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REDUCTION OF RADIATION AREA PROJECT PLAN

Rockwell Hanford Operations Staff

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MASTER

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1. INTRODUCTION

BACKGROUND

Rockwell Hanford Operations (Rockwell) is responsible for identifying and controlling radiation areas resulting from past and current operations within the 200 Areas and certain designated sites in the 600 Area on the Hanford Site. This control is exercised to prevent the spread of radioactive contamination, minimize the exposure of employees to as low as technically and economically practical (ALATEP), and prevent radiation exposure to the general population.

This plan describes the programmatic approach being taken by Rockwell to reduce outdoor radiation areas. The plan supersedes the Radiation Area Reduction Activity Plan issued January 31, 1979. This is an integrated plan for radiation area reduction, and as such, includes several program areas. The 482 facilities included in this radiation area reduction project are listed in the Appendix.

NEED

Efforts have always been undertaken within and adjacent to the 200 Areas to control and minimize contamination in outdoor radiation areas. As current waste management programs achieve or approach completion of major milestones (e.g., single-shell tank deactivation, liquid evaporation, etc.), increased emphasis is being placed on reduction or elimination of outdoor radiation areas. This increased emphasis has taken the form of cleanup of old radioactive spills, stabilization of old waste disposal sites, and increased radiological surveys. All radiation area reduction efforts identified as part of this plan are being categorized and characterized so that those areas presenting the greatest potential risk are handled first. Any contamination area deemed an immediate safety or environmental concern is handled immediately. Also, a "clean operation" philosophy is being put into place throughout the area. Containment enclosures are used to reduce contamination spread from tank farm operations, as an example.

The overall radiation area reduction efforts will continue for several years. The near-term efforts during the next 6 months, which are delineated in this document, will concentrate on the following:

1. Immediate cleanup or stabilization of any contamination spreads impacting safety or environment.
2. Surveying and posting of radiation areas.
3. Initiate contamination cleanup and surface stabilization within the burial grounds.
4. Removal of the contaminated dirt berm along the laundry ditch.
5. Development of a cooling water pond management plan.
6. Investigation of possible approaches for reduction or elimination of certain low-level liquid effluents (e.g., laundry).
7. Preparation of plans to identify the specific technical approach for each site to be cleaned or stabilized.

The Rockwell Radiation Area Reduction Plan integrates under one focal point all program activities related to radiation area reduction and contamination cleanup. Specific actions planned for the next 6 months are discussed in Section 4.

2. SUMMARY

This plan deals with the overall reduction of outdoor surface radiation areas under Rockwell's jurisdiction. Four basic alternatives are identified which will reduce and/or stabilize radiation areas until long-term disposal decisions are made. The four alternatives are: (1) continued routine surveillance and maintenance, (2) reduction or elimination of effluent discharges, (3) improved site stabilization, and (4) site removal. The four major transport mechanisms at Hanford that are the primary forces for contamination spread are identified as wind, animal transport, concentration and dispersal by plants, and transport resulting from human activities. These are discussed in terms of overall radiation area reduction.

Past radiation area reduction accomplishments in and adjacent to the 200 Areas are described and the current conditions related to contamination within the 200 Areas are discussed.

The technical approach to the overall project is covered in Section 4 and includes discussions on criteria and standards, prioritization of tasks, the general approach to the problem solution, and a description of the specific action plans. Within the Criteria and Standards section, a discussion of interim surface soil contamination limits is presented. The priorities for field operations will be established based on personnel, occupational, and environmental safety requirements supplemented by recognized practical constraints. The priority list will be periodically reevaluated and updated as new data become available and conditions change.

The generic approach to the project resulted in identification of five operational activities and one technical support activity. The field operations are grouped according to the general solution required to reduce the respective radiation areas. The five groups are reduction of dry surface areas, reduction of wet surface areas, reduction of tank

farm areas, reduction of BC Cribs and associated areas, and reduction of waste storage areas. There is a sixth activity identified as technical support which includes engineering, planning, and survey efforts.

A schedule is presented covering the specific near-term actions for the next 6 months, and the general efforts through 1984.

A brief section on resource planning is included, and the section on Management and Control describes the overall management of the project, the Rockwell internal functional responsibilities, and the administrative controls that will be used.

3. SCOPE

GENERAL

This plan deals with the overall reduction of outdoor surface radiation areas under Rockwell's jurisdiction. Various efforts over the years have been carried out to control and reduce radiation areas. In an attempt to accelerate and upgrade these efforts, Rockwell has focused the radiation area reduction efforts of several program areas into a single project plan and conducts a continuing overall review of radiological conditions in the 200 Areas. Past occurrence reports were compiled and reviewed. Expanded radiological surveys were initiated. To date, as a result of these activities, approximately 200 acres have been surveyed. Areas requiring corrective action were identified and action initiated. Stabilization and cleanup of some facilities resulted in reducing radiation areas as described below. This project concentrates on elimination of outdoor surface contamination, reduction of contamination sources from effluents, stabilization and isolation of buried radioactive material, and limited removal of radionuclides.

PAST RADIATION AREA REDUCTION ACTIVITIES

As early as 1954, efforts were underway to reduce surface radiation and contamination by the backfilling of the 216-S-17 Pond. This 17-acre pond currently has 11 acres free of surface contamination, while the other 6 acres have spotty contaminated vegetation. From 1970 through 1975, site records indicate a concerted effort toward reduction of surface radiation areas. Four trenches were exhumed (216-T-9-9, 216-T-9-10, 216-T-9-11, and 216-S-18), as was one crib (216-S-18) and one low-level scrap burial site (218-E-3). Additionally, one trench was released from radiation area status following radionuclide decay (216-S-14).

The ponds that were decontaminated during the first half of the 1970's included the 216-S-16 Pond, which had the contaminated surface

area reduced from 31 to 13 acres; the 216-T-4-1 Pond, which had the contaminated bottom excavated into a trench dug in the pond bottom and covered with clean fill to release 16 acres from surface contamination; and the 216-S-11 Pond, which was covered with clean fill to release the total 1.5 acres of surface area.

Four ditches (216-B-2-1, 216-B-2-2, 216-B-3-1, and 216-B-3-2) were associated with radiation area reduction in the early 1970's. Each was graded into the center, leveled, had plastic sheeting added for a biobarrier, and had clean fill added. In the areas where the plastic was added, no contaminated vegetation has reappeared.

Two dry waste burial grounds (218-E-1 and 218-W-4-A) were decontaminated on the surface, covered, and released from surface radiation status. The first was covered with power plant cinders to fill depressions and sterilize the soil, and was then covered with gravel to prevent weather erosion. The second site had a plastic biobarrier installed over the 50- by 50-foot surface area, and then covered with clean soil and revegetated. Neither site has any surface contamination today.

There are also 25 unplanned release sites, both numbered and unnumbered, that were removed from radiation area status during the 1970 to 1975 time period. The sites included liquid and solid spills near roads, vehicle decontamination pits, and a burial ground near White Bluffs. All of these sites provide excellent data on the durability of the various surface stabilization techniques. They will be investigated and the relative conditions factored into current approaches for site stabilization.

During FY 1978, initial progress toward programmatically planned reduction of radiation areas was accomplished utilizing funding provided by the Environmental Control Technology (ECT) division of the Department of Energy (DOE). The surface of eight cribs in the 200 East Area associated with B Plant (216-B-43 through -50) was decontaminated and stabilized. As with previous sites, contaminated vegetation and surface soil was removed; a herbicide was spread; a layer of sand, followed by

polyethylene sheet and a second layer of sand, was applied; about 24 inches of clean soil was added over the sand/polyethylene composite; and finally, the surface was revegetated with cheatgrass. This effort resulted in a reduction in the posted radiation area from 3.6 acres to 1.7 acres, and a change in the posted status from SURFACE CONTAMINATION to BURIED RADIOACTIVE MATERIAL. In addition, no surface dose rate can be measured. See Figures 1 and 2 for "before" and "after" views of this crib area.

Three other areas were also cleaned up in FY 1978. The Suzie railroad siding (Figure 3) and the Riverland siding had unplanned releases that were cleaned up. The Suzie siding is located about 2 miles north of the 200 West Area and the Riverland siding is west of the 100 Areas, near the Vernita Bridge. Both sites were used for rail car decontamination. The sites were completely cleaned and the previously posted areas of about one-half acre each were released.

Radiation areas adjacent to the south and east banks of the 207-T Retention Basin were cleaned and released from radiation area status. About one-fourth acre (about half of the original posted area) was removed from posted status.

Progress to date in FY 1979 includes the surface cleanup and stabilization of the 23rd and Camden Street (Figures 4 and 5) unplanned release, UN-216-W-5. The site had about three-fourths acre of posted radiation area. The site was excavated to about 1-foot depth to remove contaminated soil. Since contamination levels were still in evidence below this depth, herbicide, sand, polyethylene, and sand composite were applied. About 6 inches of gravel was added to stabilize the surface and the site was posted as containing "Buried Radioactive Material". No surface contamination or measurable surface dose rate remained.

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FIGURE 1. 216-B-43 Through 216-B-50 Crit. Area Prior to Cleanup and Stabilization.

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FIGURE 2. 216-B-43 Through 216-B-50 Crib Area After Cleanup and Stabilization.

RCP7907-131

FIGURE 3. Suzie Railroad Siding Subsequent to Cleanup.

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FIGURE 4. Contaminated Dirt Removal at 23rd and Camden.

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FIGURE 5. 23rd and Camden Following Completion of Cleanup and Stabilization.

Also underway this year is the cleanup and stabilization of low-level waste burial grounds in the 200 Areas. A complete aerial photographic survey of the 200 Area burial grounds was made. The photos were compared to existing plot plans, and sketches were made of the access roads and trenches located in the 218-E-12A and 218-W-2A Burial Grounds. General procedures were prepared to initiate cleanup and stabilization of the burial grounds. Access roads have been identified, staked, stabilized, and ballasted with rock; the trenches have been load tested and depressions filled; grading and sand filling of the trenches has also begun. The next operation in the 218-E-12A Burial Ground will be to cover the trenches with clean sand, polyethylene, and more sand; cover with about 24 inches of clean soil; and revegetate. This burial ground will be completed during calendar year 1979.

Additional work this year includes ditch stabilization. The contaminated U-14 Ditch berm has been removed and buried from the laundry discharge outflow to 19th Street. Work is continuing from 16th Street to U Pond. To date approximately 1000 feet of berm have been removed and buried.

Other efforts continued that indirectly resulted in the reduction or prevention of new radiation areas. An example of a major task that prevented further spread of contamination was the repair of the Redox canyon roof. Twenty thousand square feet of roofing was repaired by the resaturation process. About 600 square feet of the original roof membrane was replaced due to damage. The remaining area was restored by the use of specially formulated solvents. A report was prepared documenting the results of this effort, for use by DOE and other contractors.

