CAISSON STORAGE UNITS LIKELY RUSTED AND RELEASING CONTAMINANTS. SURFACE SOIL CONTAMINATION. INCLUDES UPR-600-4-18. ONE CONTAMINATED AREA WASHED DOWN WITH 6000 GALLONS WATER.
burial ground	9CR		1956	J.R. Jones No. 2 (?)	P S	NS	NS	NS	NS	NS					X	CONSTRUCTION MATERIALS BURIED UNDER CLEAN SOIL AND SOME METALLIC WASTE. SITE ENGINED AND CONTENTS MOVED TO 200 AREA; SITE BACKFILLED IN 1971.
burial ground	2CR	618-10	1963	300 North 'M' Burial Ground	D-S	NS	NS	ND	P,C?	NS		X				PIPE STORAGE UNITS MAY HAVE RUSTED THROUGH. SURFACE SOIL CONTAMINATION FOLLOWING UPR-600-1 AND 2. INCLUDES UPR-600-1,2,3. IMPROPER DURING CONTAINER USE; CONTAMINATED AREA WASHED DOWN WITH WATER.
burial ground	9CR		ND	Army Munitions Burial Site	NS	NS	NS	NS	NS						X	ALL MATERIALS ENGINED/REMOVED TO VARIOUS FIRING RANGE ("BA") OR DESTROYED. MATERIAL BURIED IN CRATES ORIGINALLY.
burial ground	2CR	USGS-2, 4-0	1967	USGS-2, 4-0 burial ground	SS	NS	NS	P	P P			X				
burning pit	4LR	618-5	1962	Burial Ground No. 5	P-SS	NS	NS	NS	P,C?					X		URANIUM TRASH BURNING PIT. SOURCE OF CONTAMINATION/RELEASE STILL PRESENT?
crib	4NR	P-11	1951	110-F-6 Crib	SS	NS	NS	NS	NS					X		SITE AND STRUCTURE ENGINED IN 1974
crib	4NR	213-J and K	1950	Gable Mountain Cribs	D-SS	NS	NS	NS	NS	NS				X		UNDERGROUND CRIBS, RECEIVED VERY LITTLE AQUEOUS SOLUTION. PIPE FOUND TO BE FREE OF RADIOACTIVITY ABOVE BACKGROUND FALLOUT LEVELS. REMOVED FROM RADIATION ZONE STATUS.
crib	4NR		1945	Pickling Acid Crib (?)	P-SS	P	NS	NS	P	NS				X		
landfill	9CR		1945	Hanford Trailer Camp (?)	P-S	NS	NS	NS	NS	NS					X	PRESUMED TO BE SMALL QUANTITIES OF GENERALLY NONCHEMICAL NATURE.
landfill	2CR		1970	Horn Rapids Disposal	P-S	NS	NS	ND	NS	NS		X				SITE CONTAINS MAINLY OFFICE WASTE AND OILS & SOLVENTS. BECAUSE OF UNKNOWN QUANTITIES OF ORGANICS, MUST EVALUATE ANY RELEASE.
landfill	4CR		1945	Sodium Dichromate Barrel	P-S	NS	NS	NS	P	NS				X		EMPTY CRUSHED BARRELS HAD CONTAINED SODIUM DICHROMATE. MUST VERIFY THAT HAZARDOUS CHEMICALS OR OTHER CONTAMINANTS ARE NOT CURRENTLY PRESENT. NO DATA REGARDING DECONTAMINATION OF DRUMS PRIOR TO DISPOSAL. BACKFILLED OVER DRUMS BUT SOME DEBRIS STILL VISIBLE.
landfill	4CR		1943	White Bluffs City Landfill	D-S P-SS	P	NS	P	P	NS				X		INDUSTRY/COMMERCIAL, DOMESTIC WASTE. QUANTITIES UNKNOWN. RELEASE MAY STILL BE OCCURING. BULLDOZED AND COVERED WITH CLEAN SOIL.
landfill	3CR		1979	J.R. Jones No. 1 (?)	ND	NS	NS	NS	NS	NS			X			NONRADIOACTIVE SOLID WASTE, CONSTRUCTION MATERIALS BURIED/COVERED BY CLEAN SOIL.
landfill	4CR		1943	City of Hanford Landfill	D-S P-SS	P	NS	P	P	NS				X		INDUSTRIAL & DOMESTIC WASTES. QUANTITIES UNKNOWN. RELEASE MAY STILL BE OCCURING. BACKFILLED AND COVERED WITH CLEAN SOIL.
landfill	4CR		1988	Midway Landfill No. 1 (?)	D-S P-SS	NS	NS	P	P	NS				X		DESIGNATED DISPOSAL SITE FOR "ORDINARY" HOUSEHOLD WASTE. MUST VERIFY THAT NO HAZARDOUS RELEASES OCCURING OR RESIDUAL CONTAMINATION. COMMERCIAL/DOMESTIC WASTE SINCE 1950.
landfill	4CR		1943	East White Bluffs City Landfill	D-S P-SS	P	NS	P	P	NS				X		
landfill	2CR		1970	Midway Landfill No. 2 (?)	P-S,SS	NS	NS	P	P			X				CONTAINS "SMALL QUANTITIES" OF SPENT SOLVENTS, HERBICIDE CONTAINERS, CAPACITOR CELLS. QUANTITIES UNKNOWN. MUST VERIFY AMOUNTS & CHECK FOR RELEASES. COVERED WITH CLEAN FILL AND VEGETATED.
pits	2CR	618-4	1961	Burial Ground No. 4	P-SS	ND	NS	ND	NS			X				URANIUM WASTE; NO CONTAINMENT. RELEASES CONTINUE? COVERED WITH CLEAN SOIL.
pond	3CS	618-12	1954	North Process Pond Scraping	D-SS	NS	NS	ND	P			X				URANIUM CONTAMINATED SOIL COVERED/BACKFILLED

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C= current air release

F= future air release
D= yes

Blank= no

8/26/87.

TABLE 2-26. 600 RELEASE POTENTIAL AND NEED FOR ACTION MATRIX (CONTINUED)

600 Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	COMMENTS
				Disposal Area												WITH ASH. SITE CLOSURE INADEQUATE, EXPOSURE LIKELY.
tank	3E0	6652-0*	1960	6652-0 ALE Field Storage	?-SS	ND	NS	ND	ND				X			INACTIVE SEPTIC TANK. VERIFY NO HAZARDOUS CONSTITUENTS DISPOSED.
tank	3E0		1950s	Army Bunkers Septic Tank (3)	?-SS	ND	NS	ND	ND				X			INACTIVE SEPTIC TANK. VERIFY NO HAZARDOUS CONSTITUENTS DISPOSED.
tank	3E0	6652-C*	1960	6652-C Space Science Lab.	?	?	NS	ND	NS				X			INACTIVE SEPTIC TANK. VERIFY NO HAZARDOUS CONSTITUENTS DISPOSED.
trench	5DS	610-6*	1946	Burial Ground No. 6	NS	NS	NS	NS	NS						X	SITE NO LONGER EXISTS. AT 325 BUILDING 1944-46, 300 BUILDING 1952-57, 324 BUILDING 1957-62. LAST RELOCATED TO 610-10 IN '62. BUILDINGS CONSTRUCTED AT PREVIOUS LOCATIONS.
trench	2CR	610-3*	1955	Burial Ground No. 3	?-SS	NS	NS	NS	NS			X				URANIUM WASTE/CONTAMINATED BUILDING MATERIAL. IS WASTE IN MOBILE FORM? RELEASES OCCURING?
trench	1CN	610-9*	1956	300 West Burial Ground	?-SS	?	NS	?	ND		X					DRUMS OF URANIUM CONTAMINATED ORGANIC SOLVENT BURIED. LEAKING LIKELY. BACKFILLED AND STABILIZED (HOW?)
trench	2CN	610-0	1944	Early Waste Burial Ground	?-SS	NS	NS	ND	NS			X				WASTE PRESENTLY COVERED BY PARKING LOT. RELEASES OCCURING?
trench	2CN	610-7	1973	Burial Ground No. 7	?-SS	NS	NS	ND	ND			X				URANIUM, THORIUM WASTES; "SLIGHT CONTAMINATION. "EVALUATE EXTENT OF CONTAMINATION. RELEASES OCCURING? BACKFILLED AND COVERED WITH CLEAN SOIL.
trench	2CN		1956	Original Central Landfill (9)	ND	ND	NS	NS	P	NS		X				IN PAST, WASTES BLEW OFF GENERAL AREA. BACKFILLED TO GRADE.
trench	2CR	610-2	1954	SW Burial Ground No. 2	?-SS	?	NS	NS	? P			X				URANIUM WASTES AND PLUTONIUM FISSION PRODUCTS. NO CONTAINMENT. INCLUDES OXIDES.
trench and pits	2CN	610-1	1956	SW Burial Ground No. 1	?-SS	?	NS	ND	ND			X				URANIUM, PLUTONIUM FISSION PRODUCTS, LAB WASTES. NO CONTAINMENT.
waste pile	2RR	610-13	1958	303 Area Contaminated Soil Burial Ground	Y-SS	NS	ND	NS	? C			X				MOUND OF CONTAMINATED SOIL. UNKNOWN TOTAL RADIOACTIVITY. EXPOSURE POTENTIAL SUBSTANTIAL. POSTED AS RADIATION ZONE.

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8/26/87.

TABLE 2-27. 700 AREA RELEASE POTENTIAL AND FOR ACTION MATRIX

700 Area Release Potential and Need For Action Matrix

Unit Type	Site Code	Official Number	Site Name/ Description	Date Last Used	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
tank	4E0		Underground Waste Solvent Tank (3)	ND	ND	ND	ND	ND	ND					X		Tank has been emptied and triple rinsed. Tank is scheduled for removal. Waste was disposed off-site as hazardous waste. Need additional data to confirm no soil contamination.

KEY: a = official number not assigned but identified by unit number; D= documented; P= suspected; ND= no data; NS= not suspected; SS= subsurface soil; S= surface soil; P= past air release; C= current air release; F= future air release; X= yes; Blank= no

8/26/87.

TABLE 2-28. 1100 AREA RELEASE POTENTIAL AND NEED FOR ACTION MATRIX

1100 Area Release Potential and Need for Action Matrix

Unit Type	Site Code	Official Number	Date Last Used	Site Name/ Description	RELEASE POTENTIAL: Soil	Ground Water	Surface Water	Subsurface Gas	Air	Residual Radio-active Structures	NEED FOR ACTION: Remedi-ation	Verify No Release	Verify No Hazardous Constituents	Verify No Residual Contamination	No Further Action Required	Comments
ground disposal	1E0	UPR-1100-2	1985	disposal on railroad tracks	D-S	MS	?	?	P		X					test. total disposal of 2000 gal over 30 yrs.
pit	1L0	UPR-1100-1	1977	sand pit	?	MS	MS	MS	MS		X					saturated sand removed periodically and replaced with new sand.
pit	1F0	UPR-1100-3	-1985	sand pit	?	?	MS	?	P		X					materials appear to be in place. Wash water also disposed.
tank	4L0	UPR-1100-4	pre-1976	underground disposal tank	?	MS	MS	?	MS					X		antifreeze not hazardous constituent. Residual waste should be removed.

KEY: 0 = official number not assigned but identified by unit number; D= documented; ?= suspected; MD= no data; MS= not suspected; SS= subsurface soil; S= surface soil; P= past air release; C= current air release; F= future air release; B= gas; Blank= no

8/26/87.

3.0 REMEDIATION STRATEGY

The remediation strategy has been developed based on identification of remediation techniques suitable to the types of sites identified in the characterization effort as potentially requiring remediation. The Statement of Work for this project required that exhumation be considered in all cases and that on applicable in-place remediation technique be selected for each type of unit. Together, these two techniques, on a site-by-site basis, are assumed to provide the range of effort and cost required to address site problems. Cost, equipment, and manpower requirements are identified for each remediation technique.

Section 3.1 discusses the in-place remediation techniques identified for the inactive sites. The technologies selected and the basis for the selection are also identified. Section 3.2 discusses the exhumation alternative and the assumptions made regarding the applicability and implementation of the technique to the Hanford sites. Section 3.3 presents the costs for each remediation technique.

3.1 IN-PLACE REMEDIATION TECHNIQUES

In-place remediation techniques are defined in this report to include remedial actions that generally do not require the removal of the waste and contaminated soil from the unit. Instead, application of these techniques will remove contaminants or immobilize the contaminants within the local area surrounding the unit.

Some seventy remedial action technologies are currently in use. These technologies are listed in Appendix A. In selecting potentially applicable in-place remediation techniques, these technologies were considered in conjunction with the general problems associated with the types of RCRA 3004(u) sites identified for remediation, implementation issues, waste compatibility, and site-specific hydrogeologic considerations.

Only sites corresponding to the 15 unit types identified in Section have been identified for remediation: belowground landfill (covered, uncovered), surface impoundments, ditches, underground dispersion systems, aboveground tanks, belowground tanks, spills, underground vault, burning pit, and process sewer. A review of available information concerning

remedial techniques for such waste sites indicates that eight techniques are generally applicable to these units:

- Soil flushing
- Soil treatment
- Grouting-in-place
- In-situ vitrification
- Surface sealing
- Subsurface barriers
- Groundwater pumping and treatment
- In-place decontamination.

