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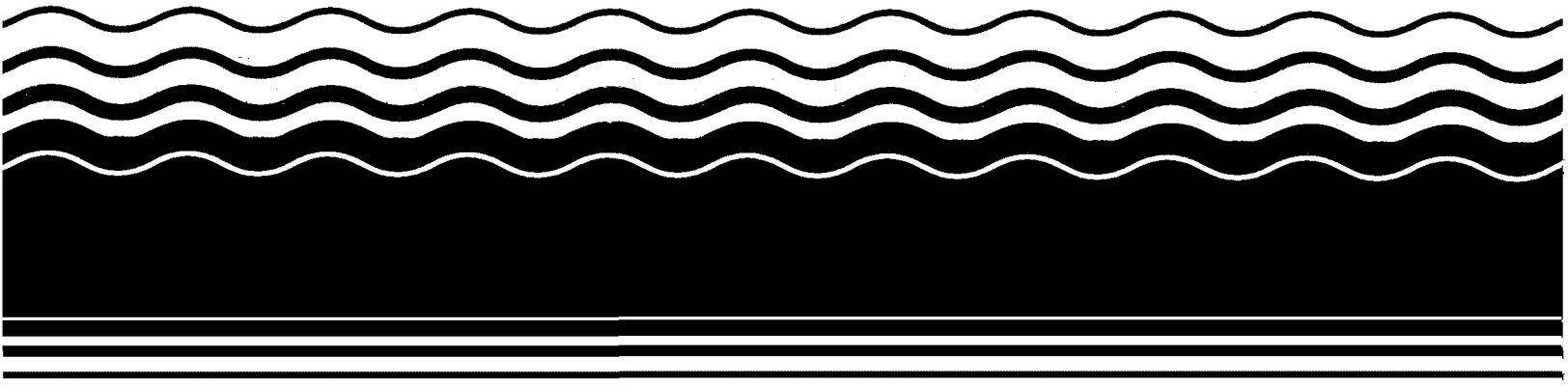
March 1995

EPA Superfund
Explanation of Significant Difference for the Record of Decision:

Denver Radium Superfund Site (O.U. 4 & 5), Denver, CO 12/7/1994



EXPLANATION OF SIGNIFICANT DIFFERENCES

DENVER RADIUM SUPERFUND SITE
OPERABLE UNIT IV/V

INTRODUCTION

The purpose of this document is to explain the significant differences between the remedy selected in the Record of Decision (ROD), signed by the U.S. Environmental Protection Agency (EPA) on September 30, 1986 and the remedy which was implemented at Operable Unit IV/V (OU IV/V) of the Denver Radium Superfund Site. EPA is the lead agency at OU IV/V with the support of the Colorado Department of Public Health and Environment.

OU IV/V is located in Denver, Colorado at 500 South Santa Fe Drive, near the intersection of West Alameda Avenue and Interstate 25 (Figure 1). The 17 acre site consists of two properties; the Robinson Brick Company property (OU IV) and the adjacent Denver & Rio Grande Western Railroad property (OU V). OU IV/V is zoned for industrial use.

This Explanation of Significant Differences (ESD) describes changes to the remedy that were implemented at OU IV/V. The ESD explains 1) how the remedy was modified to address the discovery of much larger volumes of contaminated soils than were anticipated at the time of the ROD, and 2) why certain contaminated soils were left in place based on supplemental standards and how these soils will be managed.

The Administrative Record, in accordance with Section 300.825(a)(2) of the National Contingency Plan, 40 CFR Part 300 (NCP), contains this ESD, the documents that form the basis for the decision to modify the response action, and the documentation relating to selecting a remedy for OU IV/V. It is available for public review at the following location:

EPA Superfund Record Center
999 18th Street, Suite 500
Denver, Colorado 80202
Hours: M-F 8:00 AM - 4:30 PM
Telephone: (303) 293-1807

This ESD is prepared in fulfillment of EPA's public participation responsibilities under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and Section 300.435(c)(2)(1) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300.