CURRENT CONDITIONS

Established radiation areas associated with past or present operational processes consist of tank farms, diversion boxes, cribs, ponds, ditches, trenches, french drains, reverse wells, burial grounds, retention basins, and pipelines. In addition, some unplanned radiological

releases occurred during past operations, which are also identified as radiation areas. These unplanned release areas have been identified for control purposes because of the presence of loose surface contamination, the presence of subsurface contamination, which is accessible to vegetation and burrowing animals, or because the inventory of radioactive material present creates an external radiation field. There are also other locations within the 200 Areas which are contaminated with detectable amounts of radioactivity that are outside the boundaries of identified operating sites. The general boundaries of these areas have been established from historical data, aerial surveys, and routine environmental surveys. This contamination has resulted from the transport of detectable amounts of radioactivity from established radiation areas and from unplanned release sites. Controlled movement of personnel and equipment into and out of posted radiation areas prevents spread of radioactive materials by that mechanism. However, detectable amounts of radioactive material are moved from the controlled areas by wind or biological transport modes.

Unplanned releases are treated as they occur by a suitable combination of decontamination, partial decontamination, and covering an area with clean soil. All previous unplanned releases were surveyed and were either concluded to be uncontaminated at that time or identified as a radiation area. The instruments used for surveying in the past were not as sensitive as present instruments; therefore, some residual contamination not previously detectable may be present. Also, the action of wind and biological transport may result in redistribution of radioactivity and the presence of surface contamination may exist in areas which previously were not clearly identified. Extensive surveys have been conducted of locations accessible to 200 Area personnel not associated with controlled field work, such as roads, areas surrounding facilities, and parking lots. These surveys have established that these areas are free from contamination and significant radiation fields.

Environmental monitoring programs are conducted both within the 200 Areas and beyond the boundaries of the areas. Within the 200 Areas, a gridwork of sites is systematically assayed for external radiation fields, radioactivity concentrations in soil and vegetation, and other evidence of biological transport. These data are used to control radionuclide transport by identifying areas requiring immediate cleanup or stabilization. In addition, a series of air monitoring stations are used to measure the concentration of airborne radioactive material and sample wells are used to monitor radioactivity concentrations in ground water.

Similar monitoring is performed at a network of sites outside the 200 Areas. Data from both the 200 Area and outside area monitoring programs indicate that no health hazard of consequence exists for the 200 Area employees, and that current operations within the 200 Areas have had no measurable effect on environmental conditions outside the Hanford Site.

TRANSPORT MECHANISMS

As stated previously, the transport of contamination within the 200 Areas has not resulted in any measurable effects to the environment off the Hanford Site. The incentive for radiation area reduction is to eliminate the potential hazard for exposure to 200 Area operating personnel and to reduce even further the already low probability for contamination exposure to the public. In order to control the contamination present in the 200 Areas, the mechanisms for transporting the radionuclides must be identified and understood.

A variety of mechanisms may transport radioactive material from existing radiation sources. This project is directed toward isolating or eliminating the sources of radioactivity which are susceptible to transport and also toward controlling the transport mechanism where possible until the sources are eliminated. The following are recognized as primary means of movement of radioactivity.

Wind

Where radioactive material in particulate form is present on or near the soil surface, erosion and subsequent transport by wind may occur. Strong winds may transport contamination beyond the established boundaries of a radiation area. Because of gravitation settling, transport over significant distances does not occur except for very small particles. Dustdevils, however, because of the higher internal velocities and the altitude reached by a rapidly upward-moving thermal, can lift heavier particles higher into the air, with very dilute fallout subsequently occurring downwind. No evidence exists as part of the environmental monitoring program which would indicate that significant quantities of radioactive materials are transported offsite by this mechanism.

Animal Transport

Native animals in the Hanford environment are a possible mechanism for the transport of radionuclides. Rodents, particularly mice, may obtain access to radioactive material in some waste-disposal and waste-handling sites. The mice may become contaminated externally, or even ingest material like salts. A variety of predators which prey on the rodents, and even the rodents themselves, continue the chain of dispersion by depositing subsequently contaminated urine and feces over a larger area. Birds have access to potentially contaminated mud and vegetation from ponds and ditches for use in building nests, or may even ingest the vegetation, thus spreading the radioactive material. This transport mechanism has been thoroughly studied by Battelle's Pacific Northwest Laboratory and does not represent a significant risk to Hanford personnel or the public.

Concentration and Dispersal by Plants

Outdoor waste-disposal sites and sites where underground leaks have occurred support the growth of some vegetation that have roots which can reach the radioactive material. Certain of these plants concentrate the specific nuclides in their cellular structure and are then subject to

transport by animals or wind. Most notable are tumbleweeds which have deep roots and selectively concentrate strontium and, to a lesser extent, cesium. The tumbleweeds, when dry, break off and are transported by wind. Although studies have shown that the rolling range of the tumbleweeds is short on the Hanford Site, elimination of this transport mechanism is desirable.

Transport Resulting from Human Activities

Personnel and vehicular traffic may account for some transport. Personnel and equipment surveys prior to exiting controlled contamination areas minimize the significance of this mechanism. Also, the use of containments during operations with contaminated equipment prevents the spread of loose contamination and the subsequent transport out of controlled areas.

Some evidence of each of these transport mechanisms has been found over the years within the 200 Areas. However, the monitoring programs used within the 200 Areas and outside of the 200 Areas have shown that: (1) within the 200 Areas, concentrations of radioactivity detected in the atmosphere continue to be a small fraction of the permissible concentrations for occupational workers; (2) external radiation levels outside of posted and controlled radiation areas are such that no employee could reasonably receive any exposure in excess of the permissible dose for an individual in the general populace; and (3) Hanford operations caused no distinguishable impact on concentrations of airborne radionuclides or on external radiation dose measured off the Hanford Site.

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4. TECHNICAL APPROACH

This section describes the technical approach to be utilized for activities within the scope of the radiation area reduction plan. The objective of the approach is to allow the radiation area reduction plan to be divided into manageable and controllable activities. There are four basic radiation area reduction alternatives available. These alternatives are:

- Continued Routine Site Surveillance and Maintenance
- Reduction or Elimination of Effluent Discharges
- Improved Site Stabilization
- Site Removal.

The Continued Routine Site Surveillance and Maintenance alternative stipulates that no facility modifications are required to satisfactorily maintain the site or to release it to an uncontrolled status. In this case, continued routine surveillance will be maintained to ensure that conditions affecting safety and environment do not change. The Reduction or Elimination of Effluent Discharges alternative may require the revision of current operating practices, improved effluent treatment, and upgraded monitoring devices for liquid, gaseous, and particulate discharges. The Improved Site Stabilization alternative will require facility improvements to reduce potential radionuclide transport or migration, but generally the contained radionuclide inventory will not be disturbed. The Site Removal alternative will require removal of all or a large portion of the radionuclide inventory from its current location to a more suitable storage or disposal location. Any contamination remaining after removal then would be stabilized.

After an appropriate technical approach has been selected for individual facilities, scheduling of corresponding radiation area reduction activities will be based on a priority listing agreed to by Health, Safety and Environment; Research and Engineering; Production Operations; Production Support; and the Program Office.

CRITERIA AND STANDARDS

Although radiation area cleanup has been performed in the past, there are no officially published local or national standards defining the extent to which surface soil is to be decontaminated before release from radiation area status. Work is progressing both locally and nationally to establish such standards; however, it is not expected that the task will be completed in time to be useful for the very early stages of this program. Soil decontamination criteria will be incorporated into the program planning and controls as they become available.

In the meantime, Rockwell is developing interim criteria to be used in posting areas and for releasing areas from radiation status following decontamination. These criteria will be based upon the potential for occupational radiation exposure to personnel. The surface soil contamination limits will be established with the objective of providing reasonable assurance that current radiation protection standards are not exceeded. Four basic items will be considered providing necessary personnel protection. These items and the recognized protection standards are:

- External Radiation Fields: The limits shall assure that no individual will receive in excess of 500 mrem per year from external radiation sources.
- Body Burdens of Radioactivity: The limits shall assure that no individual working or digging in a released area will ingest or inhale radioactivity that could result in 1/10 the maximum permissible body burdens specified in International Commission on Radiological Protection (ICRP) Report Number 2, Permissible Dose for Internal Radiation.
- Concentration of Radioactivity in Air: The limits shall assure that released areas do not produce airborne concentrations of radioactive materials in excess of the limits specified in DOE MC 0524, Annex A, Table II.

- Concentration of Radioactivity in Water: The limits shall assure that released areas do not result in surface water contamination in excess of the limits specified in DOE MC 0524, Annex A, Table II.

These four items of radiological control are based upon the generally accepted radiation protection standards applicable to the population at large.

It is the intent that all of the above standards will be met and that the surface soil contamination limits will be based on the most restrictive.

In developing the surface soil contamination limits, three types of contamination will be addressed: (1) contamination generally distributed through a volume of soil, (2) contamination uniformly distributed over the surface (less than 1 centimeter in thickness), and (3) individual particles of contamination distributed randomly over the surface. In deciding which type of contamination is predominant in a specific case and which standards apply, the basic intent of meeting the radiation protection requirements stated above will be considered.

For the purpose of establishing the contamination limits for the 200 Areas, the radionuclides assumed to be present in the soil are ^{90}Sr , ^{137}Cs , and ^{239}Pu . These are judged to be the major contributors and constitute the greatest hazard when ingested or inhaled.

PRIORITIZATION OF RADIATION AREA REDUCTION ACTIVITIES

The scheduling of radiation area reduction activities will be based on a priority list agreed to by Health, Safety and Environment; Research and Engineering; Production Operations; Production Support; and the Program Office. The inviolate requirements for personnel, occupational and environmental safety predominate the prioritization criteria. These safety requirements will, in turn, be supplemented by the recognized practical constraints of being unable to perform all currently identified projects immediately. The safety requirements and constraints form the criteria by which the priorities are established.

The radiological safety criteria are based on: first, assuring the safety of employees and the general public; second, reducing the potential for transport of radioactive material to the environment; and third, reducing radiation and contamination to ALATEP. The radiological status of the areas will be determined by scheduled radiation surveys. Other criteria which will be evaluated to establish the priority list include:

1. Utilization of available equipment, resources, and personnel.
2. Technology available to understand the long-term effects of the proposed stabilization efforts.
3. Interfaces with other programs.
4. Interfaces with ongoing soil stabilization projects and evaluations.
5. Seasonal weather considerations.

The list will be reevaluated periodically and updated as new data become available and conditions develop.

A continuing radiation survey program will provide current data for the priority list and also assure that areas which may create an immediate hazard to employees are identified and are properly controlled. If conditions which produce an immediate hazard are discovered during the surveys, prompt corrective actions will be taken. In addition, any new releases resulting from operations either within or outside an established area will be decontaminated promptly and methods established to eliminate any such future releases.

Multifunctional coordination meetings will be held to review progress, identify immediate response tasks and assign actions, and reevaluate the priority list in response to any new inputs. The meetings will be held by the Program Office and will be attended by Health, Safety and Environment; Production Operations; Production Support; Research and Engineering; and Quality Assurance.

GENERIC APPROACH

In order to ensure consistency in radiation area reduction operations and to minimize potential redundant engineering efforts, sites have been reviewed for common characteristics and requirements and are grouped into generic categories, or activities. Detailed planning will be performed at this level.