Table 3-1 identifies the remediation techniques applicable to each unit type; exhumation is considered separately in Section 3.3.

It should be noted that on a site-specific basis these techniques may or may not be the preferred remediation technique. In general, the final remediation technique is selected through a feasibility study and often involves multiple technologies. The technologies identified above are anticipated to be appropriate for the type and number of units considered in this analysis.

3.1.1 Description of Techniques

Each in-place remediation technique identified in Table 3-1 is briefly described below. Appendix B provides a more detailed description and lists the costs associated with each.

Soil Flushing

Soil flushing is a technique where an appropriate chemical solution is applied to a waste site to remobilize waste constituents that are bound to the soil, and the leachate is collected with a series of shallow well points. Solutions of sulfuric, hydrochloric, nitric, phosphoric, or carbonic acid may be used to dissolve basic metal salts (hydroxides, oxides, and carbonates).

This technique represents a low cost alternative to excavation and treatment of the waste, especially when there is a high safety and health

TABLE 3-1. POTENTIAL IN-SITU REMEDIAL ACTIONS FOR WASTE UNITS

Type of Waste Units	POTENTIAL IN-SITU REMEDIAL ACTIONS								Comments
	Soil Flushing	Soil Treatm.	Grout-in-Place	In-situ Vitrif.	Surface Sealing	Subsurface Barrier	Grd Wtr Recovery & Treatment	In-place Decont.	
C (Belowground Covered Landfill) D (Belowground Un-Covered Landfill)			X	X	X	X			Grout-in-place or encapsulation with grout is chosen to contain and immobilize the waste within the unit.
E (Surface Impoundments) F (Ditches) G (Underground Depression Systems)	X		X	X	X	X	X		Ground Water Recovery and Treatment is chosen as the technique for removing contaminants that have migrated to the groundwater or any materials that can be flushed from the vadose zone (Comment 1).
H (Aboveground Tanks)			X					X	In-place decontamination by draining the tank and rinsing with appropriate solvent. Sludge will be removed using hi-pressure water injection system. In some cases, this technique may not work, thus, grout-in-place should be used.
I-1 (Underground Tanks)	?[1]	X	X				?[1]		Grout-in-place by injecting grout into the tank and the surrounding soil to contain and immobilize contaminants.
I-2 (Underground Diversion Boxes)	?[1]		X			?[1]	?[1]		Grout-in-place or encapsulation of unit using grout to contain waste within unit.

[1]Technical implementation and chemical compatibility concerns must be addressed before these actions can be taken. They are the techniques which were considered to be potentially applicable.

TABLE 3-1. POTENTIAL IN-SITU REMEDIAL ACTIONS FOR WASTE UNITS (continued)

Type of Waste Units	POTENTIAL IN-SITU REMEDIAL ACTIONS								Comments
	Soil Flushing	Soil Treatm.	Grout-in-Place	In-situ Vitrif.	Surface Sealing	Subsurface Barrier	Grd Wtr Recovery & Treatment	In-place Decont.	
J (Spills)		X	?[1]		?[1]		X		Grout-in-place is recommended to immobilize the contamination in subsurface soil. Ground water recovery and treatment is also suggested if the contamination reaches groundwater table.
K (Underground Vault)			X	X			?[1]	X	Grout-in-place such as encapsulation of unit in grout is recommended for this type of waste unit.
L (Burning Pit)			X	X	X		X		Grout-in-place is selected to immobilize the waste within the unit.
N (Process Sewer)		X	X	X	X		X	X	Grout-in-place is recommended to stabilize the unit.

[1]Technical implementation and chemical compatibility concerns must be addressed before these actions can be taken. They are the techniques which were considered to be potentially applicable.

hazard associated with the excavation. However, there are some drawbacks that include: uncertainties with regard to the adequate contact with the wastes; the technique is inapplicable for containerized waste; there are concerns about the ability to effectively recollect the leachate elutriate, or the soil flushing solvent from the site. If the elutriate is not completely removed from the soil, it can become a pollutant itself.

Soil Treatment

As in the soil flushing technique, this process involves application or injection of a substance into the contaminated soil to immobilize or destroy the pollutants. However, instead of creating elutriate or leachate that needs to be collected and treated, this technique does not generally create hazardous constituents that can migrate from the waste site to the environment. As a result, this technique is limited to waste that can be degraded, has non-toxic breakdown products, and/or can be converted to insoluble chemical products.

Soil treatment techniques include soil neutralization/detoxification and microbial degradation processes. Soil neutralization or detoxification is highly waste dependent. For example, many heavy metals may be precipitated as insoluble salts by injecting alkalis or sulfides. While microbial degradation is highly applicable for removing organic contamination such as oil or solvents, it is not a likely solution for removing heavy metal contaminants from the soil. Thus, depending on the type of waste constituents present, soil treatment can be an applicable in-situ remedial technique.

Some of the disadvantages of this technique include the potential of generating leachate that can not be contained, when the treatment is unsuccessful, and it is also difficult to determine the degree of effectiveness of the technique.

Grout-In-Place

In-situ grouting is a technique that involves injection of grout or cement directly into the waste site to create a solid matrix that would restrict the movement of contaminants. The applications of this technique could be in the form of: (1) direct mixing of the waste inside the unit to

form a solid matrix, (2) injecting solidifier around a buried waste unit as a form of encapsulation, or (3) a combination of both of the above methods.

If correctly applied, this technique would be a feasible remedial solution for waste sites with a short-term effectiveness. However, because some of the solidifiers such as cement and grout are porous solids, the contaminants could be leached out of the solid matrix over a long period of time.

Cap/Cover

Cap/cover is a process used to cover the waste site to prevent the waste materials coming in contact with land surface and to minimize the migration of waste to groundwater. Surface sealing comes with two basic designs: multi-layered and single-layered caps.

In humid climate areas such as the East Coast of the U.S., where the infiltration rate is high, this technique is one of many favored in-situ remediation technologies. However, current RCRA program policy is to use tecchniques that provide final destruction of final immobilization of contaminants. Cap/cover is considered a temporary other than a final action. On a case-by-case basis, cap/cover may be an appropriate technique to control erosion and resuspension of contaminated soil as well as preventing vegetation growth over contaminated soil.

Subsurface Barrier

Groundwater diversion techniques consist of subsurface barriers in conjunction with ground water pumping. This discussion focuses on subsurface barriers. Groundwater pumping will be discussed along with groundwater treatment in a subsequent section.

Subsurface barriers refer to various techniques for imbedding a low permeability cut-off wall or diversion structure in the proximity of the waste site to contain, capture, or redirect the groundwater flow near the site. These subsurface diversion structures include soil-bentonite slurry walls, cement-bentonite slurry walls, diaphram walls, grout curtains, and sheet piling.

This technique is readily applicable for sites with shallow groundwater tables and low permeability confining layers such as competent bedrock. However, for sites with deep groundwater tables, the technique may not be economically nor practically feasible dueto depth limitations of excavation equipment. Such a decision requires case-by case analysis. Subsurface barriers may not be able to withstand the attacks from highly corrosive materials, and may not withstand certain organic compounds. Depending on the construction technique, gaps within the structure are not uncommon that would lead to groundwater seepage into the waste site.

In-Place Decontamination

This technique refers to the decontamination of structures containing waste materials such as above-ground tanks, vaults, and waste containers. In-place decontamination of these structures consists of removing waste from the structure, rinsing the structure with an appropriate solution, and, if necessary, filling the emptied structure with unreactive materials such as sand, clean soil, or cement. In some cases, the emptied and cleaned structure could also be reused for other purposes. The removed waste materials would need to be treated and disposed of appropriately. The cost associated with this technique is minimal when compared to other in-situ remedial actions. However, this technique is not applicable to contamination in the environment (e.g., soils).

In-Situ Vitrification

In-situ vitrification is a thermal process that converts contaminated soil into a chemically inert and stable glass and crystalline product that has about the same durability properties as granite. The resultant solids formed have a very low leach rate. This technique has been tested on a pilot-scale basis at the Hanford Reservation, and the results indicate that such a process may be feasible for decontamination/stabilization of the contaminated soil at the site.

Groundwater Recovery and Treatment

Groundwater recovery and treatment is very similar to soil flushing, except that instead of applying chemicals to the waste and collecting the

elutriate, this technique only requires removal of contaminated groundwater by pumping then treating the contaminated water. In some cases, it would also be appropriate to perform soil flushing (with water) before pumping and treating groundwater. After the contaminated water is treated, it can be discharged directly to nearby surface water, or reinjected into another uncontaminated aquifer. Appropriate permits would be required.

Contaminated water treatment includes filtration, ion-exchange, solvent absorption and separation, evaporation, and/or solidification, depending on the constituent concentrations in and characteristics of the contaminated water.

3.1.2 Selection of In-Place Remedial Actions

The methodology for selecting one in-situ remediation technique for each waste site type is comprised of the following two steps. The first step is to review each type of waste unit against all of the potential in-situ remedial actions describe above, and generate a preliminary set of techniques that appears to be applicable for the remediation of that unit. The second step is to select the most appropriate remedial action for the unit from the preliminary set of remediation techniques. The results of this exercise are presented in Table 3-1, and the basis for selecting each remediation technique is described below.

In general, for all waste disposal units that received liquid waste, such as burial grounds, trenches, ditches, cribs, french drains, pits, and ponds, groundwater recovery and treatment is selected as the in-situ remediation technique. This selection is based on two assumptions: (1) most, if not all, of the wastes disposed of have reached the groundwater, and (2) wastes still in the vadose zone have sufficient liquid present to permit pumping. Other in-situ treatment techniques such as soil treatment, surface sealing, etc., may effectively control the migration of any remaining contaminants in at least part of the soil column beneath the unit. However, the contamination to the groundwater still remains untreated. Only soil flushing appears to one of the techniques that may also be applicable to contaminants in the soil column. But this technique also introduces other problems concerning the capability of containing and collecting the elutriate effectively, the potential to mobilize contaminants thereby increasing their migration, and the possibility of leaving other pollutants

in the site. Based on the above considerations, groundwater recovery and treatment is considered to be generally the most appropriate method for removing the contamination from the groundwater without disturbing the unit. It is further assumed that any contaminants that remain in the unsaturated region and cannot be pumped out will remain absorbed the soil, and will not migrate to groundwater. Although pumping and treatment is considered here as a unit-specific action, it is generally conducted on a regional scale allowing multiple sources to be addressed through on action.

In practice, groundwater recovery and treatment is not generally conducted alone. It is often more appropriate to consider additional in-situ techniques such as surface sealing and partial excavation to complete the remedial action for these sites. Also, it should be noted that selection of one remediation technique for a general type of problem overlooks the site-specific nature of the selection process. For example, not all liquid waste disposal units have a contaminated groundwater problem. Some units that are located in a shallow groundwater region and near the bank of the Columbia river may have contaminated the local groundwater at one time in the past; however, the groundwater may have been flushed many times so that little or negligible traces of contamination still remain. In this case, other in-situ remedial actions or no action may be chosen to deal with the potential remobilization of the contaminants that remain bound to the soil beneath the units.

For solid waste units such as burial grounds, trenches, pits, and ditches, grout-in-place or encapsulation is considered to be the most appropriate alternative to excavating the site and removing the contaminated materials. Other applicable treatment techniques include in-situ vitrification, surface sealing, and subsurface barrier. In-situ vitrification is still a developmental technique with many economic and applicability limitations. Surface sealing would limit the potential for exposing the waste, however, it would not prevent migration of contaminants from the unit due to any interactions with active liquid waste disposal units located nearby. Finally, subsurface barriers may not be applicable at all for units that are located in an area where the water table is far below the surface such as the 200 areas or where little subsurface migration is found.

For diversion boxes, weir boxes, and underground vaults, it is assumed that most of these units are empty, and if there was any leakage from the units, it would be confined to the surrounding soil. Since the contamination is primarily contained within the unit, it is most appropriate to recommend grout-in-place or encapsulation of the unit. Encapsulation refers to injecting a "liner" or "barrier" of grout below and around the unit thus creating a containment structure. The unit can remain buried in the ground with little possibility of releasing contaminants to the soil, or could be exhumed at a later time as a solid block that is ready for proper disposal.

Contaminated retention basins are usually concrete or asphalt lined surface impoundment structures. Other than excavating the units, the most applicable alternative is to use grout-in-place or grouting to contain the units in a low permeability matrix which would help prevent the release of contaminants the subsurface soil. Surface sealing and subsurface barrier techniques are also applicable. However, as discussed previously, there are some concerns associated with these techniques that need to be resolved prior to their selection.

For underground tanks, the most practical choice of in-place remediation techniques is grout-in-place. For above-ground tanks, in-place decontamination can be used as the in-situ remediation technique. It should be noted that, in cases where removal of the remaining waste is not possible, grout-in-place is an appropriate.

3.2 EXHUMATION

One of the many options for cleaning up a waste site is to exhume the waste material, treat it, and dispose of it in a permitted RCRA or Dangerous Waste an appropriate disposal site. Depending on the extent of the contamination at the site and the exhumation effort, application of this technique can lead to virtually complete removal of the contamination from the site. From the stand-point of evaluating all options for the clean up effort at the Hanford site, it is necessary to study and consider the exhumation technique as a potentially ultimate solution for the remediation of the waste units at Hanford.

