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SUMMARY OF
SITE CHARACTERIZATION/REMEDIAL INVESTIGATION PLANS
FOR THE ROCKY FLATS PLANT

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SITE CHARACTERIZATION/REMEDIAL INVESTIGATION PLANS
FOR THE ROCKY FLATS PLANT

INTRODUCTION

This document summarizes ongoing investigation activities at the areas of the Rocky Flats Plant potentially contaminated with hazardous or radioactive materials. These environmental activities are an outgrowth of the United States Environmental Protection Agency rules and regulations governing hazardous waste. These rules and regulations fall into two broad categories: the Resource Conservation and Recovery Act (RCRA) regulations governing use, operation, maintenance, corrective action and eventual decommissioning (closure) of hazardous waste management areas operating in November 1980 and later; and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) governing the investigation and clean-up of hazardous waste disposal sites that ceased operation prior to November 1980. The United States Department of Energy (DOE) facilities (of which the Rocky Flats Plant is one) operate under a policy of full compliance with applicable environmental regulations while conducting their mission. DOE fulfills this responsibility through the use of DOE orders that address the letter and intent of a number of environmental regulations including RCRA and CERCLA. DOE developed a program to implement RCRA and CERCLA activities at inactive sites called the Comprehensive Environmental Assessment and Response Program (CEARP). The Rocky Flats Plant is one of several DOE facilities being evaluated under the CEARP program.

On July 31, 1986, a Compliance Agreement was signed by representatives of the DOE, the EPA, and the State of Colorado regarding which agencies have authority to regulate environmental activities at the Rocky Flats Plant. This Compliance Agreement gave the EPA and the Colorado Department of Health (CDH) authority to regulate hazardous and radioactive mixed waste (a waste that has both chemically hazardous constituents and low levels of radioactivity) activities at Rocky Flats. The Compliance Agreement ties specific tasks defined in either the regulations or the Compliance Agreement to aggressive implementation schedules at Rocky Flats.

CEARP investigations at Rocky Flats are being integrated with Compliance Agreement tasks addressing both RCRA and CERCLA issues. Environmental activities, whenever discussed in this document, will first be presented with the CEARP name followed by the equivalent CERCLA or RCRA name in parentheses.

OVERVIEW OF THE CEARP PROGRAM

CEARP is being implemented in five phases. The Phase I, Installation Assessment (CERCLA Preliminary Assessment, RCRA Preliminary Facility Assessment), has already been completed at Rocky Flats. This phase evaluated current compliance with environmental laws and ascertained the magnitude of potential environmental concerns. CEARP Phase 2, Site Characterization (CERCLA Remedial Investigation, RCRA Assessment Monitoring), will complete the environmental evaluation of potential environmental concerns identified in CEARP Phase 1, and plan and carry out

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sampling programs, as required, to characterize potential contaminant sources and environmental pathways. CEARP Phase 3, Technology Assessment (CERCLA Feasibility Study), will develop remedial action plans to mitigate environmental problems identified as needing correction in CEARP Phase 2, and will suggest the best remedial alternative to the EPA and CDH for their selection. CEARP Phase 4, Remedial Action (CERCLA Remedial Design and Action, RCRA Corrective Action), will implement selected site-specific remedial actions identified in CEARP Phase 3. CEARP Phase 5 Assessment and Verification (CERCLA Inspection/Monitoring) will document the adequacy of remedial actions carried out under CEARP Phase 4 and plan for continued monitoring requirements.

SUMMARY OF SITE CHARACTERIZATION PLANS (COMPLIANCE AGREEMENT TASK 3.8)

On February 16, 1987, documents outlining the CEARP Phase 2 program at the Rocky Flats Plant were submitted to the EPA and the Colorado Department of Health. Implementation of CEARP Phase 2 activities has already begun. CEARP uses a three-tiered approach in preparing Phase 2 Plans: the CEARP Generic Monitoring Plan (CGMP), the Installation Generic Monitoring Plan (IGMP), and the Site Specific Monitoring Plans (SSMPs).

The CGMP serves as a general outline for all work to be done at any DOE site requiring CEARP Phase 2 actions. The CGMP serves as a generic document from which specific procedures for a particular facility are developed.

The IGMP provides guidelines for all work to be conducted at a

particular DOE facility. The IGMP is a derivative of the CGMP and serves to guide development of plans to characterize any particular area of a DOE facility. The IGMP for the Rocky Flats Plant has been developed as the Comprehensive Source and Plume Characterization Plan in accordance with Task 3.8 of the Compliance Agreement.