Each generic category will have a general stabilization approach and appropriate techniques developed. Individual sites within a generic category will be characterized to establish any unique properties and requirements. Specific actions for an individual site will be developed based on its requirements in a manner consistent with the generic approach and operational procedures developed as required. These categories are defined below:

Radiation Area Reduction Activities

<u>Activity Number</u>	<u>Description</u>
I.	Reduction of Dry Surface Areas
II.	Reduction of Wet Surface Areas
III.	Reduction of Tank Farm Areas
IV.	Reduction of BC Cribs and Control Zone
V.	Reduction of Storage Areas
VI.	Technical Support

Each generic category or activity pertains to groups of sites with similar physical conditions requiring similar treatments. The tank farms, BC Cribs and control zone, and storage areas are identified as separate, unique activities due to the extent or type of effort. Activity VI is the technical support which is applied to all of the first five activities.

1. Reduction of Dry Surface Areas (Activity I). This activity includes all low-level waste sites, other than active (wet) ponds and associated ditches; BC Cribs, wet trenches, and control zones; tank farms; and storage areas. The types of sites that are considered include

ial grounds, silo/caissons, dry trenches, cribs, ditches, french
ins, pits, retired (dry) ponds, dry retention basins, and unplanned
ease sites.

Generally, all of these sites exhibit some or all of the following
ditions: Dry surfaces, subsurface and/or surface contamination, plant
lioniucleide uptake, animal action, wind erosion, subsidence and human
ivities. Three of the four basic alternatives available for radiation
a reduction are applicable to dry surface areas. They are continued
rtine surveillance and maintenance, improved site stabilization and
e removal.

Below is a discussion of these alternatives as they apply to Reduc-
in of Dry Surface Areas.

- Continued Routine Surveillance and Maintenance - Dry Surface Areas

This action is required on all dry surface area sites prior to the execution of one of the other alternatives. This alternative, if selected, indicates that a particular site can be maintained within the release criteria.

- Improved Site Stabilization - Dry Surface Areas

Biobarriers. Biobarriers are defined as a subsurface layer of material placed in a contaminated site to reduce the migration of radionuclides from a subsurface zone of contamination to the surface. Biobarriers, depending on the type of material or technique used, are designed to provide an improved level of control over plant uptake, weather-caused migration, animal intrusion, and human activities.

- a. 10-mil polyethylene: The use of 10-mil polyethylene sheeting as a subsurface biobarrier material is directed at reducing root penetration into buried waste zones and eliminating vertical moisture movement. Placement of the

barrier is straightforward and consists of laying overlapping sheets on a clean sand bed. Care must be taken during backfilling, to avoid damage, as the material has relatively poor strength characteristics. This material is applicable to all subsurface waste sites. The installation also aids in surface revegetation by retaining soil moisture above the barrier for use by short-rooted plants.

- b. Herbicides: The use of subsurface layers of herbicides provides an effective means for controlling deep root penetration. The effectiveness, however, is currently limited to only short-term applications due to the chemical dissipation. Herbicide barriers are easy to apply, usually placed as a layer in granular form, and will generally be applied to all sites using the plastic barrier sheeting. An important consideration that must be examined before applying a specific herbicide is the possible effects on revegetation efforts. Care must be taken to ensure that the herbicide is either nontoxic or isolated from desirable vegetation. This will be accomplished, in part, by placing it beneath the plastic barrier and/or using selective herbicides.
- c. Cobbles (6-Inch Layer of 3/4-Inch Aggregate): This type of biobarrier is useful as a deterrent to small burrowing animals. A 6-inch layer of 3/4-inch aggregate is considered to be the minimum thickness and aggregate size to provide an effective barrier. The application will be limited to sites having burrowing animal intrusion problems due to the large quantities of import material required for this technique. The need for such a barrier as a part of stabilization will be carefully considered since nominally 2 feet of clean fill will be required to provide sufficient depth to restrict intrusion by small

animals. Large burrowing animals, such as badgers, are not expected to be controlled by a cobble layer less than several feet thick.

- d. Wire Mesh: Wire mesh, such as that used in fencing, placed as a subsurface barrier provides an effective barrier against animal intrusion. Mesh will be considered for controlling small and/or large burrowing animals. Corrosion of the material in a subsurface environment will be the limiting factor which determines the effective life of this barrier. Application would be similar to that of plastics and consists of fastening together successive strips of the material. This type of barrier is applicable to all subsurface waste sites where root penetration and vertical moisture movement is not a problem.

Surface Stabilization. Several surface stabilization alternatives are currently available which can provide improved levels of control over plant uptake, animal action, intrusion, wind, erosion, subsidence, and human activities. The following paragraphs discuss the potential applications and limitations of those materials and techniques currently available for surface stabilization applications.

- a. Revegetation: Revegetation as a surface treatment will be used to provide erosion control and to reduce the numbers and penetrating ability of undesirable deep-rooted species. Revegetation has been utilized to some extent with varying degrees of success during the past 10 years. Current methodologies using cheatgrass and to a lesser extent Siberian wheat are expected to yield successful revegetation in 1 to 4 years. Revegetation is limited to the fall planting season and requires the use of special mulching equipment to achieve a high rate of success. Revegetation

is applicable to all dry, decontaminated, and stabilized sites not subject to routine traffic or heavy equipment activities. Maintenance such as chemical stabilization or reseeding may be required as a result of episodic events such as drought or fire.

- b. Rock Covers: A surface rock cover treatment will provide effective erosion control, and when combined with regular surface application of herbicides, will control root penetration. Rock covers have been used on a number of occasions in past stabilization activities, and observations indicate that tumbleweeds rapidly inhabit the area if surface herbicide applications are not maintained. Indications are that some local animal populations may decrease while others increase, depending on specific site conditions. This treatment is applicable to all dry surface areas that have been decontaminated and stabilized and where erosion control is required. This treatment is relatively easy to apply, but requires a large quantity of material.
- c. Hard Surface Cover: A hard surface cover is a layer of hard material (e.g., asphalt pavement) placed on the surface over a waste site. Applications of such a surface would provide relatively maintenance-free control of biological transport, erosion, human activities, and subsidence damage. The extent of maintenance required for a hard surface cover is directly related to the surfacing material and loading to which the surface is subjected. The only material currently considered for application is asphalt pavement similar to that used in roads or parking lot construction. Two problems exist with the application of this alternative. First of all, it is considerably

more expensive than the other surface stabilization techniques. Secondly, the site surface must be stable to allow access for the paving equipment. This treatment will be used in limited cases only.

- d. Vegetation Control: Several forms of vegetation control are currently available. Herbicides will be applied for vegetation control in both dry and wet surface areas. In dry areas, selective herbicides will be used to control undesirable vegetation such as tumbleweeds.

- Site Removal - Dry Surface Areas

The third alternative available for the reduction of dry surface radiation areas is removal and subsequent disposal of the contaminated material. Although site removal is certainly an available alternative, the costs and environmental exposure hazards associated with the removal operation must be compared to the long-term risks and benefits. Application of this technique normally will be limited to small areas of shallow surface contamination that can be handled easily or that are required to accomplish objectives. Stabilization of any residual contamination will be required following site removal.

Techniques currently available for site removal operations are (a) the front loader and dump truck method, (b) the manual shovel and bucket method, and (c) the mobile mini-vacuum system.

- a. Front Loader and Dump Truck Method: This method consists of removing contaminated soil using a front end loader and placing the soil in a dump truck for transport to a burial site. This is the most efficient method, as relatively large quantities of material can be moved in a short period of time. However, resuspension and spillage limits activities to low wind days and requires special handling and transportation procedures.

- b. Shovel and Bucket Method: This method consists of manually removing contaminated soil with shovels and placing it in bags or buckets for transport to a burial site. This method is useful only for very small areas, as it is very labor-intensive and only small quantities of soil can be removed. Here again, hazards due to possible resuspension and spillage are problems compounded by the fact that personnel must work in close proximity to the contaminated soil. Again, special procedures and protective clothing are required.
- c. Mobile Mini-Vacuum System: The mobile mini-vacuum system, which should become operational during FY 1979, is capable of removing small areas of contaminated surface soil of the same magnitude as the shovel and bucket method. The advantage of the vacuum system is that contaminated soil is selectively picked up and immediately contained within a 55-gallon drum for direct disposal, greatly reducing the possibility of resuspension or spillage during the operation.

2. Reduction of Wet Surface Areas (Activity II). Wet surface areas include those sites currently receiving or containing liquid waste, such as ponds and associated ditches, and exposed retention basins (also referred to as holding ponds).

The current potential transport problems at these sites are primarily the result of attractiveness of standing water and vegetation to wildlife. Various species may utilize these areas for drinking, forage or habitat, as well as a source of building materials such as vegetation or mud for the construction of nests. This problem is confused by the beneficial effects of moisture and vegetation for stabilizing contaminated pond bottoms and banks generally found in these sites. Therefore, any potential radiation area reduction actions must consider both of these factors.

Applicable techniques are discussed below.

All four of the basic radiation area reduction alternatives are applicable to wet surface areas.

- Continued Routine Surveillance - Wet Surface Areas

This alternative is required on all sites to verify the level and nature of contamination.

- Reduction or Elimination of Effluent Discharges - Wet Surface Areas

This action will reduce the buildup and spread of contamination at disposal sites by reducing or eliminating the source of discharge. Continued discharge of contaminated effluents within maximum permissible concentration limits can eventually lead to a buildup of contaminated soils and sediments exceeding the limits. Reduction in volume and concentration of facility effluents will significantly decrease the rate of contamination buildup.

Investigations will be made to study liquid-effluent reduction by application of established methods of industrial and municipal waste water treatment such as flocculation, sedimentation, filtering, and ion exchange. Advanced filtration methods such as ultra-filtration or reverse osmosis will also be investigated in addition to recycling of process and cooling water through closed-loop systems.

- Improved Site Stabilization - Wet Surface Areas

30-45 Mil Reinforced Pond Linings. This type of material is commonly used in many industrial waste applications. Though primarily used to control seepage, these materials also control root penetration and provide some deterrent to small burrowing animals. Pond linings are considerably more expensive than the 10-mil polyethylene, and their use will be limited to those cases where the cost/benefit considerations require a longer assured biobarrier lifetime.

Rock Covers. A rock cover used as a surface treatment will provide effective erosion control, and when combined with regular surface application of herbicides, will control root penetration. Rock covers have been used and observations indicate tumbleweeds rapidly inhabit the area if surface herbicide applications are not maintained. (Indications are that some local animal populations may decrease while others increase; however, this depends on site conditions.) This treatment is applicable to banks of ponds, is relatively easy to apply, but requires a large quantity of material.

Exclusions. Several forms of exclusions are available to physically limit the intrusion of animals into areas. Exclusion fences will be considered for placement around the ponds and ditches to limit the intrusion of some types of mammals. Exclusion mesh will be considered for installation over small facilities such as holding ponds, retention basins and liquid effluent release points to limit the intrusion of birds. Chemical or electronic deterrents currently on the market will also be investigated for short-term usefulness in small areas. The applicability of exclusions will be limited, as routine maintenance will be required to maintain effectiveness.