The exhumation technique consists of excavating, removing, treating, and disposing of the waste and the contaminated soil. Prior to excavating the waste unit, site planning needs to be performed. During this phase, all engineering and survey works are conducted to establish the groundwork for the actual excavation. During the planning phase, manpower requirements include engineer, surveyor, drafting, geologist, health and safety officer, and secretarial support.

Excavation of contaminated soil and structures requires heavy construction or mining equipment. Removal and transportation of the contaminated material from the site will rely on containment of the wastes, deontamination of containers prior to disposal, and trucks to transport the waste containers. A containment structure will also be required to control radionuclides. Disposal of the waste is assumed to be on-site, at a permitted and controlled land disposal site. Excavated waste material that does not meet the constituent concentration limitations under the EPA and State regulations ("land disposal ban") cannot be disposed of without pretreatment prior to disposal. A more detailed description of the exhumation technique is presented in Appendix A of this report.

Exhumation can be applied to remediate most of the waste units identified at the Hanford site. However, there are some engineering and health and safety limitations that should be considered prior to selecting this technique. For example, exhumation alone may not completely remove all of the contamination. Special equipment may be required for deep excavations, but some contamination may be so deep that excavation is neither practical nor feasible. In selecting the actual remediation alteernative for a specific site, a ccombination of excavation and in-situ remediation is most likely. Such decisions reflect a case-by-case analysis beyond the scope of this study.

Disposal of excavated soil or the treated material could become a major issue that will need resolution. Normally, the excavated or treated contaminated soil can be packaged and disposed of off-site in permitted land disposal site. However, if exhumation is required for all identified waste units at Hanford, off-site disposal may not be feasible due to the amount of contaminated soil to be disposed of. Neither off-site nor on-site permitted capacity is sufficient to accommodate the volumes of mixed waste generated from exhumation of the Hanford waste sites. As a result, an engineered and

approved land disposal site may need to be constructed on-site to accommodate the disposal of all excavated material.

3.3 REMEDIAL ACTION UNIT COST

The four remediation techniques identified for the RCRA 3004(u) waste sites are: exhumation, groundwater recovery and treatment, grout-in-place, and in-place decontamination. Unit costs have been developed for each of the proposed remediation techniques described above and equipment and manpower requirements have been identified. The given unit cost includes equipment, materials, operation and maintenance (labor, power, etc.), and health and safety. Other costs such as site preparation (i.e., demolition, road building, etc.) are considered to be site-specific, and are not included in this unit cost. Instead, these costs will be considered as a contingency factor or allowance for unforeseen expenses.

Appendix A provides the details of the costs, equipment, and manpower estimates for exhumation, grout-in-place, groundwater recovery and treatment, and in-place decontamination. The costs are summarized as follows:

- Exhumation: $365/cu yd (without waste treatment - $689/cu yd (with waste treatment)
- Grout-in-place: $60/cu yd
- Groundwater recovery and treatment: $35/1,000 gal.
- In-place decontamination: $210/cu yd.

4.0 SUPPORT ACTIVITIES

Support activities have been identified for site characterization and site remediation. These activities represent studies, plans, and procedures that need to be developed in order to proceed with site characterization and site remediation. The following activities represent support needs for the inactive RCRA 3004(u) sites:

- Development of sampling plans and health and safety plans for site characterization

- Conduct an RI/FS for sites identified for remediation (includes sampling and health and safety plans)

- Assessment of waste management needs to accommodate the wastes generated from site remediation and development of waste management plans

- Characterization and modeling studies of site areas to account for contributing sources (both active and inactive)

- Treatability studies to support remediation technique selection on a site-specific basis

- Evaluation of the need for requesting that Alternate Concentration Limits (ACLS) be used as the cleanup criteria for the inactive waste sites given site-specific conditions

- Evaluation of the need to modify existing permits

- NEPA documentation to support new facilities development and possibly remediation activities.

Each of these support activities are described in more detail below.

Sampling plans need to be developed for the RCRA 3004(u) waste sites designated for verification of no release, verification of no hazardous constituents, and verification of no residual contamination. These plans

should be developed on a site-specific basis (or within a grouping) so that the media affected and the techniques employed are most appropriate to the site situation and configuration. The sampling plans should identify the the purpose of the study, the media to be sampled, the sampling locations, sampling and decontamination techniques, data management and sample chain of custody, analytical parameters selected, and health and safety requirements. The sampling programs should be geared towards documenting that there is no problem. If contamination problems are encountered, then the site will need to be re-evaluated for further action. Such sampling planning needs to be coordinated with the planning for CERCLA sites and RCRA remediation sites.

Sites identified as requiring remediation will require remedial investigation plans be developed. These plans will be essentially the same as the remedial investigation characterization plans identified for the CERCLA sites both in terms of focus and content.

Like the CERCLA sites, RCRA 3004(u) sites identified as requiring remediation will require feasibility studies be conducted in conjunction with the remedial investigation. These feasibility studies will assess the site-specific alternatives that may be considered and includes an effectiveness evaluation to select the most appropriate alternative. These studies have been described more fully in the CERCLA tasks under this program.

As identified in Section 3, existing waste management capacity both on-site and off-site is insufficient to handle the volumes of mixed waste anticipated to be generated from site remediation. This will require an evaluation of available off-site capacity and an assessment of on-site new facility needs to determine whether new management units are needed as well as the form required (landfill, wastewater treatment system, etc.). Engineering designs and appropriate permits will be required for new facilities to handle the wastes from remediation. Also, characteristics of the waste and contaminated materials expected to be generated from the remediation activities may be evaluated to determine if the materials may be delisted (from the dangerous waste designation) thereby allowing waste disposal as only radioactive waste.

Modeling studies will be needed to fully evaluate site conditions and subsurface transport of radioactive and chemical contaminants on a larger grouping or regional (area-based) seale rather than on a site-specific basis. The inactive waste sites at Hanford involve a complex environment through the interaction of waste management units that operated twenty or thirty years ago and waste management units that recently ceased operations or are still operating. In addition, sites may be located directly next to each other that are being addressed under different remediation programs (CERCLA and RCRA 3004(u)) that can create an artificial barrier between the sites and may not take into account the complexity of the site interactions. Finally, subsurface processes in effect at Hanford create complex contaminant distributions. For example, thermal gradients and lenses of high/low permeability in the subsurface contribute to lateral spread of contaminant plumes in situations where a downward or elliptical plume may be expected. These conditions coupled with the hydraulic interaction with the Columbia River; operations variations in the past that affected groundwater movement and possibly contaminant flow; and continued interactions with active discharges create an environment that may be best understood and evaluated through detailed regional site modeling of both the chemical and radioactive materials movement and behavior. Such modeling would support detailed regional site characterization, long-term monitoring strategies, and selection/design of remediation techniques.

The state-of-the-art of remediation is continuing to evolve. EPA has generally found that site-specific treatability studies are required prior to final remediation technology selection and design in order to ensure that the selected technique will successfully apply to site conditions and the combinations of waste constituents found. Often, these studies can determine design modifications, alternative equipment or materials of construction selection, or treatment parameters/procedures required. Sometimes these studies can identify the inapplicability of a given technique otherwise thought to be suitable. The need for treatability studies will depend on a site-by-site basis, but is generally recommended for any type of in-situ treatment or waste treatment process.

Current RCRA closure and cleanup requirements establish the cleanup criteria as background concentrations of a given constituent or a health-based standard such as a maximum concentration limit (MCL). In many cases,

particularly where no health-based standard exists (such as soil) or where site conditions do not support cleanup to background concentration, alternate concentration limits (ACLs) may be pursued as alternate cleanup standards. The ACL development process requires detailed studies of site conditions, contaminant characteristics and movement in the environment, and contaminant toxicity and other health effects. This involves a fairly detailed assessment process supported by detailed modeling. EPA review and approval will be necessary. The need for and the feasibility of proposing alternate concentration levels for cleanup criteria at Hanford remediation projects should be evaluated once more detailed site characterization information is available.

Hanford has existing waste management units with RCRA (Washington Dangerous Waste) interim status and seeking operating permits. These facilities may be likely candidates to receive some of the wastes generated from remediation actions. The permit conditions and waste acceptance criteria will require evaluating, prior to facility use for remediation wastes, to determine whether remediation wastes may be accepted or whether permit modifications are required prior to remediation waste acceptance.

NEPA documentation such as environmental assessments and environmental impact statements may be needed to support remediation decisionmaking and actual remediation activities. The Savannah River Plant is currently completing a final Environmental Impact Statement for Waste Management Activities, which addresses proposed remediation strategies, proposed waste management changes, and proposed strategies for development and construction of new waste management facilities to handle future wastes and wastes generated from site remediation. The Nevada Test Site is currently in the process of preparing environmental assessment documents to support the expansion of the existing radioactive waste landfill to provide new landfill cells for disposal of mixed wastes. Finally, Rocky Flats has encountered difficulties in completing the trial burn for a RCRA incinerator because the incinerator was not addressed in previous environmental documents. Although there are already a number of environmental documents addressing waste management issues at Hanford, it is anticipated that new documentation may be needed as remediation plans progress.

REFERENCES

1. U.S. Environmental Protection Agency (U.S. EPA). Handbook for Remedial Action at Waste Disposal Sites (Revised). EPA/625/5-85/006. October 1985.

2. Godfrey, R. (ed.) 1984. Building Construction Cost Data. Robert Snow Means Co., Inc., Kingston, ME.

3. Science Applications International Corporation. Draft Final Report Energy Recovery From Hazardous Waste Incineration. Oak Ridge, TN. August 1987.

4. Engineering News-Record. 1987. ENR Market Trends.

5. Kaiser Engineers Hanford Company. Kaiser Engineers Hanford Company, FY87 Revised Liquidation Rates Effective June 15, 1987. [Business Sensitive Document].

6. U.S. Environmental Protection Agency (U.S. EPA). Remedial Response at Hazardous Waste Sites - Summary Report. EPA-540/2-84-002a. March 1984.

7. U.S. Environmental Protection Agency (U.S. EPA). Remedial Response at Hazardous Waste Sites - Summary Report. EPA-540/2-84-002a. March 1984.

8. Rockwell International Energy Systems Group. Handbook - 200 Areas Waste Sites, Maxfield, H.L. RHO-CD-673. Volume II of 3. Richland, WA. April 1, 1979.

9. Rockwell International, Rockwell Hanford Operations. Hanford Defense Waste Disposal Alternatives: Engineering Support Data for the Hanford Defense Waste Environmental Impact Statement. Richland, WA. RHO-RE-ST-30 P. December 1985.

TASK 8 - APPENDIX A

REMEDIAL ACTION TECHNOLOGIES

REMEDIAL TECHNOLOGIES

A. Air Pollution Controls

- Capping

  - synthetic membranes
  - clay
  - asphalt
  - multimedia cap
  - concrete
  - chemical sealants/stabilizers

- Dust Control Measures

  - polymers
  - water

Surface Water Controls

- Capping (See A.)

- Grading

  - scarification
  - tracking
  - contour furrowing

- Revegetation

  - grasses
  - legumes
  - shrubs
  - trees, conifers
  - trees, hardwoods

- Diversion and Collection Systems

  - dikes and berms
  - ditches, trenches, diversions
  - terraces and benches
  - chutes and downpipes
  - seepage basins
  - sedimentation basins/ponds
  - levees
  - floodwalls

C. Leachate and Groundwater Controls

- Capping (See A.)

- Containment Barriers

  Function Options (Vertical Barriers)

  - upgradient placement
  - downgradient placement
  - circumferential placement

  Materials/Construction Options (Vertical Barriers)

  - soil-bentonite slurry wall
  - cement-bentonite slurry wall
  - vibrating beam/asphalt wall
  - grout curtains
  - steel sheet piling
  - Envirowall cut-off

  Horizontal Barrier (Bottom Sealing)

  - block displacement
  - grout injection

- Groundwater Pumping

  Function Options

  - extraction alone
  - extraction/injection
  - injection wells

  Equipment/Material Options

  - well points
  - deep wells
  - suction wells
  - ejector wells

- Subsurface Collection Drains

  - French drains
  - tile drain
  - pipe drain (dual media drain)

D. Gas Migration Controls

- Capping (gas barriers) (See A.)
- Gas Collection and/or Recovery
  - passive pipe vents
  - passive trench vents
  - active gas collection systems

E. Waste and Soil Excavation and Removal

- Excavation/Removal
  - backhoe
  - cranes and attachments
  - front end loaders
  - scrapers
  - pumps
  - industrial vacuums
  - drum grapplers
  - forklifts and attachments
- Grading (See B.)
- Capping (See A.)
- Revegetation (See B.)