The SSMPs serve as work plans for performing Site Characterizations (CERCLA Remedial Investigations, RCRA Assessment Monitoring) for all sites at a DOE facility. The SSMPs for Rocky Flats are being developed from the IGMP. The SSMP submitted February 16, 1987, serves as the Work Plan for Remedial Investigations and Feasibility Studies for units identified as potentially major contributors to groundwater contamination, including the high priority sites, in accordance with Task 3.8 of the Compliance Agreement. The CEARP Site Characterization Plan contains six parts: Synopsis, Sampling Plan, Technical Data Management Plan, Health and Safety Plan, Quality Assurance/Quality Control (QA/QC) Plan, and a Feasibility Study Plan. The CEARP Sampling Plan provides the basic components of sample/measurement collection and analysis for each unit at the Rocky Flats Plant. The purpose of the Technical Data Management Plan is to provide a structured and organized framework in which to identify and document contaminants in the Rocky Flats Plant environs. It further ensures that necessary information for preparation of Site Characterization (CERCLA Remedial Investigations, RCRA Assessment Monitoring) and Technological Assessments (CERCLA Feasibility Studies) are available, and that specific reporting requirements are met. The purpose of the

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Health and Safety Plan is to ensure that human exposure to toxic materials and radiation are as low as reasonably achievable. The QA/AC Plan is designed to achieve specific data quality goals for Site Investigations (CERCLA Remedial Investigations, RCRA Assessment Monitoring). The purpose of the Feasibility Study Plan is to develop and evaluate alternative remedial actions in terms of cost, feasibility of proposed engineering, extent of protection to public health and the environment, and environmental impacts during or remaining after implementation.

Sampling at any CEARP DOE facility (including Rocky Flats) is conducted in stages, in which the results from the previous stage of sampling are used to design the next stage. This iterative process incorporates the experience and knowledge gained from each stage to minimize the total number of samples required to adequately characterize the site and to provide the necessary data base to prepare feasibility studies for alternative remedial actions.

ROCKY FLATS PHASE 2 WORK

The objectives of CEARP Phase 2 Site Characterization activities (CERCLA Remedial Investigations) at Rocky Flats are to:

- verify and characterize contaminant sources
- determine the present areal and vertical extent of contamination
- estimate the potential for contaminant migration (including rate and direction) to support risk assessment studies
- support the technological assessments (feasibility

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studies) of alternative response actions, including the alternative of "no action," and

-support identification of long term monitoring and verification requirements, as appropriate

The high priority sites at Rocky Flats are located in an area known as the 881 Hillside Area. The 881 Hillside Area is proposed as the high priority area because of the concentrations of volatile organic compounds present in the groundwater, the relatively high permeability of the soils in the area, and the proximity to one of the surface drainages. The other areas for which remedial investigation plans were prepared as part of the Rocky Flats SSMP are the: 903 Pad Area, the Mound Area, and the East Burial Trenches Area. These other areas also appear to be sources of groundwater contamination.

The solar ponds and present landfill are RCRA regulated units undergoing closure. Closure, which is a RCRA-regulated activity, is intended to control, minimize or eliminate, to the extent necessary to protect human health and the environment from the escape of hazardous waste and hazardous waste constituents after closure of the unit. Site characterization plans were prepared and are being implemented for the solar ponds and landfill areas because of RCRA closure schedules.

Investigations at each site can be divided into source characterization, and migration pathway and plume characterization (the extent and magnitude of groundwater contamination). Source characterization is an attempt to define the source and quantity of any contaminant that may potentially be affecting groundwater quality. Source characterization consists of geophysical surveys, soil gas surveys and soil/waste

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sampling. Determination of the extent and magnitude of groundwater contamination includes geophysical surveys, soil gas surveys, soil sampling, monitor well installation, and groundwater sampling. Surface water and sediment sampling is also being conducted at the Rocky Flats Plant to aid in defining the extent and magnitude of surface water contamination and surface water - groundwater contamination. All CEARP Phase 2 site characterizations (CERCLA Remedial Investigations, RCRA Assessment Monitoring) will be implemented using an integrated approach, in which geophysical and soil gas survey results are used to direct soil and groundwater sampling efforts. Detailed procedures for implementation of all aspects of the remedial investigations are contained in the plans submitted to the EPA and CDH on February 16, 1987.