Vegetation Control. Herbicides will be applied for vegetation control in selected wet surface areas. Application will disrupt the food chain established at the sites and thereby reduce the attractiveness of the site to wildlife. However, the use of these techniques must be carefully evaluated as new problems of an equal or more serious nature may actually be created. For example, while pond or ditch bank vegetation may be attractive to wildlife, it also serves to stabilize the soil. Elimination of bank vegetation without also providing a soil stabilization program may result in replacing a relatively minor biological transport problem with a more serious atmospheric transport problem. Also, herbicide applications

once begun must be maintained or undesirable vegetation will rapidly return to the area. Vegetation control as an independent technique will have limited applicability due to the high maintenance requirements.

Pond Modifications. Modification of the configuration or complete elimination of the ponds and ditches associated with the 200 Areas will be used selectively to decrease the attractiveness of these facilities to wildlife. The fact that ponds tend to have large areas of shallow standing water (less than 2 feet deep) and gently sloped banks (less than 45 degrees) contributes significantly to the likely occurrence of radionuclide transport events. Shallow standing water and gently sloped banks allow attractive vegetation to become established in these areas and also allows water fowl access to pond bottom sediments, where the first few inches contain most of the radionuclide inventory of ponds. If, however, the ponds are modified to maintain water levels of greater than 1 meter and have banks of large rock or concrete rubble at a slope greater than 60 degrees, they are no longer attractive for animal habitat or intrusion. Modifications will be considered where ponds and ditches must remain wet and are fairly large in extent.

3. Reduction of Tank Farm Areas (Activity III). All 200 Area Tank farms will be considered within the Reduction of Tank Farms Activity. This includes contaminated soil and contaminated storage areas as well as maintenance and/or construction actions that may expose or disturb contamination within the tank farms. Current conditions within the tank farms include potentially resuspendable surface contamination, storage of contaminated equipment, maintenance/construction activities within tank farms, and potentially contaminated effluents resulting from tank farm operations. Periodic applications of herbicides in the tank farms maintain these areas free of vegetation and significant animal

intrusions have been reported. Prevention of further spread of contamination will be exercised through the use of containments, strict access control, and the incorporation of step-off areas during ingress and egress to control contamination migration via protective clothing.

Long-term alternatives for tank-farm surface stabilization are being developed. Alternatives being considered include removal of some surface soil, installation of clean material (e.g., asphalt or grass cover), or a combination.

Interim actions for tank farm are identified below:

- Continued Routine Surveillance - Tank Farms

This alternative is required on all tank farms.

- Improved Site Stabilization - Tank Farms

Removal of Contaminated Stored Equipment. Contaminated equipment stored in tank farms often is wrapped in plastic which can deteriorate in time and be transported by the wind. Storage containers are being fabricated for use in the tank farms to reduce the effect of plastic deterioration and reduce any subsequent spread of contamination.

Clean-Up of Tank Farm Areas. Surface contaminated materials which are the secondary source of transported radionuclides are being cleaned up and removed where practicable. Improved tank farm operating procedures will substantially reduce the incidence of contamination spread to articles in the farms.

Soil Stabilization. Chemical soil stabilizers are being evaluated for effectiveness for wind erosion control. Such agents will be utilized where appropriate to minimize airborne transport from the tank farms.

4. Reduction of BC Cribs and Control Zone (Activity IV). The BC Cribs commonly refers to a collection of cribs and trenches located outside and directly south of the 200 East Exclusion Area. The associated control zone is an area of approximately 4 square miles that has

some contaminated as a result of past biological transport from trenches in the BC Cribs areas. This contiguous area will be considered the BC Cribs and Control Zone Activity.

Current conditions within the cribs, trenches, and control zone consist primarily of surface contamination resulting from past biological intrusion and transport. However, plant uptake, animal action, subsidence, wind erosion, and human activities have been observed to some extent in the BC Cribs and control zone. The same alternatives will be utilized as discussed under Dry Surface Areas.

5. Reduction of Storage Areas (Activity V). Contaminated equipment materials placed temporarily in outdoor storage are considered in the Reduction of Storage Areas Activity. For example, internally contaminated railroad cars and other large pieces of equipment have been obtained and stored in above-ground outdoor radiation areas. This equipment will be transported for disposal in burial grounds, and the surrounding surface areas decontaminated as necessary and released from radiation area status. Current conditions within these storage areas include potentially resuspendable contamination, leakage, animal action, and human activities.

6. Technical Support (Activity VI). This Activity provides for evaluation and implementation of new or existing radiation area reduction technology. The developmental efforts will include tests performed under field conditions. Those techniques that prove effective would be implemented into the radiation area reduction operations with ongoing evaluation of the results. Additionally, development of applicable criteria, site characterization, and other technical support efforts are provided.

Engineering evaluation of current site conditions is needed to better define transport mechanisms as they relate to specific sites. The basic radiological transport mechanisms (i.e., wind, plants, animals) have previously been identified and studied in general and on a few select sites. This work needs to be updated and applied to existing

radiation areas to determine which mechanisms predominate. Such information is needed to determine the optimum methods for radiation area reduction. Additional information will be gained from radiological surveys; samples of soil, vegetation, and water; and monitoring of animals and studies of ecosystems. Development of improved methods of biomonitoring also may be appropriate to aid in gathering this type of data.

Radiological surveys will be performed in support of all radiation area reduction activities. These surveys will be used to: characterize the site prior to initiation of operations, monitor progress, provide personnel exposure safety, and ensure release criteria have been achieved upon action completion. Establishment of radiological survey requirements for radiation area reduction actions will be performed by Environmental and Occupational Safety.

All applicable data will be compiled and maintained to provide records of all data generated during radiation area reduction activities. This includes data pertaining to site characterization, radiation area reduction actions, and site status data before, during, and after radiation area reduction activities. Records of these data shall be maintained to allow complete and easy access for future reference.

SPECIFIC ACTION PLANS

Introduction

Radiation area reduction and contamination cleanup work has begun in several areas. Field work is progressing on the laundry ditch berm, burial ground stabilization, tank farm cleanup, tumbleweed removal, posting and cleanup of contaminated areas, and radiological surveys.

Near-Term Field Work (6 Months)

1. Burial Grounds. The 200 East and 200 West burial grounds to receive initial action have been selected (218-E-12A and 218-W-2A), boundaries identified, access roads stabilized to provide vehicle and personnel entry, trenches characterized, and stabilization initiated.

During the last half of FY 1979, general housekeeping will be performed on the 600 Area solid waste burial grounds under Rockwell's responsibility. Additionally, a diversion bank will be placed above the 3-2 and 618-3 Burial Sites to prevent erosion due to rain run-off from the paved areas inside the 300 Area fence onto the surface of the burial ground. Also, the 618-8 site, which is located beneath the north parking lot in the 300 Area, will have rain run-off trench modified to prevent seepage of the water onto the burial ground.

2. Laundry Ditch Berm. Cleanup of contaminated sediment which has built up along the 216-U-14 Laundry Ditch was started May 1, 1979, with the first 350 feet of berm scheduled to be removed and buried by June 30, 1979. The entirety of the berm will be removed up to 16th Street, then the efforts will leapfrog to the 16th Street region to stabilize areas near the evaporator.

3. Survey Items. Radiological surveys and audits will be conducted routinely within tank farms, burial grounds, and around suspected contamination sources. Surveys will also be made routinely near facilities, parking lots, and roadways. Any items requiring corrective action will be resolved. A prioritized list of survey items for both tank farms and general areas has been developed and schedules prepared. Approximately 10 tank farm audit items have been cleaned up and resolved during June. Work in tank farms resolving survey items will continue throughout 1979, as will general survey items and posting outside the tank farms. When work forces are hindered from doing other scheduled work due to wind velocity exceeding maximum criteria, or other reasons, they are assigned working off the backlog of survey items.

4. BC Cribs. Efforts will begin on the cleanup and stabilization of the BC Cribs and trenches. Current estimates forecast 50% of the access roads between the trenches stabilized by the end of FY 1979.

Near-Term Engineering and Health, Safety and Environment Support
(6 Months)

The near-term engineering support for radiation area reduction consists primarily of reviewing past experience and results of research work currently underway, and then selecting the best solution for corrective actions.

1. Pond Management. Past pond management practices have been oriented toward preventing spread of contamination from pond sediment by maintaining water levels such that contaminated sediments are not exposed to possible wind transport. Transport due to migratory water fowl has not historically been considered a pathway of relative hazard to man. However, recent studies and new or proposed Environmental Protection Agency radiation limits indicate improved pond management practices should be reviewed. A general Pond Management Practices study will be completed, with the objective of identifying, evaluating, and recommending improved pond management techniques. These techniques would then be implemented at U Pond (216-U-10), B Pond (216-B-3), and Gable Mountain Pond (216-A-25), as applicable. Such techniques will address bank vegetation control, aquatic vegetation control, animal control, bird and water fowl control, and stabilization of exposed sediments.

2. Laundry Facility Effluent Treatment Upgrade. An engineering study will be developed to upgrade the laundry effluent treatment systems. This engineering study will support a FY 1980 General Plant Project. An additional engineering study will be initiated in FY 1979 to evaluate longer-term laundry upgrade requirements for incorporation into a possible FY 1982 line item. This study will include radiological controls within the laundry, receipt and inspection of laundry, further effluent control treatment, and space utilization.

3. Rodent Control. General rodent control measures are being initiated as a result of finding contaminated rodent feces in the 200 Areas. While this has not posed a personnel hazard, the potential exists for

contaminated fecal deposition in inhabited areas. The rodent control measures are being evaluated to reduce or eliminate rodent populations inside 200 Area buildings.

4. Z-19 Ditch. The ambient air sampler at the 216-Z-19 Ditch has shown alpha radiation levels above maximum permissible concentrations at various times. This is believed to be due to surface exposure of contamination. Additional sampling and evaluation of the radiological conditions in and around the ditches will be made to establish the scope of the problem. Corrective actions then will be developed.

5. Surface Stabilization Techniques. Numerous chemicals have been proposed for possible field use as surface stabilizers to prevent windborne spread or vehicular pickup of contaminated soil. These chemicals will be tested outside radiation areas, for effectiveness and durability, prior to radiation area application. Tests involve applying the stabilizing agent to a test plot, placing a closed box over a portion of the plot, and pulling a high-volume air sample across the surface. The air sample will be filtered, and the sample filter weighed. Mass loading of the filter will be a gross indication of the effectiveness of the stabilizing agent. Tests will be repeated at intervals to determine stabilizing agent degradation with age and environmental exposure. Results then will be used to prepare step-by-step procedures for field application.

6. Herbicides. Use of herbicides is currently limited to soil sterilant application to prevent vegetation growth in selected radiation areas such as tank farms, BC Cribs, and certain burial grounds. Expanded use of herbicides has been considered in the past to eliminate tumbleweed growth on a much larger scale. Engineering evaluations of herbicides will be carried out in the second half of FY 1979 to develop a plan of action for tumbleweed control.