F. Contaminated Sediments Removal and Containment

- Sediment Removal

  Mechanical Dredging

  - clamshell
  - dragline
  - backhoe

  Hydraulic Dredging

  - plain suction
  - cutterhead
  - dustpan

  Pneumatic Dredging

  - airlift
  - pneuma
  - oozer

- Sediment Turbidity Controls and Containment

  - curtain barriers
  - cofferdams
  - pneumatic barriers
  - capping

G. <u>In-Situ Treatment Methods</u>

  - hydrolysis
  - oxidation
  - reduction
  - soil aeration
  - solvent flushing
  - neutralization
  - polymerization
  - sulfide precipitation
  - bioreclamation
  - permeable treatment beds
  - chemical dechlorination

H. <u>Direct Waste Treatment</u>

- Incineration

  - rotary kiln
  - fluidized bed
  - multiple hearth
  - liquid injection
  - molten salt
  - high temperature fluid wall
  - plasma arc pyrolysis
  - cement kiln
  - pyrolysis/starved combustion
  - wet air oxidation

- Gaseous Waste Treatment

  - activated carbon
  - flares
  - afterburners

- Treatment of Aqueous and Liquid Waste Streams

  Biological Treatment Techniques

  - activated sludge
  - trickling filters
  - aerated lagoons
  - waste stabilization ponds
  - rotating biological discs
  - fluidized bed bioreactors

TABLE 3-1 REMEDIAL TECHNOLOGIES (Continued)

Chemical Treatment Techniques

- neutralization
- precipitation
- oxidation
- hydrolysis
- reduction
- chemical dechlorination
- UV/ozonation

Physical Treatment Techniques

- flow equalization
- flocculation
- sedimentation
- activated carbon
- Kleensorb
- ion exchange
- reverse osmosis
- liquid/liquid extraction
- oil water separator
- steam distillation
- air stripping
- steam stripping
- filtration
- dissolved air flotation

Discharge to POTW

- Solids Handling and Treatment

Dewatering

- screens, hydraulic classifiers, scalpers
- centrifuges
- gravity thickening
- flocculation, sedimentation
- belt filter press
- filter press
- drying or dewatering beds
- vacuum assisted drying beds

Treatment

- neutralization
- solvent
- oxidation
- reduction
- composting

- Solidification/Stabilization/Fixation

  - cement based
  - lime based
  - thermoplastic
  - organic polymer
  - self-cementing techniques
  - surface encapsulation
  - glassification
  - solidification materials (i.e., flyash, polymers, sawdust)

I. Land Disposal Storage

  - landfills
  - surface impoundments
  - land application
  - waste piles
  - deep well injection
  - temporary storage

J. Contaminated Water Supplies and Sewer Lines

- In-Situ Cleaning

- Removal and Replacement

- Alternate Drinking Water Supply

  - bottled water
  - cisterns/tanks
  - deeper or upgradient wells
  - municipal water system
  - relocation of intake

- Individual Treatment Units

TASK 8 - APPENDIX B

REMEDIATION TECHNIQUES AND COSTS

(SAME AS APPENDIX A IN TASK 5)

A.1 CAP/COVER

A.1.1 General Description

The cap and cover technique provides a horizontal barrier to isolate contaminants within an underlying waste zone and reduce their potential for migration out of this zone. A cap is usually designed as a low permeability barrier to reduce or prevent the movement of surface precipitation down into the contaminated zone. In arid regions, where evapotranspiration regularly exceeds precipitation, a cap can reduce the movement upward to the surface of contaminated water. Other forms of upward contaminant migration that may be reduced by a cap include the withdrawal of contaminated soil moisture by deep rooted plants penetrating into the contaminated zone and the transport of contaminants to the surface by burrowing animals.

The applicability of a cap at Hanford is governed by its prevailing arid climate. Although consideration must be given to an abnormally high precipitation event such as the 100-year storm, the migration of wastes upwards due to the "wicking" of soil moisture and the action of deep rooted plants (Dabrowski, 1973) and burrowing animals (O'Farrell and Gilbert, 1975) are the primary concerns. Because the sites considered for cap/cover deal with low-level radioactive concentrations, the potential for radioactive decay particles penetrating through the 10 to 30 feet of cover soil is expected to be minimal. Site field sampling surveys will determine this later, as described in Section 2, Characterization Plan for CERCLA Sites.

For those sites that contain near the surface a large concentration of radioactive or chemically hazardous materials that cannot be completely or feasibly removed by other technologies, capping can be employed as a barrier above the waste site until the wastes can degrade naturally, in place, with time.

Capping techniques applicable to the Hanford Reservation include:

- Synthetic liners
- Asphalts and asphalt cement
- Reinforced Portland cement
- Low permeability clay bentonite
- Gravel-cobble
- Chemical toxins (herbicides).

An applicable barrier cap may consist of one or a combination of these techniques. For instance, synthetic liners coupled with a soil-bentonite layer are commonly used.

In choosing a technique appropriate to the Hanford Reservation, several concerns must be evaluated. The expected or field-proven life of the cap must be adequate until the wastes within the site are no longer hazardous for contaminant pathways in question. Capital and operation and maintenance costs must also be considered. For sites that are to be capped, consideration must be given to any adjacent active sites that may cause lateral migration of fluids beneath the cap and into the contaminant zone. Subsidence may occur, destroying the cap as the supporting soil beneath it collapses. Many of the waste units considered in this report are cribs, French drains, ditches and trenches. Cribs particularly have a history of subsidence, and if excavation and disposal are used to extract the contaminants concentrated near the surface before a cap is installed, some subsidence is likely.

Long-term monitoring of the cap and site after completion are important. The waste site must be monitored to determine whether contaminants are escaping either to the surface or down towards the ground water. The integrity of the cap must be monitored and periodic maintenance may be needed, such as sealing of asphalt liners that have developed cracks or removal of deep rooted plants and burrowing animals that could disrupt a clay or synthetic liner.

An evaluation of the possible capping technologies indicates that a gravel-cobble barrier or a reinforced concrete cap are the best choices. Synthetic liners and asphalts have too short a life span; it would be necessary to excavate and reinstall a synthetic liner every 20 years. Asphalts, chemical toxins, clays, reinforced concrete, and to some extent gravel-cobble are susceptible to subsidence. Bentonite must be kept moist to be effective. In the arid climate at Hanford, drying and cracking of a bentonite liner is likely. Chemical toxins are still experimental.

Both reinforced concrete and gravel-cobble can be expensive to install. Reinforced concrete is the more expensive of the two, is susceptible to cracking, and requires periodic repairs to maintain cap integrity. The life span of concrete is also expected to be shorter than that of gravel-cobble. Both, however, are effective against burrowing animals. A gravel-cobble liner offers better long-term protection against surface water infiltration if it is covered with a less permeable layer such as the natural soil found at the Hanford Reservation.

A layer of cobbles (1.49 - 2.99 in. diameter) will create a zone of large void spaces lacking nutrients and water. If this zone is deep enough, plant roots will be prevented from penetrating it. The mass of the cobbles prevents burrowing mammals from tunneling beyond the barrier zone. A gravel layer (.118 - .236 in. diameter) above the cobbles prevents finer sediments within the soil column from passing into and filling the cobble voids. The gravel layer is covered with a soil of lower permeability than the gravel to contain any surface water infiltration and to sustain plant life in order to maintain the evapotranspiration levels normal for the area. Should a large storm event saturate the soil layer, capillary action would draw all or most of the water away from the site, due to its lower permeability, without penetrating into the gravel-cobble layer or into the contaminated zone.

A.1.2 Design and Construction

The barrier zone is the cobble layer. It must be of sufficient mass to deter burrowing mammals and of sufficient void space and depth to inhibit plant roots. The area above the site will be excavated to a depth adequate

to contain the cobble layer and the supporting layers placed above. The cobble layer will be at most 2.5 feet deep. To protect the cobble layer from filling with smaller particles over time, a gradation of material sizes, decreasing towards the surface, is used to trap these finer particles as they migrate downward. A gravel layer above the cobbles, approximately ten inches deep, will serve this function. Approximately 2.5 feet of sandy soil will be placed above this.

An area above and to some prespecified distance laterally beyond the contaminated zone will be excavated. A layer of cobbles will be placed at the bottom of the excavated pit with its upper surface kept level. The gravel layer will be placed and compacted above the cobbles, and backfill will be placed and compacted in six-inch lifts over the site up to the original grade. The remaining backfill will be placed and compacted over the site with the final surface grade designed to withstand wind erosion and to promote surface water runoff. The depth of excavation of each site may be more or less than the five feet assumed in this Appendix. The controlling criteria will be excavate enough soil so that backfilling of all excavated soil will produce a surface grade adequate to withstand the elements. The compacted soil layer must be able to retain the designed-for storm intensity (like the 100-year storm) and prevent surface water from penetrating into the gravel-cobble layers. After installation, a monitoring plan will be implemented to ensure that the cap is effectively deterring deep rooted plants and burrowing mammals and that the integrity of the cap has not been impacted by subsidence, filling of the cobble voids, or by any unforeseen factors that may be detected during periodic monitoring.

Excavation will require a bulldozer or backhoe, depending on the size of the site. Placement of the cobble, gravel and soil layers will be accomplished by a combination of backhoe and hand or bulldozer. Hand-held vibrating tampers will be used to compact the gravel and soil. The gravel and cobble will be imported by truck and the excess excavated soil will be exported by truck.

In selecting a capping technique, the important factors to be considered include 1) the health and safety of the workers (excavation

above a crib could result in sudden collapse of the crib itself; the excavated material may be contaminated and require specific health and safety gear), 2) the environmental impact of excavating (wind may disperse excavated contaminated soil), 3) possible inundation by water (such as flooding of the sites near the Columbia River), 4) design of the site to handle a large storm event (like the 100-year storm), and 5) the expectation that the waste will remain in place and degrade to acceptable radioactive levels or chemical concentrations within a reasonable time. Costs are also of concern; the gravel and cobble must be economically available.

A.1.3 Advantages and Disadvantages

Advantages of the gravel-cobble cap are that it is effective against plant root penetration and burrowing animals, it is not subject to rapid deterioration, and it does not appear to alter water balance relationships when installed correctly (Hakonson et al, 1982). Since it does not deteriorate quickly, operation and maintenance costs should be low over the life of the cap. Disadvantages are that contaminants are still onsite and must be monitored and that subsidence may disrupt the cap.

A.1.4 Remedial Action Schedule

It is assumed that site reconnaissance and surveying have been performed during the earlier characterization phase. It is also assumed that a list of contractors cleared to work at Hanford is available, and that the contractor chosen to implement this remedial action will already be at Hanford and will be able to transfer equipment and personnel from a nearby site.

The remedial action schedules are largely derived from the average daily output values given by construction cost guides (Means, 1985 and Dodge, 1987). Some information has been taken from technical journals when it was more specific than the construction cost guides.

Mobilization of equipment to the generic site and site setup take a day. Excavation to a depth of five feet using two backhoes will take 24 days, installation of the gravel-cobble layers 19 days, and backfilling and compacting the site 53 days. Demobilization and decontamination of equipment will require two days. A total of 19.8 weeks will be required for remedial action implementation. Post remedial action monitoring will continue for 30 years following the remedial action implementation.

A summary of the remedial action schedule for cap/cover is as follows:

o Mobilization/Setup	0.2 weeks
o Prepare and excavate site	4.8 weeks
o Install gravel-cobble layers	3.8 weeks
o Backfill and compact site	10.6 weeks
o Demobilize and decontaminate site	0.4 weeks
Total	19.8 weeks

A.1.5 Resource Requirements

Excavation and backfilling of the site will require two backhoes, both of which will be used to excavate for several days. Four dump trucks will be required to remove excavated materials. So that large portions of the site are not exposed to the elements (wind or precipitation) for an extended period of time, the backhoes will be used to install the gravel-cobble layers and to perform backfilling operations on the fourth day. Ten dump trucks will be required during backfilling operations, along with four vibrating compactors (with operators) and eight laborers. The excavation and the gravel-cobble layer and backfilling operations will continue in tandem until completion of the gravel-cobble layers and the covering soil layer.

The resource requirements are summarized as follows:

Excavation (53-day duration)

Manpower

4 Teamsters (dump truck operators)
2 Operating Engineers-Hoisting (backhoe operators)
2 Oilers (backhoe support)
2 Laborers (backhoe support)

Equipment

2 Backhoes
4 Dump trucks

Laying gravel-cobble and backfilling (72-day duration)

Manpower

10 Teamsters (dump truck operators)
6 Operating Engineers-Hoisting (2 backhoe operators and 4 vibrating compacter operators)
2 Oilers (backhoe support)
8 Laborers (backhoe support and soil compaction)

Equipment

10 Dump trucks
2 Backhoes
4 Vibrating compacters

Materials

7580 yd^3 Cobble
2530 yd^3 Gravel

A.1.6 Costs

The depth of excavation for placement of the cobble layer is five feet. The cap is designed to extend 20 feet in all directions beyond the area of contamination. Side slopes of the excavated site will be 1:1. These criteria have been used to compute the areal extent of contamination for all sites that considered cap/cover as a remedial action. The average of the two median sites gave a cross-sectioned area of 9100 yd^2 to be capped. This generic site was used for costing.

It is assumed that eight hours are worked per day and that holidays are ignored. All costs, except the cost of applying the cobble and gravel layers, have been taken from Dodge, 1987. Table A.1.1 summarizes costs for the cap/cover technology.