Attached to this summary are outlines of the Phase 2 CEARP documents: the Installation Generic Monitoring Plan and the Site Specific Monitoring Plan.

The following sections present a description of the high priority area (881 Hillside Area), and descriptions of the other areas which appear to be contributors to groundwater contamination.

881 HILLSIDE AREA

The 881 Hillside Area has been the site of various spills and disposal operations during the history of the plant. The ten high priority sites that make up the 881 Hillside Area are: an oil sludge pit, a chemical burial area containing unknown

MOUND AREA

The Mound Area is composed of the following sites: Trench T-1, the Mound Area Site, oil burn pit number 2, and a pallet burn site. Trench T-1 was used from 1952 until 1962 for disposal of 125 drums filled with depleted uranium chips (depleted uranium is uranium from which fissile radioactive materials have largely been removed) coated with small amounts of lathe coolant. The Mound Area Site was used from 1954 until 1958 for disposal of 1405 drums of depleted uranium and beryllium wastes, the drums were removed between 1967 and 1970 and shipped offsite for disposal. Oil burn pit number 2 was used to burn oil slightly contaminated with uranium, the pit was excavated to a depth of approximately 5 feet in 1978 and the wastes shipped offsite for disposal. The pallet burn site was used in 1965 to destroy possibly contaminated wooden pallets. A schedule for remedial investigation of the Mound Area is found in Figure 1.

EAST TRENCHES AREA

The East Trenches Area consists of nine burial trenches (Trenches T-3 through T-11). The trenches were used from 1954 to 1968 for disposal of depleted uranium, flattened depleted uranium and plutonium contaminated drums, and sanitary sewage sludge. Trench T-3 received radioactively contaminated flattened drums and substantial quantities of sanitary sewage sludge. Trenches T-4 and T-11 also contain some uranium and plutonium contaminated planks from the solar evaporation ponds and sanitary sewage sludge. The trenches are covered with soil. A schedule for

remedial investigation of the East Trenches is found in Figure 1.

PRESENT LANDFILL AREA

The Present Landfill Area consists of the present landfill and two other sites on the hillsides east of the landfill discussed below.

Operations at the present landfill began in 1968. Operational procedures have evolved over the life of the landfill. Most of the 20 to 30 cubic yards of waste historically delivered to the landfill each day was office trash. Small quantities of hazardous materials including solvents and paints were incorporated into the landfill along with construction debris and shop wastes. These practices were halted in November of 1986.

Three trenches were operated in the vicinity of the landfill for disposal of sanitary sewage sludge contaminated with uranium and possibly plutonium.

A schedule for planned work in this area is found in the Present Landfill Closure Plan submitted to the EPA and the Colorado Department of Health on November 28, 1986, in the Rocky Flats Plant Post - Closure Care Permit Application.

SOLAR EVAPORATION PONDS AREA

The Solar Evaporation Ponds Area consist of three separate ponds: 207A, 207B, and 207C. Pond 207B is separated into three sectors (north, central, and south). Ponds 207A and 207C contain low-level radioactive liquid process wastes (high in nitrate) being held for evaporation, treatment and solidification. Pond 207B North receives groundwater pumped from the interceptor

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trench north of the solar ponds. Pond 207B Center contains treated sanitary wastewater from the treatment plant. Pond 207B South is currently empty. The solar evaporation ponds were constructed in separate phases between 1953 and 1970.

In addition to the high nitrate, low-level radioactive process waste and the treated aluminum hydroxide waste, the solar evaporation ponds have received sanitary sewage sludge, lithium metal, sodium nitrate, ferric chloride, lithium chloride, sulfuric acid, ammonium persulfate, hydrochloric acid, nitric acid, hexavalent chromium and cyanide solutions. To the greatest extent possible, oils and solvents were not sent to the ponds so that surface scum would not hamper evaporation.

A series of trenches and drains was constructed on the north facing slope below the ponds to collect leakage between 1971 and 1981. Because of various construction projects in the area, only the most recent french drain, constructed in 1981, is functional. This system more than covers the east-west dimensions of the ponds and appears to be effective in collecting the seepage.

A schedule for future work at the Solar Evaporation Ponds Area is found in the Solar Ponds Closure Plan submitted to the EPA and the Colorado Department of Health on March 1, 1987.