7. Radiological Audit Surveys. Extensive radiological audit surveys will be conducted within the 200 Areas. The schedule for routine audits is shown in Section 5 of this report. Based on the results of

these surveys, an appropriate generic approach will be selected and applied on a case-by-case basis. These actions may include one or more of the following:

- Identify and eliminate primary source of contamination and document condition.
- Cleanup by hand (bucket and shovel) areas having a limited number of particles of contamination.
- Cleanup by mechanized equipment areas having extensive contamination and document cleanup efforts.

Long-Term Field Work (6 Months and Beyond)

Radiological surveys and audits will continue so as to identify primary sources and extent of contamination and to verify clean areas. Operations crews will clean up and/or post areas as appropriate to support identified audit actions. Improved methods for biotic transport control will be studied for potential application. Rodent control will continue within facilities. Engineering support for planning, procedure development, safety assessments, design and specification development will be provided to support burial grounds, tank farms, cribs, laundry effluent control and monitoring, ditches, and other facilities.

Evaluations of relative action priorities will be made in order to assign available equipment judiciously. Where conflicts between potential uses of personnel and equipment exist, cleanup actions having the highest environmental and safety hazards will be given the highest priority. As operational activities within single-shell tank farms are reduced and completed, tank farm cleanup and stabilization action will be accelerated.

General support to the radiation area reduction projects will be provided in the form of preparation of specific plans, procedures, and safety analyses; performance of document reviews; and the design and fabrication of field support tools, equipment, and survey instruments. A file containing photographs and characterization data for the individual

es will be developed and facility drawings will be updated. Design, orication, and/or procurement of a portable vacuum cleaner and other ecial equipment required to stabilize contaminated outdoor sites will performed, as well as the preparation of engineering and research commendations for methodology, prioritization, and implementation of face stabilization and revegetation efforts.

A detailed specific action plan for the following period will be veloped and issued as part of the update to this plan. This updated edule will be based on accomplishments and on the results of radiolog- al surveys.

5. SCHEDULES

This section consists of oversize charts showing radiation area reduction scheduling.

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RHO RADIATION AREA REDUCTION PLAN

SCHEDULE NO:	2
PAGE	2 OF 2
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6. RESOURCE PLANNING

HEAVY EQUIPMENT UTILIZATION

Since the early beginnings of operations in the 200 Areas, various pieces of heavy equipment have been used on a continuous basis in supporting radiological control and cleanup operations. Heavy mobile equipment has been used in the past 2 years to clean up many small areas that were determined to be retired or inactive. In addition, plans were made during the past 2 years to increase the number of heavy mobile units to begin work on larger cleanup projects, starting in 1979.

Each piece of heavy equipment is scheduled in support of project work, on a weekly basis, to gain maximum usage and efficiency relative to the various stages of completion on each project work plan.

In the next 5 years, additional equipment needs will be identified and many of the units now in service replaced, due to those units having completed their useful life expectancy.

EXPENSE FUNDING PLAN

Expense funding for radiation area reduction is provided by three end functions:

JM-05-01-01-2	Waste Concentration
JM-05-01-01-5	Low-Level Waste
AG-70-01-01-0	Surveillance and Maintenance of Surplus Facilities

The specific amounts of funding within each end function which has been allocated to radiation area reduction efforts are given in Table 1.

TABLE 1. Expense Funding Plan.
(Dollars in Thousands)

End Function/Activity	Fiscal Year						
	1979	1980	1981	1982	1983	1984	1985
<u>JM-05-01-01-2</u>							
KF - Waste Concentration KF6 - Radiation Reduction and Cleanup	\$ 0	\$ 208	\$ 300	\$ 300	\$ 550	\$ 550	\$ 550
<u>JM-05-01-01-5</u>							
KK - Low-Level Waste KK2 - Radiation Area Control	729	1,553	2,482	2,600	2,800	2,800	3,000
<u>AG-70-01-01-0</u>							
UI - Surveillance and Maintenance of Surplus Facilities*	553	1,406	3,076	3,244	3,328	3,719	4,044
TOTAL	\$1,282	\$3,167	\$5,858	\$6,144	\$6,678	\$7,069	\$7,594

* Spread among four activities, U11, U12, U15, and U16. A portion of the activity funding goes toward D&D program management and surveillance and is not included herein for radiation area reduction planning.

CAPITAL FUNDING PLAN

All capital funding for radiation area reduction is provided by 35-JM-05, Defense Waste Management. This funding category is further divided into several subcategories, of which two (Programmatic and Transportation) provide capital equipment in support of radiation area reduction. Specific programmatic capital funding plans are contained in Table 2.

TABLE 2. Capital Budget Plan, Equipment Not Related to Construction.

(Dollars in Thousands)

Description	Fiscal Year						
	1979	1980	1981	1982	1983	1984	1985
Portable Vacuum Cleaner (3)	\$12	\$ 6					
Herbicide Applicator Equipment		20					
Garbage Truck Compactor		60					
10-Yard Dump Trucks (6)		150	\$150				
Front Loaders		80			\$ 40		
4-Yard Payloader				\$ 20			
Road Grader			210				
Flatbed Truck			35				
Belly Loader (20-Yard Capacity) (3)		200	400				
Buck Rake			23				
Dragline Bucket			12				
Water Truck (2)		40			190		
Four-Wheel Drive Pickups (3)	10	10	10				
Crew Cabs (3)		20	10				
Fertilizer Spreader	3						
Trailer-Mounted Straw Mulcher		15					
Sheep's Foot Packer		-					
D-8 Caterpillar		200					
1- by 40-foot Change Trailer				40			
D-4 Caterpillar					\$105		
Field-Test Equipment			30	20	100		
Replacement Equipment				75		\$60	\$58
TOTAL	\$25	\$802	\$880	\$155	\$435	\$60	\$58

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7. MANAGEMENT AND CONTROL

This section highlights portions of the Rockwell Management Control System (MCS), RHO-MA-141, especially applicable to Radiation Area Reduction, and delineates specific authorities and responsibilities. All activities carried out as part of this plan are conducted in accordance with approved Rockwell policies, procedures, specifications, and manuals.

PROGRAM MANAGEMENT AND CONTROL

All Rockwell Directors are required to carry out their programs and operations in a safe and cost-effective manner, and in accordance with approved regulations and policies. As such, each Director has responsibility to assure that current operations do not contribute to the generation of new radiation areas, and that every effort possible is made to reduce existing areas.

The activities discussed in this plan integrate, coordinate, and organize Rockwell's approach to the reduction of radiation areas within the 200 Areas and in specifically designated 600 Area sites. The Program Director for Waste Management has overall Rockwell programmatic responsibility and authority for the conduct of the program. This direction consists principally of establishing program and management policy, funding allocations, overall priorities, and specific milestones and goals. The Program Director will be responsible for overall schedule and cost control.

Two primary DOE-RL program funding sources are utilized for radiation area reduction activities. They are JM-05, Defense Waste Management, and AG-70, Decontamination and Decommissioning. Within these two funding sources, three specific end functions participate in radiation area reduction activities. They are:

JM-05-01-01-2	Waste Concentration
JM-05-01-01-5	Low-Level Waste
AG-70-01-01-0	Surveillance and Maintenance of Surplus Facilities

The first two of these end functions are under the overall program control of the Program Director for Waste Management, and the third (AG) is under the Program Director for Waste Technology, and each end function has been charged with specific areas of responsibility for the purposes of radiation area reduction. The Program Director for Waste Management will have overall Rockwell radiation area reduction project control.

The Waste Concentration Program is responsible for radiation reduction activities within the tank farms and associated facilities. This is done to ensure that tank farm cleanup, source elimination, and waste concentration activities are integrated and coordinated, and do not become counterproductive.

The Low-Level Waste Program has responsibility for all radiation area reduction activities not covered within the scope of either Waste Concentration or Surveillance and Maintenance of Surplus Facilities.

The Surveillance and Maintenance of Surplus Facilities has responsibility for all facilities designated as retired prior to October 1, 1976, which includes structural D&D.

In addition to the programmatic responsibilities discussed, several functional directors play key roles in the performance of radiation area reduction plans.

Health, Safety and Environment (HS&E)

The Director of HS&E is responsible for overall safety criteria and standards, environmental monitoring and surveillance, and radiological surveys. Health, Safety and Environment also will be responsible for establishing and maintaining audit action lists and establishing specific radiological priorities for actions to be taken. Health, Safety and Environment will provide input for technology development and will review and approve all Work Procedures.

Research and Engineering (R&E)

The Director of R&E will be responsible for the preparation of engineering and supporting documents for the conduct of radiation area reduction activities. Research and Engineering also will identify the need for

site characterization and technology development, and will carry out the required technology development. Research and Engineering will prepare, review, and approve all Work Procedures.

Production Operations

The Director of Production Operations will provide the necessary staff, including chemical operators, to implement the Radiation Area Reduction Work Procedures. Production Operations will review, approve, and utilize all Work Procedures according to the requirements of Procedures D-4 and D-4.2 of the Rockwell Engineering Procedures Manual, RHO-MA-115. The Director of Production Operations will be responsible for providing overall scheduling and control of all radiation area reduction field work.

Production Support

The Director of Production Support will provide the necessary equipment, heavy equipment operators, and craftsmen to implement the Radiation Area Reduction Work Procedures. Production Support will review all Work Procedures and will approve those resulting in work assignments within Production Support.

Quality Assurance (QA)

The Director of QA is responsible for providing Quality Engineering, Quality Control, and Analytical services to implement radiation area reduction operations and data management. Quality Assurance will review and approve all Work Procedures.

EXECUTIVE MANAGEMENT REVIEW

Rockwell policy requires that all operations, functions, and programs be independently reviewed to assure that these activities are being performed in accordance with safety standards established by Rockwell Hanford Operations, U.S. Department of Energy, and regulatory agencies. The activities described in the Radiation Area Reduction Plan will be subjected to this independent review process. Specifically, the Waste

Processing Safety Committee will have responsibility for reviewing radiation area reduction operations for safety. This process will provide Rockwell executive management with an independent review of the activities.

COST AND SCHEDULE CONTROL

Cost and schedule control is in accordance with the Rockwell Hanford Operations Management Control System Description, RHO-MA-141. The effort performed in the Radiation Area Reduction Project Plan follows the Work Breakdown Structure of the Waste Concentration Program Plan, RHO-CD-330, Activity KF6; the Low-Level Waste Program Plan, RHO-CD-428, Activity KK2; and the Decontamination and Decommissioning (D&D) Program Plan, RHO-CD-421, Activities U11, U12, U15, and U16.

1. Cost control for the Radiation Area Reduction Plan for FY 1979 will utilize existing Rockwell cost controls. Work packages, which are the fourth level of the Rockwell Work Breakdown Structures, will be used. Work packages will be issued to the functional organizations by the Program Office. The work package will include description of work, milestones, and target budgets consistent with each program plan. Each functional organization will prepare Functional Planning Documents for each assigned work package which defines and distributes resource requirements. Any deviation from the provided scope, milestone, and/or budget guidance will be resolved with the Program Office. Program Business Management will provide support for all phases of the budget cycle.