TABLE A.1.1 CAP/COVER COSTS

	Hourly Rate ($/hr)	Total Cost ($/yr)
Labor[1]:		
1 Site Superintendent	58	$120,640/yr
1 Health & Safety Supervisor	48	99,840/yr
2 Radiation Safety Technicians (40% of time) (Additional labor cost for equipment operators included in equipment costs)	28	46,600/yr
	Subtotal	$267,080/yr
Equipment		
2 Backhoes w/operators and support ($2.49/yd^3)[2]		$ 39,100
10 Dump Trucks w/drivers 1/4 mile round trip ($1.22/yd^3)		19,200
4 Vibrating Compacters w/operators and support ($9.25/yd^3)		145,000
	Subtotal	$203,000
Materials & Safety		
Cobble, 2.5 ft thick ($7.19/yd^2 installed)[3]		$ 65,400
Gravel, 10 in thick ($3.60/yd^2 installed and compacted)[4]		32,800
Health and Safety (5 men including backhoe operator @ $25/day/man during excavation and laying of cobble only = 11 wks)		9,000
	Subtotal	$107,200

Total Cost = Equip + Materials & Safety + Labor for 11 weeks

= $203,000 + 107,200 + (19.8/52) (267,000) = $412,000/unit site

Unit Cost = $412,000/9,100 yd^2
= $45/yd^2

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(1) Kaiser Labor Rates
(2) Means 1987
(3) Hakonson et al. 1982 (adjusted)
(4) Dodge 1987

A.1.7 References

Dabrowski, T.E. 1973. Radioactive Tumbleweeds in the 100 Areas, United Nuclear Industries Report, UNI-65, Richland, Washington.

Dodge Unit Cost Data. 1987. McGraw-Hill Information Systems Company.

Hakonson, T.E., J.F.Cline and W.H. Rickard. 1982. Biological Intrusion Barriers for Large Volume Waste Disposal Sites, Proceedings of the Symposium on Low-Level Waste Disposal, pp. 289-308.

O'Farrel, T.P. and R.O. Gilbert. 1975. Transport of Radioactive Materials by Jackrabbits on the Hanford Reservation, Health Phys. 29:9-15.

U.S. Environmental Protection Agency. 1985. Remedial Action at Waste Disposal Sites.

A.2 GROUT-IN-PLACE

A.2.1 General Description

Grouting is a process whereby one of a variety of suspensions or fluids is injected into an earth formation where it is allowed to set in place. The purpose of this process may be to impart additional strength to the formation, reduce the permeability of the formation, or, in theory, to stabilize and solidify a body of waste or soil in situ. It should be noted that waste stabilization/solidification using grouting techniques is not an established remedial technology and would require further development before it could be used with confidence.

Grout injection may be accomplished by a variety of techniques including curtain grouting, jet grouting, and area grouting. Curtain grouting involves creating an underground barrier wall by injecting columns of grout that overlap vertically and horizontally. Jet grouting employs a high-pressure nozzle to cut a kerf in soil or soft rock where grout is allowed to set. Area or blanket grouting is a low-pressure technique for injecting and stabilizing shallow soils for reduced infiltration or increased strength.

The three general classes of grout utilized today are as follows:

- Suspension grouts
- Chemical grouts
- Bituminous grouts (Tiedemann and Graver, 1982; Bowen, 1981)

Suspension grouts are the most common type of grout and include coarse grouts that contain particles in suspension. Cement, clay, and cement-clay grouts are in this category. These materials are usually the more viscous of the available grouting materials and have the largest particle size. These grouts are restricted to use in the grouting of fractured rock or coarse grained material.

Chemical grouts rely on polymerization reactions to form hardened gels. They have initially low viscosities and thus can be used in finer grained, cohesionless soils as well as a secondary treatment for grouting of coarse soils and rock fissures. Some chemical grouts such as urethane can be suspensions that undergo polymerization to form a gel. This class of grout is comprised of two subclasses: silicates and organic polymer grouts.

Bituminous grouts can be either emulsions of bitumen in water or asphalts. These grouts can be used to seal soils, fill rock cavities, or construct thin cutoff walls.

A.2.2 Design and Construction

The nature of the earth materials at a site will greatly influence the type of grout to be used. If soil materials are to be grouted, the characteristics that must be determined include:

- Permeability
- Porosity
- Particle size distribution

Permeability will influence the selection of grout type (particulate or chemical) to be used, the allowable viscosity, and the required injection pressures (Bowen, 1981). The porosity, or voids ratio, will give an indication of the amount of grout a unit volume of soil will "take," and how rapidly grout may be injected (Herndon and Lenahan, 1976a). The particle size distribution indicates, among other things, the presence of large particles that could interfere with grout injection.

After a detailed site and waste characterization is completed, a grout capable of being injected into the treatment area and immobilizing the wastes must be formulated. For this discussion, it is assumed that a chemical grout is suitable for the alluvial deposits found at Hanford and is also capable of solidifying the waste deposits and immobilizing their hazardous constituents. In actual practice, bench and pilot scale testing

would be required on a site-specific level to determine if these assumptions are valid.

Based on background and exploratory data, the location for a pattern of primary injection holes is chosen and injection at one or more zones is identified. Based on field experience in similar soil types, it was estimated that the primary holes would be on 20-foot centers. The first few primary holes are then drilled and slotted grout pipes installed (Millet and Engelhardt, 1982). Background and exploratory data are also used to identify each vertical zone or stage to be grouted. The grout pipe, usually small diameter PVC pipe, is then slotted to allow grout penetration into the formation. Starting at the bottom, successive stages are sealed off using a pneumatic packer and then pressure grouted. Each hole is then pressure tested, often using a nonsetting fluid of the same viscosity as the grout. These tests are used to determine the initial grout mixture and are often conducted using the grout plant and other equipment to be used for the actual grouting (Millet and Engelhardt, 1982 and Karol, 1982a).

Each zone within each primary hole is then injected with the grout mixture until a predetermined amount is pumped (grout take) or a predetermined flow rate at maximum allowable pressure is reached. Maximum allowable pressure is typically around 1 pound per square inch (psi) per foot of overburden (Millet and Engelhardt, 1982). Data from the drilling and injection of the first primary holes is analyzed and, if necessary, the grout mixture or injection pressure modified before completing the remaining primary holes. Following completion of the primary hole grouting, the program is again analyzed, necessary changes made, and a pattern of more closely spaced secondary holes drilled and injected.

The analysis and evaluation of the completed grouting becomes, in essence, another pressure test. Close quality control during drilling and grouting identifies areas that require tertiary hole grouting to complete sealing. Such areas are identified by faster than expected drilling rates and higher than expected grout takes (Millet and Engelhardt, 1982). For a successful grouting program, each hole series (i.e., primary, secondary) will have lower grout takes than the previous one. Many projects will

require that proof holes be drilled and injected. A very low grout take on tertiary or proof holes indicates that most voids are grout filled and the grouting program was successful.

A.2.3 Advantages and Disadvantages

The greatest advantage of grout injection, if it can successfully be accomplished, would be the in-situ immobilization of hazardous constituents until they can decay or be recovered for treatment. Other advantages include minimization of human contact with the wastes and the absence of operation and maintenance costs for the completed remedy.

The major disadvantage of this technique lies in its unproven nature. Any application of it has to be custom tailored to both the geohydrologic conditions of the site and to the characteristics of the wastes present. The state-of-the-art of grouting for hazardous material control is such that each proposed waste/grout combination must be thoroughly tested to predict effectiveness of immobilization. Also, because each application of this technique is experimental, long term effectiveness is not known.

A.2.4 Remedial Action Schedule

The following estimated schedule is based on pressure injecting phenolic resin grout into the soils of a site measuring 370 feet square, to a depth of 160 feet. The soils are presumed to be relatively uniform sands with a porosity of 20 percent. Grout injection holes will be located on 20 foot centers, and 400 primary and 361 secondary holes, each 160 feet deep will be required. It is assumed that one rig can drill grout holes at a rate of 3 per week.

Each grout plant will be manifolded to six grout plants and can pump four cubic yards (yd^3) of grout through each pipe. Twelve grout plants will be used. Working a five-day week, total grouting capacity will be 1,440 yd^3/week, or 374,400 yd^3 per year with a soil porosity of 0.20. Based on these estimated quantities, the following represents the estimated remedial action schedule.

o Mobilization and Site Preparation	
Drill Rig	0.5 weeks
Grout Plants (12)	6.0 weeks
o Drilling 761 holes, three holes/rig/week, three rigs	84.5 weeks
o Grouting (162,250 yd^3)	
Primary Holes 126,555 yd^3, 1,440 yd^3/week	87.9 weeks
Secondary Holes 35,695 yd^3, 1,440 yd^3/week	24.8 weeks
Total	119.5 weeks = 2.3 years

A.2.5 Resource Requirements

The labor requirements for grout-in-place can be divided into three categories: supervisory personnel, drilling crews, and grouting crews. The supervisory personnel would include one site supervisor overseeing all onsite operations, three labor foremen overseeing drilling and grouting efforts, and one radiation protection technician observing only the drilling effort. Each drill rig would be manned by a lead driller and a driller's helper. Each grout plant would be manned by a crew of four who would mix, test, and inject the grout.

Equipment for grout hold drilling would be limited to a truck and a track or skid-mounted drill rig, outfitted with a minimum of 170 feet of small diameter hollow stem auger. Miscellaneous small tools are standard rig equipment. Each grout plant would consist of a grout mixer, an agitator, a grout pump, a pressure transducer with recorder, a manifold, piping, and a sleeve grout pipe.

The principal materials needed for this effort would be reusable grout pipe of sufficient length to reach the bottom of a grout hold and extend to the grout plant manifold and the grout formulation itself. A typical phenolic resin grout would consist of a polyphenolic polymer power that is

soluble in water, a catalyst such as a formaldehyde solution, and an activator, usually a metal salt such as ferric chloride.

A.2.6 Costs

The equipment involved in injecting grouting includes a drill rig for drilling injection holes and a grout plant for mixing and injecting the grout. The drill rig would employ at least two operators and the grout plant at least three. The following costs are based on grouting an area sufficiently large for the crew to work in the same area for a full year. It is assumed that a phenolic resin grout would be used.

Table A.2.1 summarizes the grout injection costs, which are based on Means, 1985, updated using the ENR Construction Cost Index for 1987 (June).

TABLE A.2.1 GROUT INJECTION COSTS

	Hourly Rate ($/hr)	Annual Cost ($/yr)
Labor		
1 Site Supervisor	58[1]	120,640
3 Labor Foremen	44[1]	274,560
48 Laborers (12 4-man Grout Crews)	20[4]	1,996,800
1 Radiation Protection Technician	28[1]	58,240
	Subtotal	$ 2,450,240
Equipment		
Drilling Cost ($100/ft) (3 rigs x 3 wells/wk x 160 ft/well)		7,488,000
12 Grout Plants ($282/day)[3])		1,235,000
	Subtotal	$ 8,723,000
Materials and Safety		
Phenolic Grout ($150/yd^3)[3]		11,232,000
Health and Safety ($25/day/man x 7 men) (Drilling crew only)		45,500
	Subtotal	$11,277,500
	Total Cost	$22,450,000

Volume of Soil Grouted:

$$4\,yd^3/hole/day \times 6\ holes/plant \times 12\ plants/site \times 260\ days/year \times 20\%\ Soil\ Porosity = 374{,}400\ yd^3/yr.$$

$$\text{Unit Cost} = \frac{\$22{,}450{,}000/yr.}{374{,}400\ yd/yr.} = \$60/yd^3 \text{ of soil}$$

(1) Kaiser Labor Data
(2) SAIC Field Experience
(3) Means (1985 x 1.07)
(4) Dodge

A.2.7 References

Bowen, R. 1981. Grouting in Engineering Practice. 2nd ed. John Wiley and Sons, NY.

Herndon, J. and T. Lenahan. 1976. Grouting Soils. Volume 2. Design and Operation Manual. FHWA-RD-76-27. Halliburton Services. Prepared for: USDOT, Federal Highway Administration, Washington, DC.

Karol, R. H. 1982a. Chemical Grouts and Their Properties. In: Proceedings of the Conference on Grouting in Geotechnical Engineering, American Society of Civil Engineers, NY.

Millet, R. A. and R. L. Engelhardt. 1982. Matrix Evaluation of Structural Grouting of Rock. In: Proceedings of the Conference on Grouting in Geotechnical Engineering, ASCE, New York.

Spooner, P. A., G. E. Hunt, V. E. Hodge, and P. M. Wagner. 1984. Compatibility of Grouts with Hazardous Wastes, EPA 600/2-84-015.

Tiedemann, H. R. and J. Graver. 1982. Groundwater Control in Tunneling. Vol. 2--Preventing Groundwater Intrusion into Completed Transportation Tunnels. FHWA/RD-81/074. Jacobs Associates. Prepared for: USDOT, Federal Highway Administration, Washington, DC.

U.S. Environmental Protection Agency. 1985. Handbook for Remedial Action at Waste Disposal Sites (Revised), EPA/625/6-85-06.

A.3 IN-SITU VITRIFICATION

A.3.1 General Description

Vitrification involves the mixing of waste with molten glass at a temperature greater than 1,300^{0}C. At this temperature all of the combustibles are completely burned away, including the various organic chemicals. Vitrification offers the greatest degree of containment, since the resultant solids formed generally have very low leach rates. The process is being employed on radioactive and highly toxic waste.

In-situ vitrification involves encapsulating previously burned wastes in a glass matrix without first exhuming the waste and is limited in its application to shallow depths and soils with low moisture content. Electrodes embedded in the ground are used to facilitate glassification of the soil. The process is extremely energy intensive; therefore, costs can be very high.

A.3.2 Design and Construction

The vitrification process is most effective at level grades. For those sites that are on slopes, excavation and grading may have to be performed. The excavated soil (a maximum of ten feet) is assumed to be uncontaminated and will provide backfill after the vitrification process.

Upon completion of vitrification activities at a site, the area and equipment are decontaminated. Contaminated equipment with further useful life can be kept in the "hot" area when not in use. Contaminated electrodes with no useful service life would be decontaminated, then disposed of. Other transportable equipment is taken to the decontamination trailer for washing. Standby parts and equipment are decontaminated on a scheduled basis. During the disassembly and repair, direct contact and exposure to personnel should be minimized.