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SUMMARY
COMPREHENSIVE ENVIRONMENTAL ASSESSMENT
AND RESPONSE PROGRAM
PHASE 2:
ROCKY FLATS PLANT
INSTALLATION GENERIC MONITORING PLAN

The principal components of this document are as follows:

I). Synopsis

1). Introduction

2). Current Situation

2.1). Site Description and Background

2.2). Nature and Extent of the Problem

2.3). History of Response Actions

2.4). Evaluation of Existing Data

3). Possible Remedial Alternatives

4). Data Requirements

4.1). Data Needs

5). CEARP Phase 2 - Implementation

5.1). Implementation Responsibilities

5.2). Integrated Approach

5.3). CEARP Phase 2A - Monitoring Plan

5.4). Prioritization of Sites

5.5). Reporting Requirements

II). Sampling Plan

1). Introduction

1.1). Integrated Approach

1.2). Objectives of the Sampling Program

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- 1.3). Scope
- 1.4). Schedule
- 2). Site Survey and Mapping
 - 2.1). Installation Coordinate System
 - 2.2). Area of Interest
 - 2.3). Scope of Work for Surveying
- 3). Data Requirements
 - 3.1). Installation Data Needs
 - 3.2). Site - Specific Data Needs
- 4). Sampling Plan and Rationale
 - 4.1). Installation - Wide Sampling Plan
 - 4.2). Guidance for the Site - Specific Sampling Plans
- 5). Sample Numbering System
- 6). Sampling Equipment and Procedures
 - 6.1). Surface Soil Samples
 - 6.2). Soil Samples Collected During Drilling
 - 6.3). Monitoring Well Installation
 - 6.4). Groundwater Samples
 - 6.5). Hydraulic Tests
 - 6.6). Surface Water Samples
 - 6.7). Storage and Disposal of Drilling and Sampling Wastes
- 7). Sample Analysis and Handling
 - 7.1). Sample Containers and Preservation
 - 7.2). Sample Packaging and Shipping
- 8). Sample Documentation and Tracking
 - 8.1). Field Records
 - 8.2). Chain - of - Custody Procedures

8.3). Photographs

III). Technical Data Management Plan

- 1). Introduction
- 2). Objectives
- 3). Implementation
- 4). Data and Documentation Requirements
- 5). Data Analysis
- 6). Data Reporting
- 7). Data Archive
- 8). Information Management System Description
 - 8.1). Information Management System
 - 8.2). Data Collection and Entry
 - 8.3). Data Analysis
 - 8.4). Program and Model Library

IV). Health and Safety Plan

- 1). Introduction
- 2). Policy and Standards
 - 2.1). Policy
 - 2.2). Standards and Regulations
 - 2.3). Permits
- 3). Health and Safety Responsibilities
 - 3.1). General Responsibilities
 - 3.2). Installation Requirements
 - 3.3). Specific Responsibilities
 - 3.4). Audits
 - 3.5). Variances from Health and Safety Requirements
- 4). Hazard Assessment and Personnel Protection Requirements
 - 4.1). Identification of Potential Hazards

- 4.2). Personnel Protection Requirements
- 4.3). Site Access Control
- 4.4). Worker Training
- 4.5). Employee Medical Program
- 4.6). Records and Reporting Requirements
- 4.7). Employee Information
- 5). Emergency Response and Notification
 - 5.1). Emergency Contacts
 - 5.2). Contingency Plans
 - 5.3). Notification Requirements
- 6). Environmental Monitoring
- V). Quality Assurance/Quality Control Plan
 - 1). Introduction
 - 2). Project Organization and Responsibility
 - 2.1). Operational Responsibilities
 - 2.2). Analytical Laboratory Responsibilities
 - 2.3). QA Responsibility
 - 3). Quality Assurance Objectives for Measurement Data
 - 3.1). Regulatory and Legal Requirements
 - 3.2). Level of Quality Assurance Effort
 - 3.3). Accuracy, Precision, and Sensitivity of Analyses
 - 3.4). Completeness, Representativeness, and Comparability
 - 3.5). Field Measurements
 - 4). Sampling Procedures
 - 5). Sample Custody
 - 6). Calibration Procedures and Frequency
 - 7). Analytical Procedures

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- 8). Data Reduction, Validation and Reporting
- 9). Internal Quality Control Procedures
- 10). Performance and Systems Audits
- 11). Preventive Maintenance
- 12). Laboratory Data Assessment Procedures
- 13). Corrective Action Procedures
- 14). Quality Assurance Reports