2. Schedule control will be in accordance with Rockwell Hanford Management Schedule System Manual, RHO-MA-123 DRAFT. The schedules included in this plan will be maintained in current status through periodic updates. Program Business Management will provide scheduling support at all levels of the schedule hierarchy, with the exception of Production Operations and Production Support, who shall furnish functional schedule support through their production control departments. The major milestones will be consistent with the Waste Concentration Program Plan, RHO-CD-330; the Low-Level Waste Program Plan, RHO-CD-428; and the Decontamination and Decommissioning (D&D) Program Plan, RHO-CD-421.

The major milestones depicted on the master program schedules will be used as key milestones on the Work Packages. These documents shall be maintained consistent throughout the fiscal year.

These same major milestones appear, and will be stated, on the Rockwell Monthly Report, RHO-LD-108, which will be the reporting document for this plan.

SAFETY

The Radiation Area Reduction Plan will be conducted in a manner so as to protect the safety and health of all employees and prevent loss or damage to any facility. All operations will be conducted in compliance with applicable health and safety requirements of the U.S. Department of Energy and will adhere to generally recognized and accepted high standards of performance in the areas of occupational health, nuclear, radiological and industrial safety, and environmental protection.

The Health, Safety and Environment organization will be responsible for ensuring that adequate safety criteria and requirements are established, and that safety audits are performed.

QUALITY ASSURANCE

The Quality Assurance Program that will be implemented for Radiation Area Reduction shall comply with applicable portions of Department of Energy RL Appendix 0820, paragraphs A and F. The Quality Assurance organization is in accord with the organization charts contained in Rockwell Hanford Operations Policies Manual, RHO-MA-100.

The Quality Assurance disciplines applicable to Radiation Area Reduction include verification of radiological survey data, acceptance of end-point conditions, specification of acceptance criteria in specifications and instructions, assurance that operations are performed in accordance with approved Work Procedures, and records that are complete and auditable. Specific actions shall be delegated to the HS&E function in areas where they possess the expertise, personnel, and existing recordkeeping capability.

All work shall be performed in accordance with approved, written instructions, specifications, and drawings. Quality Engineering shall approve all procedures, specifications, and drawings. The acceptance (end-point) criteria shall be specified. Control of procedures, specifications, and drawings shall be exercised to assure only the appropriate revisions are used in the work areas. Confirmation that procedures are controlled and field work complies shall be by Quality Assurance surveillance.

Inspection of fabricated hardware and equipment shall be performed by Quality Control. All radiological surveys and end-point inspections of completed radiation area reduction tasks shall be performed by Health, Safety and Environment. All radiological survey and end-point data shall be maintained by HS&E. The Quality Information Center shall provide confirmation that records are maintained and are recoverable and auditable.

Adverse conditions shall be documented, investigated and corrected, through application of the Corrective Action system. This effort will prevent repetition of adverse conditions and provide more effective performance of radiation area reduction.

Formal Quality Audits will not be specifically performed for radiation area reduction. The existing audit program shall cover the disciplines involved on a 200 Area-wide basis.

SUPPORTING DOCUMENTATION AND DOCUMENT CONTROL

Supporting Documents

Each radiation area reduction activity will be further defined and developed through the preparation of supporting documents, including Activity Plans, Test Plans, Test Procedures, Work Procedures, Standard Operating Procedures, and schedules, as described in the following subsections.

1. Activity Plans. An Activity Plan defines the engineering, development, and data requirements for a specific activity. Included are assessments of available data, technology, and resources. (Note: The

term "resources" includes funding, manpower, materials, and equipment.) Also included are detailed descriptions of the need for further characterization and technological development. All subsequent work procedures, designs, and specifications required are listed. Finally, the Activity Plan presents a logic network for executing the tasks described. Each of the six activities listed in Section 4 will have an Activity Plan prepared to aid in the execution of the engineering efforts.

2. Test Plans. A Test Plan is a general description of a particular type of testing required. Included are basic definitions, objectives, testing requirements, acceptance criteria, and documentation requirements. These plans will be used in the event any hardware development is required.

3. Work Procedures. Work Procedures provide detailed, step-by-step instructions necessary to perform tasks. Each Work Procedure identifies work-related hazards and includes radiological and other safety precautions.

A Work Procedure may be either specific or general. A specific Work Procedure is tailored to a specific job and is used only once. A general Work Procedure applies to a particular aspect of many different jobs and therefore can be used more than once. Within its sequence of steps, a specific Work Procedure can call for the use of one or more general Work Procedures.

4. Standard Operating Procedure. Standard Operating Procedures (SOPs) may be used in place of general Work Procedures for jobs already covered by existing SOPs.

Document Control

Release of supporting documents shall be by Engineering Order (EO) processed through the Engineering Release System, per RHO-MA-115, Engineering Procedures Manual. The release Engineering Order shall be prepared by the supporting document author, shall include a distribution list, and shall be approved in accordance with existing procedures.

Distribution and control of Work Procedures and revisions/changes shall be accomplished by the Operating Document Control Unit. Control copies are limited to the field copy and Operating Document Control copy. Other copies are for information only.

A supplement to the D&D Document Release Plan, D00DRCP0001, will be prepared to establish the requirements for supporting document preparation, release, and control.

APPENDIX

CONTAMINATED FACILITIES LIST

NOTES:

1. Status: A - Active
R - Retired
NU - Not used; facility constructed but never used for storage or disposal of radioactivity. Not contaminated.
SB - Standby
RELEASED - Radiation area decontaminated, stabilized, and released from radiation control.
2. Total Area (Ft²) UN - Unavailable; documents not yet researched; will be developed as part of site characterization.
3. Comments: "No contamination found" indicates that no contaminated vegetation or surface contamination was detected during the most recent radiological survey.
4. Total number of facilities listed - 482.

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APPENDIX

CONTAMINATED FACILITIES LIST

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
600 AREA SOLID WASTE DISPOSAL SITES:				
618-1	R		UN	
618-2	R		UN	
618-3	R		UN	
618-4	R		UN	
618-5	R		UN	
618-6	R		UN	
618-7	R		UN	
618-8	R		UN	
618-9	R		UN	
618-10	R		UN	
618-11	R		UN	
600 AREA LIQUID WASTE DISPOSAL SITES				
616-U	R		UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>E</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
REA LIQUID WASTE DISPOSAL SITES:				
1-1	R	Crib	2,500	
1-2	R	Crib	1,600	No Contamination Found
1-3	A	Crib	1,600	No Contamination Found
1-4	R	Crib	1,600	No Contamination Found
1-5	R	Crib	3,600	No Contamination Found
1-6	R	Crib	22,500	No Contamination Found
1-7	R	Crib	400	
1-8	A	Crib	27,000	
1-9	R	Crib	15,000	No Contamination Found
1-10	A	Crib	18,000	No Contamination Found
1-11	A	French Drain	2	
1-12	A	French Drain	2	
1-13	R	French Drain	10	No Contamination Found
1-14	A	French Drain	2	No Contamination Found
1-15	A	French Drain	2	No Contamination Found
1-16	R	French Drain	3	
1-17	R	French Drain	3	
1-18	R	Crib	10,000	
1-19	R	Crib	1,600	No Contamination Found
1-20	R	Crib	900	No Contamination Found
1-21	R	Crib	1,600	No Contamination Found
1-22	R	Crib	4	
1-23A	R	French Drain	3	
1-23B	R	French Drain	3	
1-24	R	Crib	150,000	
1-25	A	Pond	2	No Contamination Found

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
200 AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
216-A-26A	R	French Drain	2	No Contamination Four
216-A-26B	A	French Drain	3	No Contamination Four
216-A-27	R	Crib	6,000	No Contamination Four
216-A-28	R	Crib	8	
216-A-29	A	Ditch	195,000	
216-A-30	A	Crib	28,000	
216-A-31	R	Crib	1,600	No Contamination Four
216-A-32	A	Crib	1,200	No Contamination Four
216-A-33	R	French Drain	4	No Contamination Four
216-A-34	R	Crib	12,300	No Contamination Four
216-A-35	R	French Drain	4	No Contamination Four
216-A-36A	R	Crib	2,000	No Contamination Four
216-A-36B	R	Crib	10,000	No Contamination Four
216-A-37-1	SB	Crib	21,000	
216-A-38-1	SB	Crib	18,000	No Contamination Four
216-A-39	R	Crib	900	No Contamination Four
216-A-40	A	Crib	20,000	No Contamination Four
216-A-41	A	Crib	400	No Contamination Four
216-A-42	A	Trench	UN	
216-A-271	A	Valve Control House	96	
216-A-508	A	Crib Control Structure	UN	
216-A-524	R	Crib Control Structure	UN	
216-B-2	A	Ditch	UN	
216-B-2-1	R	Ditch	210,000	
216-B-2-2	R	Ditch	UN	
216-B-2-3	A	Ditch	UN	No Contamination Four

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>FE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
3-3	A	Pond	2,003,760	No Contamination Found
3-3-1	R	Ditch	UN	
3-3-2	R	Ditch	UN	
3-3-3	A	Ditch	UN	No Contamination Found
3-4	R	Reverse Well	1	
3-5	R	Reverse Well	1	
3-6	R	Reverse Well	1	No Contamination Found
3-7A	R	Crib	400	
3-7B	R	Crib	400	
3-8	R	Crib & Tile Field	400	
3-9	R	Crib & Tile Field	1,300	
3-10A	R	Crib	400	No Contamination Found
3-10B	R	Crib	400	
3-11A	R	Reverse Well	6	No Contamination Found
3-11B	R	Reverse Well	6	No Contamination Found
3-12	R	Crib	UN	No Contamination Found
3-13	A	French Drain	3	
3-14	R	Crib	2,500	
3-15	R	Crib	2,500	
3-16	R	Crib	2,500	
3-17	R	Crib	2,500	
3-18	R	Crib	2,500	
3-19	R	Crib	2,500	
3-20	R	Trench	15,000	
3-21	R	Trench	15,000	
3-22	R	Trench	15,000	
3-23	R	Trench	15,000	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
200 AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
216-B-24	R	Trench	15,000	
216-B-25	R	Trench	15,000	
216-B-26	R	Trench	15,000	
216-B-27	R	Trench	15,000	
216-B-28	R	Trench	15,000	
216-B-29	R	Trench	15,000	
216-B-30	R	Trench	15,000	
216-B-31	R	Trench	15,000	
216-B-32	R	Trench	15,000	
216-B-33	R	Trench	15,000	
216-B-34	R	Trench	15,000	
216-B-35	R	Trench	7,800	
216-B-36	R	Trench	7,800	
216-B-37	R	Trench	7,800	
216-B-38	R	Trench	7,800	
216-B-39	R	Trench	7,800	
216-B-40	R	Trench	7,800	
216-B-41	R	Trench	7,800	
216-B-42	R	Trench	7,800	
216-B-43	R	Crib	64,800	Stabilized FY 1978 Under ECT - D&D Program
216-B-44	R	Crib		
216-B-45	R	Crib		
216-B-46	R	Crib		
216-B-47	R	Crib		
216-B-48	R	Crib		
216-B-49	R	Crib		
216-B-50	R	Crib		