The equipment and materials required to conduct in-situ vitrification include:

1. Electrodes: two-inch diameter, six-foot long molybdenum rods with threaded connection, covered by a one-inch thick graphite sleeve (reusable component; decontamination required). Flaked graphite and glass frit.

2. Off-gas hood: 16-gauge stainless steel panels, bolted and gasketed and supported by trusses and beams. Backfilling around the lower edge (skirt) to minimize leakage; system pressure at six inches of water.

3. Control trailer: power system for vitrification. Pilot design at Hanford Reservation utilized a Scott-Tee transformer connection for conversion of three-phase input into a balanced two-phase output configuration; site management and health physicist offices.

4. Off-gas trailer: scrubber system for inorganic fumes and radioactive particulates entrained in the off-gas from the vitrified mass. Process equipment includes indirect cooling, direct quench, two-stage, high pressure venturi scrubber, and wastewater collection tank.

5. Support trailer: electrical system hardware including glycol cooling unit.

6. Excavation equipment: bulldozer, earth mover, front end loader, and truck.

7. Crane: supports, and diesel generator.

8. Drilling equipment.

9. Decontamination trailer: wash tanks, high-pressure water, detention tanks, pumps, filtration system, and drip pans.

A.3.3 Advantages and Disadvantages

The advantages of using in-situ vitrification at Hanford Reservation are as follows:

1. The technology has been demonstrated at the Hanford site.

2. The remaining chemical and radioactive contaminants are immobilized in a glass matrix with low leachability, thus minimizing future environmental contamination.

3. Safety and health of workers is minimized because the waste is left safely in place, thus reducing dust (radioactive) and landfilling (contact with worker) problems.

The disadvantages of using in-situ vitrification at Hanford Reservation are as follows:

1. In-situ vitrification only immobilizes the contaminants in the upper 50 feet or so of soil and has no effect on contaminants that have already migrated below this elevation.

2. Cost can become very high because of the large energy consumption.

A.3.4 Remedial Action Schedule

Mobilization of equipment, setup of equipment, site preparation for the first run, drilling of the electrode holes, and placement of the electrodes will take approximately two to three weeks. Preparation of the next area can be performed concurrent with other activities and does not impact the schedule. Changeover of the hood between runs takes 20 hours with a 300 hour run time, 320 hours per 1,360yd^3, or 24 hours per hundred cubic yards.

For a 100 feet by 100 feet site, the total time that work is being performed onsite will be two weeks for mobilization and setup and 21 weeks for vitrification. Backfilling is based on spreading and compaction at a

rate of 315 yd^3/day. This will require four six yd^3 dump trucks (six yd^3capacity) each moving 85 yd^3 of soil per day, two miles to the site. At these rates the backfilling will take three weeks.

A.3.5 Resource Requirements

Typical large earth-moving equipment including front end loaders, dump trucks, and graders will be required for excavation and backfilling. During vitrification, a front end loader, a truck, drilling equipment, and a crane capable of moving 25 tons will be required. All items will be leased; however, the crane will be rented and two operators will be employed as needed.

The site work and vitrification support costs include equipment, labor, and supervision (a site manager and site engineer). The vitrification support crew would be staffed in three shifts, seven days a week, requiring four two-man crews. See A.3.2 for a list of equipment and materials.

A.3.6 Costs

The costs are based on a large scale in-situ vitrification study conducted at Hanford. The capital costs have been estimated in 1987 dollars. The vitrification costs are based on a process time of 320 hours (vitrification - 300 hours; demobilization, including decontamination - 20 hours). The vitrification is conducted on a trench 35 feet by 35 feet by 30 feet deep (1,360 yd^3). Soil initially excavated from the vitrification area is stockpiled and later used to backfill the excavated contaminated areas. (Contaminated soil excavated during site preparation would be landfilled and replaced with clean soil.)

The basic cost associated with in-situ vitrification is given as \$386/yd^3 (Batley, 1987), but does not include heath and safety costs associated with working on radiological sites on the cost of backfilling the depression. This depression consists of the ten feet of excavated soil plus an additional 20 percent compaction of the vitrified zone, for a total of 18 feet. Table A.3.1 summarizes the costs for in-situ vitrification.

TABLE A.3.1 IN-SITU VITRIFICATION COSTS

		$/yd^3
Labor (for mobilization, vitrification and backfilling)		$ 54
Equipment (includes O & M, electricity cost)		$ 155
Materials and Safety (Iincludes supplies and electrodes)		$ 180
	Total	$ 389

A.3.7 References

Fitzpatrick, V. F. 1987 Pacific Northwest Laboratory. Personal Communication.

Fitzpatrick, V. F., J. L. Buelt, K. H. Ource, and C. L. Timmerman. 1984. In-Situ Vitrification -- A Potential Remedial Action for Hazardous Waste In: 1984 Hazardous Materials Spills Conference Proceedings, Government Institutes, Inc. Rockville, Maryland.

Sanning, D. E. 1984. In-Situ Treatment Project A. USEPA, Cincinnati, OH.

Timmerman, C. L. and K. H. Oma. 1984. An In-Situ Vitrification Pilot-Scale Radioactive Test. PNL-5240, Pacific Northwest Laboratory, Richland, Washington.

A.4 GROUNDWATER RECOVERY/TREATMENT

A.4.1 Soil Flushing

A.4.1.1 General Description

Soil flushing historically has been a technique used for uranium extraction and production at mining operations. Soil flushing involves selective leaching of radioactive material from contaminated soil by use of chemical solutions injected into the soil column.

Soil flushing of radioactively contaminated soil columns has the advantage of reducing quantities of strontium-90 and cesium-137 typically contained within the Hanford Reservation vadose zone. The applicable geological environment for soil flushing is determined by a site-specific assessment of the amount of radioactive material in the soil column.

A.4.1.2 Design and Construction

There are two major components associated with a soil flushing operation: a surface plant to process injected solutions and treat contaminated fluids, and a well system comprised of injection and production wells equipped with pumps to inject and produce fluids. In addition, chemicals are used to enhance the extraction of contaminants from the groundwater and soil.

During site preparation, the design and performance of soil flushing activities are affected by many factors. Among these are well spacing, soil and groundwater contaminant types and levels, degree of water saturation and fluid conductivity of the soil, chemical activity of the soil with respect to the groundwater and its constituents, and areal extent and depth of contamination.

A surface plant is required for recovery and treatment of contaminated liquid pumped from the soil column. This facility will be a mobile wastewater treatment unit capable of precipitating heavy metals and

radionuclides out of solution. The precipitate will be encapsulated and disposed at a landfill. The surface plant will treat groundwater pumped from each site prior to reinjection of groundwater and/or solvents into the soil column. This circulation pattern will be repeated for a number of cycles.

A.4.1.3 Advantages and Disadvantages

The greatest advantage of soil flushing is that it does not involve excavation and transport of large volumes of contaminated soil. The major disadvantage of soil flushing is that the technique is unproved for decontamination of radioactive and chemically contaminated soil columns. Application would require site-specific analysis of the geology. Furthermore, this technology may not result in the desired level of site decontamination.

A.4.1.4 Remedial Action Schedule

The construction schedule for the well system involves the following activities:

1. Site preparation and drilling of wells.

2. Mobilization of contractors and equipment and setup of equipment.

3. Circulation of treatment fluids through the contaminated soil column.

4. Decontamination and demobilization of equipment.

Based on a treatment volume of 25 feet by 25 feet by 250 feet, circulation of 80 gpm, and two wells for this treatment volume, the respective time periods for the above activities are as follows:

- Mobilization/setup (Assumes delivery of modular and portable treatment facility) — 2 weeks

o	Site preparation/drilling	2 weeks
o	Treatment of soil (Assumes 10 pore volume flushes of soil pores at 20% porosity)	12 weeks
o	Decontamination/Demobilization	1 week
	Total	17 weeks

A.4.1.5 Resource Requirements

Manpower requirements for installation and operation of a soil flushing operation consist of the following:

1. Overall project management and supervision of wells and surface processing facilities. Experience in geotechnical well drilling and chemical process engineering. A total staff of three to six, depending on the size and technology used.

2. Operation and maintenance of the well and surface facilities. This requires operator experience with mechanical and chemical process equipment, and equipment used for radioactive decontamination. A total staff of four to eight, depending on the size and technology used.

3. Support of health and safety engineer.

Equipment required for soil flushing includes: drilling rigs; well tubing and casing; down hole well pumps; injection pumps; pumps for circulation fluids through chemical processing equipment; chemical processing equipment for decontamination of radioactive solutions, ion-exchange columns, mixer/settlers, filtration slurries, and storage tanks; and safety equipment for hazardous and radioactive materials.

Materials required for soil flushing include: acids and bases; lime; solvents; ion-exchange resins; and filter media.

A.4.1.6 Costs

The cost for soil flushing does not include a surface recovery concentration facility. The groundwater pump and treatment technology, which operates in tandem with soil flushing, has projected costs for a surface treatment facility and the associated solid waste disposal cost. Table A.4.1 summarizes the costs associated with solution mining techniques.

The following assumptions are used to develop a unitized cost for site remediation at the Hanford Reservation using soil flushing:

- Two wells are required to treat an area 25 feet by 25 feet by 250 feet
- Well costs of $200 per foot of depth
- The wells would treat 156,250 ft^3 of nominal soil volume, with 20 percent porosity (2900 yd^3 of soil per well)
- Soil treatment cost are $1.60/ton at 100 ppm solution
- Pumping rate of 80 gpm (40 gpm per well).

TABLE A.4.1 SOIL FLUSHING COSTS

	Hourly Rate ($/hr)	Annual Cost ($/yr)
Labor		
1 Foreman	44	21,120
7 Laborers	25	84,000
	Subtotal	$105,120
Equipment		
Drilling $100/ft (250 ft, 2 wells)		50,000
Pumping (pumps, pipes, mix tanks) 80 gpm plant, assembled onsite		18,500
	Subtotal	$68,500
Materials and Safety		
Chemicals $160/ton (19.5 x 10^6 gal of water at 10,000 gpm)		15,600
Health and Safety (8 men @ $25/day/man, 15 weeks)		15,000
	Subtotal	$30,600
	Total	$204,220

Volume of Soil Flushed, 5,800 yd^3

$$\text{Unit Cost} = \frac{\$204,000}{5,800\ yd^3} = \$35/yd^3$$

Capital Cost $80,000, 1/yr recovery.

A.4.2 Groundwater Treatment

A.4.2.1 General Description

Treatment of the water removed by the groundwater pumping system will be performed in two stages. The first stage involves the removal of contaminants by chemical addition and sedimentation in a clarifier and filtration through a dual media sand filter and an activated carbon bed. The second stage involves selective ion-exchange for the removal of strontium and cesium, followed by a mixed bed polishing demineralizer unit. Process flow rates up to 100 gallons per minute can be realized for systems of these types in mobile units that could be moved from site to site.

A.4.2.2 Design and Construction

Although the CERCLA sites are not identical, the general approach to treatment of groundwater pumped from the sites will be similar. Differences will obviously exist between sites that contain NH_3 wastes vs. CN wastes, but these differences do not weigh heavily in the overall site cleanup costs and are not addressed in detail here. These details must be identified when the individual site characterizations are performed.

The wastewater treatment trailer will consist of a chemical feed system for pH control and precipitation of the heavy metals such as chromium and lead in the clarifier along with uranium and plutonium. Fine particulate matter will then be removed in the dual media sand filter. The water then passes through an activated carbon bed for removal of volatile organic carbon (VOC). While the available data on these 81 CERCLA sites mentions disposal of organic wastes for some but not all of the sites, the activated carbon bed is considered part of the system for radionuclide removal, particularly cobalt-60.

Second stage treatment involves the use of ion-exchange resins specifically selected for removal of cesium and strontium. These units are also trailer mounted and can include additional mixed bed units should they be required for additional chemical or radionuclide removal.

The clean water will be acceptable for unrestricted release, although it is expected that it will be reused as part of the groundwater flushing process. Finally, it is assumed that the generated solids (i.e., sludges), consisting of spent carbon and depleted resins, will be solidified prior to disposal.

A.4.2.3 Advantages and Disadvantages

The advantages of this technique are that it is highly flexible in operation and design, suitable for treatment of a wide range of organics and heavy metals, tolerant of some fluctuations in concentration and flow, and relatively inexpensive. The disadvantages are that it is intolerant of high suspended solid levels; unsuitable for removal of low molecular weight organics and highly soluble, highly ionized organics; limited in practice to wastes with less than 10,000 ppm organics; and requires pretreatment for oil and grease removal where concentrations are greater than ten ppm. Spent resin has the potential for containing high concentrations of contaminants and therefore requires costly pretreatment prior to disposal.

A.4.2.4 Remedial Action Schedule

The remedial action schedule, which consists of setting up and operating a groundwater pumping and treatment system, is the same as that for soil flushing. Thus, 18 days will be required for every two million gallons of groundwater treated, based on an estimated treatment throughput of 80 gallons per minute (gpm), 24 hours per day.

A.4.2.5 Resource Requirements

It is estimated that four crews to two persons each, including a crew supervisor and seven skilled laborers, are required to operate the two mobile wastewater treatment units. The skilled laborers include health and safety technicians.