Appendix A: Quality Assurance/Quality Control Plan

- 1). Laboratory QA/QC Plan
 - 1.1). Introduction
 - 1.2). Sample Management
 - 1.3). Analytical Systems
 - 1.4). Analytical Methods
 - 1.5). Reference Materials
 - 1.6). Reagents
 - 1.7). Corrective Actions
 - 1.8). Data Management
- 2). Performance and System Audits
 - 2.1). Field Audits
 - 2.2). Corrective Action

VII). Feasibility Study Plan

- 1). Introduction
- 2). Remedial Response Objectives
- 3). Preliminary Alternative Remedial Actions Development
 - 3.1). Alternative Remedial Action Identification
 - 3.2). Identification of Potential Operable Units
- 4). Alternative Remedial Action Screening
 - 4.1). Technical Feasibility Screening

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- 4.2). Environmental, Public Health, and Institutional Screening
- 4.3). Cost Screening
- 5). Remedial Action Analysis
 - 5.1). Detailed Development of Feasible Remedial Actions
 - 5.2). Treatability Studies
 - 5.3). Remedial Action Assessment
- 6). Comparative Evaluation of Acceptable Alternatives
- 7). CEARP Phase 3 Technological Assessment (Feasibility Study) Report

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SUMMARY
COMPREHENSIVE ENVIRONMENTAL ASSESSMENT
AND RESPONSE PROGRAM
PHASE 2:
ROCKY FLATS PLANT
SITE-SPECIFIC MONITORING PLAN/
HIGH-PRIORITY SITES

I). Synopsis

- 1). Introduction
- 2). Description of Current Situation
 - 2.1). High Priority Sites
 - 2.2). Pathways
- 3). Possible Remedial Alternatives
- 4). Data Requirements
- 5). CEARP Phase 2 - Implementation
 - 5.1). Implementation Responsibilities
 - 5.2). Integrated Approach
 - 5.3). CEARP Phase 2a - Monitoring Plan
 - 5.4). Prioritization of Sites
 - 5.5). Reporting Requirements

II). Sampling Plan

- 1). Introduction
 - 1.1). Purpose
 - 1.2). Objectives
- 2). Site Survey and Mapping
- 3). Site-Specific Monitoring
 - 3.1). 881 Hillside Site

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- 3.2). 903 Pad Area Site
- 3.3). Mound Area Site
- 3.4). East Treches Site
- 3.5). Present Landfill Site
- 3.6). Solar Evaporation Ponds Site

- 4). Sample Containers, Preservation, and Holding Times
- 5). Sample Control and Documentation
- 6). Sample Handling, Transport, and Storage
- 7). Sample Preparation and Analyses

III). Technical Data Management Plan

- 1). Introduction
- 2). Objectives
- 3). Implementation
- 4). Data and Documentation Requirements
- 5). Data Analysis
- 6). Data Reporting
- 7). Data Archive
- 8). Information Management System Description
 - 8.1). Information Management System
 - 8.2). Data Collection and Entry
 - 8.3). Data Analysis
 - 8.4). Program and Model Library

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 - 2.1). Policy
 - 2.2). Standards and Regulations

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 - 3.5). Variances from Health and Safety Requirements
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 - 4.1). Identification of Potential Hazards
 - 4.2). Personnel Protection Requirements
 - 4.3). Site Access Control
 - 4.4). Worker Training
 - 4.5). Employee Medical Program
 - 4.6). Records and Reporting Requirements
 - 4.7). Employee Information
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- 6). Environmental Monitoring
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- 5). Sample Custody
- 6). Calibration Procedures and Frequency
- 7). Analytical Procedures
- 8). Data Reduction, Validation, and Reporting
- 9). Internal Quality Control Procedures
- 10). Performance and Systems Audits
- 11). Preventive Maintenance
- 12). Laboratory Data Assessment Procedures
- 13). Corrective Action Procedures
- 14). Quality Assurance Reports

VI). Feasibility Study Plan

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 - 3.2). Identification of Potential Operable Units
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 - 4.1). Technical Feasibility Screening
 - 4.2). Environmental, Public Health, and Institutional Screening
 - 4.3). Cost Screening
- 5). Remedial Action Analysis
 - 5.1). Detailed Development of Feasible Remedial Actions
 - 5.2). Treatability Studies
 - 5.3). Remedial Action Assessment
- 6). Comparative Evaluation of Acceptable Alternatives

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7). CEARP Phase 3 Technology Assessment (Feasibility Study)
Report

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