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>F</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
REA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
-51	R	French Drain	3	
-52	R	Trench	18,000	
-53A	R	Trench	2,100	
-53B	R	Trench	4,500	
-54	R	Trench	6,000	
-55	A	Crib	7,500	
-56	NU	Crib	700	No Contamination Found
-57	R	Crib	3,000	
-58	R	Trench	2,000	
-59	A	Trench	8,000	No Contamination Found
-60	R	Crib	6	No Contamination Found
-61	NU	Crib	1,750	
-62	A	Crib	5,000	No Contamination Found
-63	A	Trench	5,000	
-64	NU	Diversion Trench	5,000	No Contamination Found
-1	R	Crib	250	
-2	A	Reverse Well	1	
-3	R	Crib	2,400	
-4	R	Crib	600	
-5	R	Crib	600	
-6	R	Crib	600	
-7	A	Crib	600	
-8	R	French Drain	4	
-9	A	Pond	80,000	
-10	R	Crib	160	
I-1	RELEASED	Pond	UN	
I-2	R	Trench (backfilled)	500	No Contamination Found

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
200 AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
216-N-3	R	Trench (backfilled)	500	No Contamination Found
216-N-4	R	Pond (covered)	100,000	No Contamination Found
216-N-5	R	Trench (backfilled)	1,200	No Contamination Found
216-N-6	R	Pond (covered)	75,000	No Contamination Found
216-N-7	R	Trench (backfilled)	1,200	
216-S-1	R	Crib	3,600	
216-S-2	R	Crib	3,600	
216-S-3	R	Crib	20,000	No Contamination Found
216-S-4	R	French Drain	900	No Contamination Found
216-S-5	R	Crib	75,625	No Contamination Found
216-S-6	R	Crib	90,000	
216-S-7	R	Crib	30,625	
216-S-8	R	Trench	15,000	
216-S-9	R	Crib	26,250	No Contamination Found
216-S-10	A	Ditch & Pond	262,800	Old Redox Leach Pond
216-S-11	R	Pond	65,340	Old Redox Leach Pond No Contamination Found
216-S-12	R	Trench	5,000	
216-S-13	R	Crib	10,000	No Contamination Found
216-S-14	RELEASED	Trench	UN	
216-S-15	R	Pond (covered)	750	
216-S-16	R	Ponds (covered)	1,384,360	
216-S-17	R	Pond (covered)	740,520	
216-S-18	RELEASED	Crib	UN	
216-S-19	A	Pond	152,460	222-S Lab Pond
216-S-20	R	Crib	6,000	
216-S-21	R	Crib	5,625	
216-S-22	R	Crib	5,200	No Contamination Found

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>FE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
S-23	R	Crib	30,000	No Contamination Found
S-25	A	Crib	5,750	No Contamination Found
S-172	R	Weir and Control Structure	UN	
T-1	A	Ditch	45,000	
T-2	R	Reverse Well	1	No Contamination Found
T-3	R	Reverse Well	1	
T-4A	RELEASED	Pond	6,800	
T-4B	A	Pond	6,800	
T-4-1	R	Ditch & Pond	UN	
T-4-2	A	Ditch & Pond	UN	
T-5	R	Crib	3,000	
T-6	R	Crib	5,000	
T-7	R	Crib	40,000	No Contamination Found
T-8	R	Crib	3,300	No Contamination Found
T-9	RELEASED	Trench		
T-10	RELEASED	Trench		
T-11	RELEASED	Trench		
T-12	R	Pit	63,000	
T-13	RELEASED	Trench (Exhumed)		
T-14	R	Trench		
T-15	R	Trench	127,500	
T-16	R	Trench		
T-17	R	Trench		
T-18	R	Crib	900	
T-19	R	Crib & Tile Field	59,375	No Contamination Found
T-20	R	Crib	900	
T-21	R	Trench		

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
200 AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
216-T-22	R	Trench		
216-T-23	R	Trench	175,000	
216-T-24	R	Trench		
216-T-25	R	Trench		
216-T-26	R	Crib		
216-T-27	R	Crib	78,000	
216-T-28	R	Crib		
216-T-29	R	French Drain	UN	
216-T-30	R	Unplanned Release Site	5,500	
216-T-31	RELEASED	French Drain (Exhumed)		
216-T-32	R	Crib	40,000	No Contamination Fou
216-T-33	R	Crib	1,600	No Contamination Fou
216-T-34	R	Crib	8,800	
216-T-35	R	Crib	25,000	No Contamination Fou
216-T-36	R	Crib	20,250	No Contamination Fou
216-U-1	R	Crib	15,300	
216-U-2	R	Crib		
216-U-3	R	French Drain	400	No Contamination Fou
216-U-4	R	Reverse Well	1	No Contamination Fou
216-U-4A	R	Dry Well	2	No Contamination Fou
216-U-4B	R	Dry Well	2	No Contamination Fou
216-U-5	R	Trench	1,500	
216-U-6	R	Trench	2,000	No Contamination Fou
216-U-7	R	French Drain	2	
216-U-8	R	Crib	9,500	No Contamination Fou
216-U-9	R	Ditch	48,000	
216-U-10	A	Pond	958,320	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>TE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
U-11A	R	Ditch	51,600	
U-11B	NU	Ditch	39,200	
U-12	R	Crib	3,300	No Contamination Found
U-13	R	Crib	24,000	No Contamination Found
U-14	A	Ditch	227,200	
U-15	R	Crib	UN	
Z-1	R	Crib	17,000	No Contamination Found
Z-1	R	Ditch	UN	
Z-1A	R	Tile Field	75,000	
Z-1AA	R	Tile Field	UN	
Z-1AB	R	Tile Field	UN	
Z-1AC	R	Tile Field	UN	
Z-2	R	Crib	400	No Contamination Found
Z-3	R	Crib	1,200	No Contamination Found
Z-4	R	Crib	225	No Contamination Found
Z-5	R	Crib	5,000	No Contamination Found
Z-6	R	Crib	750	No Contamination Found
Z-6A	R		750	No Contamination Found
Z-7	R	Crib	30,000	
Z-8	R	French Drain	5,000	No Contamination Found
Z-9	R	Crib	15,000	Mining Demonstration; No Contamination Found
Z-10	R	Reverse Well	15,000	
Z-11	R	Ditch	26,500	No Contamination Found
Z-12	R	Crib	28,800	
Z-13	A	French Drain	2	No Contamination Found
Z-14	A	French Drain	2	No Contamination Found
Z-15	A	French Drain	2	No Contamination Found

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
200 AREA LIQUID WASTE DISPOSAL SITES: (CONTINUED)				
216-Z-16	A	Crib	20,000	No Contamination Fou
216-Z-17	R	Trench	4,000	No Contamination Fou
216-Z-18	R	Crib	45,900	No Contamination Fou
216-Z-19	A	Ditch	UN	
200 AREA SOLID WASTE DISPOSAL SITES:				
218-E-1	R	Burial Ground	UN	
218-E-2	R	Burial Ground	UN	
218-E-2A	R	Burial Ground	UN	
218-E-3	RELEASED	Exhumed		
218-E-4	R	Burial Ground	UN	
218-E-5	R	Burial Ground	UN	
218-E-5A	R	Burial Ground	UN	
218-E-6	RELEASED	Exhumed		
218-E-7	R	Vault	UN	No Contamination Fou
218-E-8	R	Burial Ground	UN	
218-E-9	R	Equipment Storage	UN	
218-E-10	A	Burial Ground	UN	
218-E-12A	R	Burial Ground	UN	
218-E-12B	A	Burial Ground	UN	
218-E-13	R	Burial Site	UN	
218-E-14	A	Burial Tunnel	UN	No Contamination Fou
218-E-15	A	Burial Tunnel	UN	No Contamination Fou
218-W-1	R	Burial Ground	UN	
218-W-1A	R	Burial Ground	UN	
218-W-2	R	Burial Ground	UN	
218-W-2A	A	Burial Ground	UN	
218-W-3	R	Burial Ground	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft2)</u>	<u>COMMENTS</u>
200 AREA SOLID WASTE DISPOSAL SITES: (CONTINUED)				
218-W-3A	A	Burial Ground	UN	
218-W-4A	R	Burial Ground	UN	
218-W-4B	A	Burial Ground	UN	
218-W-4C	A	Burial Ground	UN	
218-W-7	R	Vault	UN	
218-W-8	R	Vault	UN	
218-W-9	R	Burial Site	15,000	
218-W-11	A	Burial Ground	UN	
200 AREA UNPLANNED RELEASE SITES:				
UN-216-E-1	R	Ground Contamination Div. Box 241-B-151	UN	
UN-216-E-2	R	Ground Contamination Div. Box 241-B-152	UN	
UN-216-E-3	R	Ground Contamination Div. Box 241-B-153	UN	
UN-216-E-4	R	Line Break 241-B-153	UN	
UN-216-E-5	R	Ground Contamination Div. Box 241-B-154	UN	
UN-216-E-6	R	Ground Contamination Div. Box 241-BX-155	UN	
UN-216-E-7	R	Line Break 242-B to 207-B	UN	
UN-216-E-8	R	Line Break 221-B, R-3	UN	
UN-216-E-9	R	Line Break 241-CR-151	UN	
UN-216-E-10	R	Line Break 211-C-152	UN	
UN-216-E-11	R	Ground Contamination BC Cribs Controlled Area	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
200 AREA UNPLANNED RELEASE SITES: (CONTINUED)				
UN-216-E-12	R	Catch Tank Leak 241-ER-151	UN	
UN-216-E-13	R	Line Break 221-B, R-13	UN	No Contamination Fou
UN-216-E-14	R	Line Break 241-C, SW Corner	UN	
UN-216-E-15	R	Line Leak 224-B, Backside	UN	No Contamination Fou
UN-216-W-1	R	216-S-3 Crib	900	No Contamination Fou
UN-216-W-2	R	207-S Retention Basin Contamination	6,750	
UN-216-W-3	R	216-S-15 Pond	750	
UN-216-W-4	R	Ground Contamination North of 233-S	UN	No Contamination Fou
UN-216-W-5	R	Line Break 23rd & Camden	UN	
UN-216-W-6	R	Line Break 221-T, R-19	UN	
UN-216-W-7	R	Ground Contamination East of 241-TX	UN	No Contamination Fou
UN-216-W-8	R	Line Break 105TX to 118TX	12,500	
UN-216-W-9	R	Ground Contamination 221-U, R-3 - R-5	2	
UN-216-W-10	R	Interface Crud from Tank 288-U	UN	No Contamination Fou
UN-216-W-11	R	221-U Vessel Vent Blower Pit Contamination	UN	
UN-216-W-12	R	Line Leak Backside 224-T	UN	
UN-216-W-13	R	Line Break 216-Z-18 Crib Line	UN	
UN-216-W-14	R	Leach Trench NE 216-U-10 Pond	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>IE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
AREA UNPLANNED RELEASE SITES: (CONTINUED)				
216-W-15	R	Leach Trench E 216-U-10 Pond North	UN	
216-W-16	R	Leach Trench E 216-U-10 Pond South	UN	
216-W-17	R	Overflow Plain South- side 216-U-10 Pond	UN	
216-W-18	R	Line Break South End 216-S-9 Crib	UN	
216-W-19	R	Line Break East Side 218-W-9	UN	
216-W-20	R	Pu Spoil Trench Near 216-Z-1 Ditch	UN	
216-W-21	R	Sludge Pits South Side 207-U	UN	
216-W-22	R	Sludge Pits North Side 207-U	UN	
216-W-23	R	Ground Contamination Hillside West of 241-TX-155	UN	
218-E-1	R	Contaminated Concrete from Underground Pipe Encasement	UN	
218-E-2	R	BC Cribs Outer Area	UN	Approximately 4 Square Miles
218-E-13	R	Contaminated Concrete from Underground Pipe Encasement	UN	Same as UN-218-E-1
218-W-1	R	Buried Canyon Cell Blocks	UN	10 Cell Cover Blocks from 221-T Canyon
IE MANAGEMENT FACILITIES:				
-S	R	Hexone Tank	UN	
-S	R	Hexone Tank	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
WASTE MANAGEMENT FACILITIES: (CONTINUED)				
207-A	A	Retention Basin	UN	242-A Evaporator
207-B	A	Retention Basin	UN	B Plant
207-S	R	Retention Basin (covered)	UN	Redox
207-SL	A	Water Retention Basin	UN	Redox Laboratory
207-T	A	Water Retention Basin	UN	T Plant
207-U	SB	Water Retention Basin	UN	U Plant
240-S-151	A	Diversion Box	UN	
240-S-152	A	Diversion Box	UN	
241-A	A	A Tank Farm	UN	6 tanks, 1,000,000 gal each
241-A-151	A	Diversion Box	UN	
241-A-152	A	Diversion Box	UN	No Contamination Fo
241-A-153	A	Diversion Box	UN	No Contamination Fo
241-A-271	A	Tank Farm Control House	UN	
241-A-401	A	Tank Farm Condenser House	UN	
241-A-417	A	Condensate Receiver and Pump Pit	UN	
241-A-431	A	Tank Farm Ventilation Bldg.	UN	
241-A-501	A	Condensate Valve Pit	UN	
241-A-701	A	Tank Farm Compressor House	UN	
241-A-702	A	Tank Farm Fan House	UN	
241-AX	A	AX Tank Farm	UN	4 tanks, 1,000,000 gal each
241-AX-151	A	Diversion Box	UN	
241-AX-152	A	Diversion Box	UN	
241-AX-153	A	Diversion Box	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>TE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
E MANAGEMENT FACILITIES: (CONTINUED)				
AX-501	A	Condensate Valve Pit	UN	
AX-801A	A	Tank Farm Control House, North	UN	
AX-801B	A	Tank Farm Control House, South	UN	
AX-801C	A	Tank Farm Diversion House	UN	South of A Farm
AY	A	AY Tank Farm	UN	2 tanks, 1,000,000 gal each
AY-151	A	Pump Out Pit	UN	No Contamination Found
AY-152	A	Pump Out Pit	UN	No Contamination Found
AY-501	A	Condensate Valve Pit	UN	
AY-801	A	Tank Farm Instrument House	UN	
AZ	A	AZ Tank Farm	UN	2 tanks, 1,000,000 gal each
AZ-151	A	Diverter Station	UN	No Contamination Found
AZ-152	A	Sluice Transfer Box	UN	
AZ-501	A	Condensate Valve Pit	UN	
AZ-801	A	Tank Farm Instrument House	UN	
B	A	B Tank Farm	UN	4 tanks, 55,000 gal each; 12 tanks, 533,000 gal each
B-151	A	Diversion Box	UN	
B-152	A	Diversion Box	UN	No Contamination Found
B-153	A	Diversion Box	UN	No Contamination Found
B-154	A	Diversion Box	UN	
B-251	A	Diversion Box	UN	
B-252	A	Diversion Box	UN	No Contamination Found