Equipment includes one chemical treatment trailer and another trailer for radionudide treatment. Materials include chemicals, activated carbon, and sand filter for the chemical wastewater treatment unit and resins for the radionuclide treatment unit. Additionally, safety equipment is required for all workers assigned to the unit.

A.4.2.6 Costs

Waste Water System

The capital costs of the first stage trailer is $500,000 and has been assumed to be spread over five years. Chemical costs are estimated at $120/day. Safety equipment costs $25/day/man for protective clothing such as gloves and may run higher during hot weather, as high as $100/day/man if respirators are needed. The 28,000 pound carbon bed is replaced twice each year at a current cost of $0.90/pound.

It is expected that the equipment will be operated around the clock using four crews of two men each for a total of eight men. One of these will be a supervisor. It is expected that this crew would also operate the radionuclide removal system.

Radionuclide Removal System

The capital cost of this equipment, trailer mounted, is estimated at $100,000, also with a five year design life. The only other costs associated with this operation are for the resins and the processing of these resins into a form suitable for disposal. For the purpose of this analysis it is assumed that these waste products will be solidified.

The resins will be nuclear grade cation resins specifically designed for selectively removing only cesium and strontium at a cost of approximately $1,000/ft^3. Current commercial solidification systems for mobile processing cost between $50 and $70/ft^3. This analysis uses a value of $50/ft^3.

The analysis of resin usage is based on the removal of 21,000 curies of strontium and cesium from a column of water roughly equal to the quantity of liquid disposed of in these sites. It is further assumed that the maxium cesium loading on the resin will be 0.5 uCi/cc which will result in a maximum contact dose rate onthe demineralizer of 200 mR/hour.

Cost Summary

As shown in Table A.4.2, the combined cost of the chemical treatment system and the radionuclide removal system, results in a total cost of $29/1,000 gallons or $12/cubic yard of soil flushed.

TABLE A.4.2 WASTEWATER TREATMENT COSTS

	Hourly Rate ($/hr)	Annual Cost ($/yr)
Labor		
1 Supervisor	44	91,520
7 Skilled Laborers	25	364,000
	Subtotal	$ 455,520
Equipment		
1 Chemical Treatment Trailer, $500,000		100,000
1 Radionuclide Treatment Trailer, $100,000		20,000
	Subtotal	$ 120,000
Materials and Safety		
Chemicals (for Chemical Treatment Trailer) ($120/day)		44,000
Carbon replacement ($28,000 lb @ $.90/lb, twice/yr)		50,000
Sand replacement ($1,000/bed, once/yr)		1,000
Resin (150 ft^3/yr x $1,000/$ft^3$)		150,000
Polishing Resins (600 ft^3/yr x $100/$ft^3$)		60,000
Health and Safety ($25/day/man, 8 men)		73,000
	Subtotal	$ 378,000
Other Support Activities		
Waste Treatment & Disposal		
Sludge from clarifer (3,650 ft^3/yr)		
Sand (100 ft^3/yr)		
Carbon (400 ft^3/yr)		
Resins 750 ft^3/yr		
Processing Cost (4,900 ft^3/yr @ $50/$ft^3$)		245,000
Disposal (4,900 ft^3/yr @ $8/$ft^3$)		39,200
	Subtotal	$ 284,200
	Total Cost	$1,238,000

System Throughput @ 80 gpm = 4.2×10^7 gal/yr
Unit Cost = $29/1000 gal, or $12/$yd^3$

A.4.3 References

Annamalai, V., et al. 1980. Operating Experience in the Recovery of Uranium at the Pawnee and Zamzou Sites. SPE paper 9507, Dallas, Texas.

Burger, J.R. 1981. El Mesquite In-Situ Leach Plant is Mobil's First. E&M I, January 1981, page 54.

Charley, W.R. 1979. Economic Considerations of Solution Mining. Paper presented at Uranium Resource/Technology Seminar II, Colorado School of Mines, Golden, Colorado.

Coleman, K.A., et al. 1980. New Mexico's First Unanium In-Situ Solution Extraction Project. SPE paper 9489, Dallas, Texas.

Davidson, D.H. 1985. In-Situ Leaching of Nonferrous Metals. Mining Congress Journal, July 1985, pp. 52-54, 57.

Envirosphere Company. Systems to Accelerate In-Situ the Stabilization of Waste Piles. Prepared for USEPA-HWERL by Envirosphere Company, New York, New York.

Riding, J.R., et al. 1979. Groundwater Restoration for In-Situ Solution Mining of Uranium. Preprint 79-127, Society of Mining Engineers of AIME Meeting, New Orleans, LA.

U.S. Environmental Protection Agency. 1985. Remedial Action at Waste Disposal Sites, Handbook. EPA/625/6-85/006.

Utah Water Research Laboratory. In-Place Treatment Techniques for Contaminated Surface Soils. Prepared for USEPA-HWERL by Utah Water Research Laboratory, Logan, Utah, and Arthur D. Little, Incorporated, Cambridge, Mass.

Wetzel, R.S. 1985. Demonstration of In-Situ Biological Degradation of Contaminated Groundwater and Soils. 6th National Conference on Management of Uncontrolled Hazardous Waste Sites, Washington, D.C.

A.5 EXCAVATION, TREATMENT, AND DISPOSAL OF CONTAMINATED SOIL

A.5.1 General Description

One of the recommended remediation techniques for hazardous waste sites is excavation of waste materials, which includes removal of the contaminated soil, waste containers, and waste; treatment to immobilize the hazardous components of the waste, and disposal of the treated waste in an approved disposal site. Excavation, removal, and hauling of the waste to the disposal site is usually accomplished with conventional heavy construction equipment.

A.5.2 Design and Construction

This section describes conventional equipment and methods for the excavation, removal, treatment, and disposal of contaminated soil, sludge, and other solid waste material.

Because of the nature of this action, in which contaminated soil is to be exposed to the elements, it has been determined that an enclosure will be required for the excavation area. The scenario developed for this remediation technology is based on a prefabricated steel building on a concrete foundation. The building is equipped with an "airlock" type entrance large enough for construction equipment to enter. The building is not necessarily airtight, but will be under negative pressure at all times to prevent leakage of contamination. This negative pressure is maintained by an air ventilation system that exhausts through a filter system, typically a particulate filter and activated carbon filter. The air would be continuously monitored for radioactivity. A seperate "clean-room" or other small structure would be located inside the cover structure to provide for office space, a change area, lunch room, and rest room facilities.

There is a wide range of heavy construction equipment that can be used for digging and loading. This includes a trencher, dragline, belt loader, wheel bucket excavator, backhoe, dozer and loader, and crane. However, not all of this equipment is applicable for excavation at a hazardous waste site (USEPA, 1985). While conventional equipment may not be appropriate in these cases, conventional equipment costs and capacities were used in this

analysis. The error introduced in the unit cost is minimal since equipment costs are a small fraction of the total cost.

Excavation was assumed to be performed by a backhoe with a boom or dipper stick, with a hoe dipper attached to the outer end. The unit is usually a crawler-mounted, hydraulically operated vehicle. The maximun reach of the boom ranges from 35 to 70 feet. Theoritical production rate for a backhoe is from 360 cubic yard (yd^3)/day for a 1 yd^3 bucket to 1200 yd^3/day for a 3.5 yd^3 bucket (Godfrey, 1984).

Dozers and loaders are usually fitted with a hydraulic controlled blade and bucket lift, and can be either crawler-mounted or equipped with rubber tires. Crawler dozers equipped with blades have tremendous earth-moving power and are excellent graders. The dozers are usually used in combination with other excavators such as backhoes. Front-end loaders are tractors equipped with buckets for digging, lifting, hauling, and dumping materials. They can carry materials as far as 300 feet from the digging area (USEPA, 1985). Depending on the type of bucket capacity, crawler loaders can theoritically produce from about 500 to more than 1200 yd^3/day (Godfrey, 1984).

Due to the inherently hazardous nature of the material, manual handling is not desirable. For this reason is has been assumed that excavated waste material will be loaded into a hopper arrangement and meter-fed into standard 55 gallon drums. These drums will be capped, checked for external contamination, and transferred by roller conveyor to the truck loading station located outside the cover structure. Excavated and drummed waste materials must be transported either to an onsite treatment facility or directly to the approved disposal site.

In either case the filled drums will be loaded onto flatbed tractor trailers using standard forklifts equipped with four-drum grapples. Each truck will be capable of carrying approximately 60 drums weighing approximately 25 tons. Payloads greater than this would require an extensive road construction program which is not considered warranted.

Contaminated soil excavated from the site can be disposed of directly at an engineered and permitted disposal site if the contamination level is

within the disposal limitation currently promulgated under RCRA regulation. However, if the waste concentration does not meet the RCRA requirement, the excavated contaminated soil should be treated prior to final disposal. Treatment techniques for contaminated soil include thermal destruction, solidification, and chemical treatment. Among these treatment techniques, thermal destruction is probably the most costly process for removing contaminants from the soil.

Thermal destruction is a treatment technique that uses high temperature oxidation under controlled conditions to break down the waste into basic constituents such as CO_2, H_2O vapor, SO_2, NO_x, HCl, gases, and ash. Waste products such as noxious gases generated by this technology should be controlled using air pollution equipment to prevent the release of undesirable chemicals into the environment (Kaiser Engineers, 1987). At present, there are more than 20 different thermal destruction technologies that appear suitable for hazardous waste treatment. However, only rotary kilns and hearth incenerators are proven technologies that have been commercially and industrially used to treat hazardous and toxic wastes (SAIC, 1987).

Solidification of contaminated soil can be achieved by direct mixing of the soil with a solidification agent such as cement, silicates, or thermoplastics to form a monolithic block of waste with high structural integrity. The contaminants may not interact chemically with the solidifier but are mechanically locked within the solidified matrix. The effectiveness of this method is rather short-term, since the waste could be leached out of the matrix over a long period of time due to the porous nature of cement and grout.

Vitrification is also considered as a solidification technology. In this case, the waste is combined with molten glass at a temperature of 1,350^{o}C or higher. With this technique, the waste is either stable or totally destroyed during the processing. An in-situ vitrification technique is discussed in Appendix A.3.

Chemical treatment of contaminated soil consists of applying chemicals to the soil to mobilize the contaminants for extraction. Soil flushing with

surfactants, dilute acids and bases, and water are used to mobilize the contaminants for extraction. This technique is discussed in Section A.4.

Excavated contaminated soil meeting the disposal limitation under RCRA regulation, and treated soil are assumed to be disposed of onsite, since it is envisioned that the amount of excavated waste materials would be too enormous to be disposed of offsite. Therefore, it is assumed that an onsite RCRA-permitted, engineered disposal site will be established to handle the disposal of the excavated soil.

A.5.3 Advantages and Disadvantages

Excavation, packaging, removal, treatment and disposal of contaminated soil are functions performed extensively in hazardous waste site remediation. There are no definite limitations on the types of waste that can be remediated by this technique. However, worker health and safety needs to be considered during the selection of this technique for removing explosive, reactive, highly toxic and radioactive waste materials.

Excavation is applicable for all types of waste sites and conditions, although it may become cost-prohibitive at great depths or in complex geologic formations. Also, due to the potentially great health and safety risks faced by workers, this technique may not be applicable for highly reactive waste sites such as underground tank farms that may still contain highly radioactive residues. In this case, other alternatives such as in-situ treatment technologies should be considered for remediation.

A.5.4 Remedial Action Schedule

Site activities begin with site clearing and laying of the cover building foundation footings. The length of time required for these activities is dependent on the size of the site, but is assumed to require 30 days, with an additional 30 days of curing before erection of the building can start. The erection of the building is also based on building size and is estimated to take one working day per 1000 ft^2 area. For most of the sites, this will require from several weeks to a few months.

During this period, all of the drum handling equipment and other support services can be installed. Once the building is erected, the excavation will proceed at a rate of 630 yd^3/day. Once excavation of the site is completed, backfilling, using uncontaminated native soils, will begin. Initially, approximately five feet of soil will be backfilled over the base of the excavation pit to cover any contaminated soils that were not excavated. Once this is done, the cover structure will be decontaminated and disassembled. Backfilling will continue until the site has been filled to the original grade.

A.5.5 Resource Requirements

Erection of the cover structure will require conventional excavation equipment, but not to depths which could result in exhumation of the disposed waste, i.e., two to three feet for foundation footers. With the building finished, a single backhoe (or front end loader) will be used to dig soil and transfer it to the drum loading equipment. Powered drum conveyors transport the filled, clean drums outside to a loading dock where as many as seven forklifts move the drums onto flatbed trailers. Seven forklifts are needed based on a production rate of 630 cubic yards of soil per day. Each drum can hold seven cubic feet. Therefore, 2430 drums are needed daily, or approximately five drums per minute must be loaded onto a trailer. Each forklift can be equipped to pick up four drums at a time. If each forklift takes five to six minutes to pick up, move, and set down four drums and return to the pickup point, approximately six to seven forklifts are needed.

At the drum loading rates identified above, it will take approximately 30 minutes to load a truck and 30 minutes to unload it. If the travel time to the disposal site is also 30 minutes, a complete round trip will take two hours. In this event, each truck can transport 240 drums per day, for a total of ten trucks required per site. Backfilling of the excavated pit will proceed at 630 yd^3/day.