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
WASTE MANAGEMENT FACILITIES: (CONTINUED)				
241-B-701	A	Instrument Air Compressor Building	UN	
241-BR	A	B Farm Waste Metal Recovery Facilities	UN	
241-BR-152	A	Diversion Box	UN	
241-BX	A	BX Tank Farm	UN	12 tanks, 533,000 gal each
241-BX-153	A	Diversion Box	UN	
241-BX-154	A	Diversion Box	UN	
241-BX-155	A	Diversion Box	UN	
241-BXR	A	BX Farm Waste Metal Recovery Facilities	UN	
241-BXR-151	A	Diversion Box	UN	
241-BXR-152	A	Diversion Box	UN	
241-BSR-153	A	Diversion Box	UN	
241-BY	A	BY Tank Farm	UN	12 tanks, 750,000 gal each
241-BY-254	A	Control House and Compressor (ITS-2)	UN	
241-BY-301	A	Control House In-Tank Solidification (ITS-1)	UN	
241-BY-302	A	Compressor House (ITS-1)	UN	
241-BYR	A	BY Farm Waste Metal Recovery Facilities	UN	
241-BYR-152	A	Diversion Box	UN	
241-BYR-153	A	Diversion Box	UN	
241-BYR-154	A	Diversion Box	UN	
241-C	A	C Tank Farm	UN	4 tanks, 55,000 gal each; 12 tanks, 500,000 gal each
241-C-151	A	Diversion Box	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>ITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
FE MANAGEMENT FACILITIES: (CONTINUED)				
-C-152	A	Diversion Box	UN	
-C-153	A	Diversion Box	UN	
-C-252	A	Diversion Box	UN	No Contamination Found
-C-801	R	Cesium Loadout Bldg.	UN	
-CR	A	C Farm Waste Metal Recovery Facilities	UN	
-CR-151	A	Diversion Box	UN	
-CR-152	A	Diversion Box	UN	
-CR-153	A	Diversion Box	UN	No Contamination Found
-CR-271	A	Waste Disposal Control House	UN	
-CX	R	CX Tank Farm	UN	3 tanks, 3,000 gal each
-ER-151	A	Diversion Box	UN	
-ER-152	A	Diversion Box	UN	
-ER-153	A	Diversion Box	UN	
-EW-151	A	Vent Station	UN	
-S	A	S Tank Farm	UN	12 tanks, 750,000 gal each
-S-151	A	Diversion Box	UN	
-S-152	A	Diversion Box	UN	
-S-153	A	Diversion Box	UN	
-S-271A	A	Electrical and Instru- ment Control House	UN	
-S-271B	A	Electrical and Instru- ment Control House Switches	UN	
-SX	A	SX Tank Farm	UN	15 tanks, 1,000,000 gal each
-SX-151	A	Diversion Box	UN	
-SX-152	A	Diversion Box	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
WASTE MANAGEMENT FACILITIES: (CONTINUED)				
241-SX-271	A	Tank Farm Control House	UN	
241-SX-401	A	Condenser House, North	UN	
241-SX-402	A	Condenser House, South	UN	
241-SX-701	A	Compressor House	UN	
241-SY	A	SY Tank Farm	UN	3 tanks, 1,000,000 gal each
241-SY-271	A	Instrument and Electrical Control House	UN	
241-T	A	T Tank Farm	UN	{ 4 tanks, 55,000 gal each; 12 tanks, 533,000 gal each
241-T-151	A	Diversion Box	UN	No Contamination Found
241-T-152	A	Diversion Box	UN	
241-T-153	A	Diversion Box	UN	
241-T-252	A	Diversion Box	UN	No Contamination Found
241-T-701	A	Instrument Air Compressor House	UN	
241-TR	A	T Farm Waste Metal Recovery Facilities	UN	
241-TR-152	A	Diversion Box	UN	
241-TR-153	A	Diversion Box	UN	No Contamination Found
241-TX	A	TX Tank Farm	UN	18 tanks, 750,000 gal each
241-TX-153	A	Diversion Box	UN	
241-TX-154	A	Diversion Box	UN	
241-TX-155	A	Diversion Box	UN	
241-TXR	A	TX Farm Waste Metal Recovery Facilities	UN	
241-TXR-151	A	Diversion Box	UN	
241-TXR-152	A	Diversion Box	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>IE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
MANAGEMENT FACILITIES: (CONTINUED)				
XR-153	A	Diversion Box	UN	
XR-244	A	Vault	UN	
TY	A	TY Tank Farm	UN	6 tanks, 750,000 gal each
TY-153	A	Diversion Box	UN	
I	A	U Tank Farm	UN	4 tanks, 55,000 gal each; 12 tanks, 533,000 gal each
I-151	A	Diversion Box	UN	
I-152	A	Diversion Box	UN	
I-153	A	Diversion Box	UN	
I-252	A	Diversion Box	UN	No Contamination Found
I-271	A	U Farm Control House	UN	
I-361	A	Catch Tank	UN	
I-702	A	Vault Ventilation Bldg.	UN	
IR	A	U Farm Waste Metal Recovery Facilities	UN	
IR-151	A	Diversion Box	UN	No Contamination Found
IR-152	A	Diversion Box	UN	No Contamination Found
IR-153	A	Diversion Box	UN	No Contamination Found
IR-154	A	Diversion Box	UN	No Contamination Found
IX-154	A	Diversion Box	UN	
I-151	A	Catch Tank	UN	For Vent Station 241-EW-151
IR	A	Vault	UN	
I	A	Tank Farm Waste Dis- posal Sump Area	UN	} Belong to 234-5; are not in tank farms
IA	A	Sample Building	UN	
IB	A	Open Area Slab-Struc- ture Uranium Storage	UN	
IC	A	Sump Vent Enclosure	UN	

CONTAMINATED FACILITIES LIST (CONTINUED)

<u>SITE</u>	<u>STATUS</u>	<u>DESCRIPTION</u>	<u>TOTAL AREA (ft²)</u>	<u>COMMENTS</u>
WASTE MANAGEMENT FACILITIES: (CONTINUED)				
242-A	A	Evaporator	UN	
242-A-702	A	Turbine Building	UN	
242-B-151	A	Diversion Box	UN	
242-S	A	Evaporator Facility	UN	
242-S-702	A	Turbine Bldg, Ventilation	UN	
242-T	A	Waste Disposal Evapo- rator Building	UN	
242-T-151	A	Diversion Box	UN	
242-TA	A	Vault	UN	
242-TB	A	Vent House	UN	
244-A	A	Waste Vault and Instrument House	UN	} Not located in a tank farm
244-AR	A	Sludge Vault Storage and Processing	UN	
244-AR-712	A	Vault Air Lock and Loadout Building	UN	
244-BXR	A	Waste Disposal Vault, Underground	UN	
244-CR	A	Waste Disposal Vault, Underground	UN	
244-TXR	A	Waste Disposal Vault	UN	
252-BY	A	Substation, 13.8 kV	UN	Previously ITS-2 Substation
271-UR	A	Underground Services for U Farm Control House	UN	Part of Building 271 Slab