A.5.6 Costs

The costs associated with the excavation of a site have been broken down into five categories: labor, equipment (leased or rented), materials

and safety, capital equipment, and disposal. A sixth cost associated with the thermal destruction via rotary kiln incinerator is also listed.

Labor costs include a site superintendent; one labor foreman; six laborers associated with the drum filling, loading and decontamination; and a clerk to keep records on the progress of work, time sheets, and drum marking. A radiation site manager is also required, as are three radiation safety technicians, one working at the excavation area providing continuous monitoring, and two working on the drum decontamination and marking/labeling efforts. Hourly labor rates are shown in Table A.5.1.

Rental rates for a backhoe, seven forklifts, and ten tractor trailers (including operators), in addition to a detailed breakdown of the various equipment that must be purchased to perform the excavation work are provided in Table A.5.1. The total cost of the building, utilities, and ancillary equipment is only four percent of the total cost. Therefore, while some costs are based on field experience with similar equipment, the error associated with any single cost element is small.

The only regularly consumed material will be drums at a cost of $21/drum. Health and safety, including such items as gloves, and protective clothing, respirators for workers exposed to dust, will cost $100 per day per man.

Disposal costs are based on a drum capacity of seven cubic feet, but a burial cost based on 7.5 ft^3 of volume. The cost of thermal destruction is based on currently available information. For rotary kiln incinerators this cost is approximately $200/ton. Using a soil density of 120 $\#/ft^3$, this cost becomes $324/$yd^3$.

TABLE A.5.1 EXCAVATION & DISPOSAL COSTS

	Hourly Rate ($/hr)	Annual Cost ($/yr)
Labor[1]		
1 Site Superintendent	58	$ 121,000
1 Shift Foreman	44	91,520
6 Laborers (drum loading, filling)[2]	20	249,600
3 Radiation Safety Technicians	28	174,720
1 Clerical/Records Manager	26	54,080
1 Radiation Site Manager (labor associated with equipment operation is included with equipment costs)	48	99,840
	Subtotal	$ 790,760
Equipment		
1 Backhoe w/operator ($249/yd^3)[2] 630 yd^3/day x 260 days/yr.		407,862
10 Tractor Trailers-Flatbed w/driver ($350/day)[3] 60 drums/trip, 4 trips/day		1,277,500
7 Forklifts w/operators ($185/day/each)[4]		472,675
8 Dump trucks w/operators ($490/yd^3)		803,000
2 Dozers w/operators and compacters ($2.75/yd^3)		450,500
	Subtotal	$ 3,412,000
Capital Equipment		
Cover Structure (400 x 400)[4] (+ 20% for utilities)		1,872,000
Cover Structure Foundation		19,200
Soil Dumping & Drum Filling Equipment[3]		100,000
Drum Conveyors[3]		50,000
Positive Ventilation System with Filters and Monitoring System 4 required @ 3000 cfm		180,000
Local Air Sampling System		5,000
Structure Air Lock (Personnel & Equipment) not airtight		20,000
Clean Room (lunch/charge/HP)[2]		77,000
Cover Structure Decontamination and Disassembly		1,800,000
	Subtotal	4,123,000

TABLE A.5.1 EXCAVATION & DISPOSAL COSTS (CONTINUED)

	Hourly Rate ($/hr)	Annual Cost ($/yr)
Materials and Safety		
Drums - 632,000/yr (Steel 55 gal DOT 7-H)(3)		13,267,800
Health & Safety (12 people x $100/day x 260 d/yr) (forklift operator and truck driver not included)		312,000
	Subtotal	$13,580,000
Other Support Activities		
Disposal		
632,000 drums/yr x 7.5 ft^3/drum x $8/$ft^3$		37,920,000
Treatment		
$\$200/\text{ton} \times \frac{1\text{ ton}}{2000\text{ lb}} \times \frac{120\text{ lb}}{ft^3} \times \frac{27\text{ ft}^3}{yd^3} = \$324/cy^3$ (by incineration)		
	Total Cost	$56,772,000

Summary

630 yd^3/day x 260 day/yr = 163,800 yd^3/yr

	$/yr	$/$yd^3$	w/o Treatment	w/ Treatment
Labor	1,111,000	7	2%	1%
Equipment	3,412,000	13	4%	2%
Materials & Safety	13,580,000	83	24%	12%
Capital Equipment	4,123,000	12	3%	2%
Disposal	37,920,000	231	67%	35%
Treatment (if required)		324	—	48%
Total w/o Treatment		365	100%	
Total w/Treatment		689		100%

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(1) Kaiser Labor Rates (except as noted)
(2) Dodge 1987
(3) Field Experience
(4) Means 1985

A.5.7 References

Godfrey, R. (ed.) 1984. Building Construction Cost Data. Robert Snow Means Co., Inc., Kingston, ME.

Engineering News-Record. 1987. ENR Market Trends.

Kaiser Engineers Hanford Company. 1987. Kaiser Engineers Hanford Company, FY87 Revised Liquidation Rates Effective. [Business Sensitive Document].

Science Applications International Corporation. 1987. Draft Final Report Energy Recovery From Hazardous Waste Incineration. Oak Ridge, TN.

U.S. Environmental Protection Agency (U.S. EPA). 1985. Handbook for Remedial Action at Waste Disposal Sites (Revised). EPA/625/6-85/006.

U.S. Environmental Protection Agency (U.S. EPA). 1984. Remedial Response at Hazardous Waste Sites - Summary Report. EPA-540/2-84-002a.

A.6 IN-PLACE DECONTAMINATION

A.6.1 General Description

This technique refers to the decontamination of structures containing waste material such as above-ground tanks, vaults, and waste containers. In-place decontamination consists of removing residues from the structure, rinsing it with an appropriate solution, and, if necessary, filling it with inert material such as sand, clean soil, or cement.

A.6.2 Design and Construction

This technique does not require complex or state-of-the-art equipment; the requirement is to remove residual contamination and rinse the structure with an appropriate cleaning solution so as to remove all hazardous constituents.

Typically, the residue remaining in the structure will be in the form of a sludge or layer of crystallized salts. In either case, it will be necessary to liquefy the residues prior to removing them, as a liquid is easier to remove than a solid. The removal process consists of pumping the liquefied material out of the container; if it is equipped with a bottom outlet, gravity discharge can be used instead.

After the residue has been removed, a rinsing solution is injected into the unit for cleanup purposes. According to RCRA regulations, it is recommended that three rinsings be used for this type of decontamination technique. Selection of the rinsing solution depends on the chemical characteristics of the waste residues. For example, if the tank is known to contain oil heel, it is suggested that a petroleum-based solvent first be used to liquefy the sludge, followed by a detergent solution for rinsing.

Once the liquefied residue is removed from the unit, proper treatment and disposal of the waste is required. In most cases, the waste will either be chemically neutralized or stabilized in some sort of waste-solidifier matrix. The cost for these treatment techniques is presented in USEPA, 1985. The rinsing solution also requires treatment and proper disposal. In

addition, it will be necessary to sample the third (final) rinsing solution to ensure that no hazardous contaminants remain.

Following cleanup of the structure, it can either be left as is, refilled with inert material such as sand or cement, or used for another purpose. Since it is assumed that this technique ensures decontamination, no further action is required.

A.6.3 Advantages and Disadvantages

The advantages of this technique are that it is easy to perform and relatively inexpensive, does not require special equipment and material, and the decontaminated structure can be reused for other purposes.

Disadvantages include requirements for treatment and disposal of the residual waste and rinsing solution. Also, it is not applicable for structures that have leaks or residues that cannot be readily dissolved and removed from the unit. Additionally, if the waste is highly reactive and/or radioactive, a potential occupational health hazard could be a limiting factor. In these cases, other remediation techniques such as in-situ vitrification are more appropriate.

A.6.4 Remedial Action Schedule

For the purpose of estimating the manpower requirements and work schedule for this technique, it is assumed that a 50,000 gallon tank, 15 feet high by 24 feet in diameter, containing about 500 gallons of diesel oil heel is recommended for cleanup. It is also assumed that the tank is equipped with a six-inch diameter bottom outlet capable of discharging approximately 250 gallons per minute.

First, it is assumed that 1,000 gallons of solvent will be mixed with the oil heel in order to liquefy it. The liquefaction phase requires about two days for a complete reaction. During this time, the detergent solution is also prepared for the rinsing phase. When it is determined that the contents of the unit are ready for removal, the bottom outlet is hooked up to a waste storage unit. It is estimated that the discharge of 1,500 gallons of waste will take about six minutes. With a pump capable of

delivering 250 gallons per minute, each rinsing will require approximately 200 minutes. It is assumed that the solution will remain in the tank for one hour prior to discharge. The full tank discharge will require an average of about 200 minutes. Thus, for each rinsing, it is estimated that a total of 460 minutes, or approximately eight hours, is required. Assuming that other activities such as refilling tank trucks and setting up equipment will take an additional two hours per rinsing, a sum total of ten hours is estimated for each rinsing of the tank. Thus, an estimated six days will be required to complete the cleanup of the tank.

Second, it is assumed that the tank is left as is after it has been cleaned up, and that treatment of the waste residue and rinsing solution takes place afterward. Using a mobile wastewater treatment facility with a throughput of 80 gallons per minute (gpm), the wastewater treatment requires about 31 hours. Treatment of waste residue is estimated at three hours, or ten percent of the time required for wastewater treatment. Therefore, the total amount of time required for treatment of waste residue and rinsing water is estimated at about four days.

At the third rinsing of the waste unit, three samples of discharge will be collected and analyzed for cleanup confirmation. The sampling and analysis will take about six weeks, with one additional day for an evaluation of the results. Thus, the total amount of time required to clean up the above tank is estimated at eight weeks.

A.6.5 Resource Requirements

The manpower requirement is estimated for different phases of the cleanup operation. For the waste liquefaction phase, it is estimated that about four hours will be required to perform the operation requiring a tank truck operator, a health safety officer, and a field engineer. During the rinsing phase, it is estimated that the operation will take approximately four days, with a crew of two tank truck operators, a health safety officer, and a field engineer. For the waste residue and wastewater treatment phase, it is estimated that a crew of two operators and one health safety technician will be able to perform the operation in four days. For the confirmation sampling phase, it is estimated that one engineer will require

one day to evaluate the sampling analysis results. Table A.6.1 shows a summary of the manpower requirement estimated for this remediation technique. Based on the total waste unit volume of 50,000 gallons or 250 cubic yards (yd^3), the estimated unit manpower is calculated at 4.9 man-hours/1,000 gallons or about 1.0 man-hours/yd^3.

A.6.6 Costs

A summary of the costs to clean up the above unit is described in Table A.6.1. The unit cost is approximately $1.10/gallon or $210/$yd^3$of waste unit volume.

TABLE A.6.1 IN-PLACE DECONTAMINATION COSTS

	Hourly Rate ($/hr)	Annual Cost ($/yr)
Labor		
Waste Liquefaction Phase		
1 Tank Truck Operator	25(1)	100
1 Health Safety Officer	48(2)	192
1 Field Engineer	44(2)	176
Waste Unit Rinsing Phase		
2 Tank Truck Operators	25(1)	1,600
1 Health Safety Officer	48(2)	1,536
1 Field Engineer	44(2)	1,408
Waste Treatment Phase		
2 Operators*		
1 Health Safety Technician*		
Confirmation Sampling Phase		
1 Engineer	58(2)	464
	Subtotal	$5,476
Equipment		
Waste Liquefaction Phase		
1 Tank Truck ($360/day)(1)		360
Waste Unit Rinsing Phase		
2 Tank Trucks ($360/day)(1)		2,880
	Subtotal	$3,240
Materials and Safety		
Waste Liquefaction Phase		
Solvent (1,000 gal, $1/gal)		1,000
Waste Unit Rinsing Phase		
Mixed Detergent Solution (150,000 gal, $0.05/gal)		7,500
	Subtotal	$8,500

TABLE A.6.1 IN-PLACE DECONTAMINATION COSTS (continued)

	Hourly Rate ($/hr)	Annual Cost ($/yr)
Other Support Activities		
Waste Treatment**		
Wastewater Treatment (150,000 gal, $29/1,000 gal)		4,350
Waste Residue Treatment (Drum and Disposal) (1,500 gal or 7.5 yd^3, $1,350/$yd^3$)		10,125
Configuration Sampling Phase		
Sampling Cost (3 samples, $7,000/sample)		21,000
	Subtotal	$35,475
	Total	$52,700

Estimated Volume of Waste Unit	50,000 gal. or ≃ 250 yd^3
Unit Cost	$1.10/gal. or $210/$yd^3$
Estimated Unit Manpower	4.9 man-hours/1,000 gal. or 1.0 man-hours/yd^3

(1) Godfrey, updated using ENR Market Trends
(2) Kaiser
* Labor cost included in unit cost for Waste Treatment/Other
** Unit cost includes labor, equipment, and material

A.7.7 References

ENR Market Trends. 1987. Engineering News-Record.

Godfrey, R. (ed) 1984. Building Construction Cost Data. Robert Snow Means Co., Inc., Kingston, ME.

Kaiser Engineers Hanford Company. 1987. Kaiser Engineers Hanford Company FY87 Revised Liquidation Rates Effective June 15, 1987. [Business Sensitive Document]

U.S. Environmental Protection Agency (U.S. EPA). 1985. Handbook for Remedial Action at Waste Disposal Sites (Revised). EPA/625/6-85/006.