SITE HISTORY

The Denver Radium Site is comprised of over 40 properties located along the South Platte River Valley that were contaminated as a result of a radium processing industry that flourished in Denver during the period from 1915 to 1927. Production of refined radium produced large quantities of radioactive waste materials. Generally, these materials were discarded on-site when the processing facilities were closed.

In 1979, EPA discovered the presence of long-forgotten radium processing sites. Subsequent field research revealed the presence of thirty-one radiologically contaminated properties in Denver. Because of the enormity and complexity of the Denver Radium Site, EPA divided the Site into Operable Units based upon site conditions and proximity with other radiologically contaminated properties.

Industrial activity at OU IV/V began in 1886 with the Bailey Smelter. The Bailey Smelter appears to have operated only sporadically in the late 1880's. In 1890, the Gold & Silver Extraction Company began a cyanide leaching operation. In 1901, the Bailey Smelter burned down. By 1903, the Colorado Zinc Company had constructed a mill on the Site of the old Bailey Smelter. Zinc milling operations continued until about 1910. From 1914 - 1917, the U.S. Bureau of Mines operated a Radium processing facility (the National Radium Institute) on Site. Other industrial activities at the site have included minerals recovery, manufacturing and servicing of storage batteries, treating and sacking of metallic ore insulation, oil reclamation, and landfilling. In 1941, the Robinson Brick Company acquired 13.5 acres of the Site and in 1951 acquired an additional 3.5 contiguous acres and manufactured bricks on the Site until 1980.

The Denver Radium Site was placed on the National Priorities List (NPL) in September 1983. EPA released a Remedial Investigation for OU IV/V in April of 1986 and a Feasibility Study in September, 1986. On September 30, 1986, EPA issued a Record of Decision (ROD) for OU IV/V. Remedial action began in May, 1988 and was completed in March, 1991.

SUMMARY OF THE REMEDY SELECTED IN THE 1986 RECORD OF DECISION

Radium and its associated decay products were the primary contaminants of concern at OU IV/V. Radiologic contamination poses a health hazard by way of three routes of exposure: 1) inhalation of radon gas and its decay products; 2) direct exposure to gamma radiation from the decay of radium and its progeny; and 3) ingestion or inhalation of radium contaminated material. The greater the exposure rate and the longer the exposure to radiation, the greater the associated health hazard. Of these three exposure routes, the most significant risk is that posed by radon gas accumulating in buildings.

EPA's preferred alternative and the remedy selected by EPA for OU IV/V was removal and permanent off-site disposal of radiologically contaminated materials. Because a permanent disposal facility was not available at the time the ROD was issued in September, 1986, the remedy included temporary on-site storage and stabilization measures to be implemented while EPA and the State of Colorado searched for a permanent repository.

The selected remedy in the ROD entailed:

* Removal of approximately 11,000 tons of radium - contaminated soil from the site.

* Removal of approximately 200 cubic yards of debris from the demolition of the contaminated laboratory and office buildings.

* Disposal of the contaminated soil and debris at a facility permitted to accept radiologically contaminated waste.

DESCRIPTION OF THE SIGNIFICANT DIFFERENCES

The significant differences from the 1986 ROD are: (1) the volume of contaminated soils increased, and 2) relatively small volumes of contaminated soils were left in place based upon supplemental standards.

Difference 1. The volume of contaminated soils removed (96,984 tons) was almost nine times greater than the amount estimated in the ROD (11,000 tons). It was discovered during the remedial action that the contamination was not located in a single continuous deposit. It was located in lens shaped deposits which were layered on top of each other. Between the lenses of radiological contaminated soils were deposits of soils free from radiological contamination. Thus, the radiological contamination occurred deeper than estimated in the Remedial Investigation, resulting in a much greater volume of contaminated soils to be excavated and disposed at an off-site disposal facility.

Difference 2. Radium and thorium-contaminated soil was left in place below the groundwater level. (Figure 2 shows the locations where contaminated soil was left in place.)

40 CFR Part 192, the primary ARAR identified for the site, provides that under specific circumstances the agency performing the cleanup may choose a remedial action that does not achieve complete removal of radium contamination to the levels described in 40 CFR Section 192.12(a). The following are circumstances under which such "supplemental standards" can be applied (40 CFR Section 192.21(c)):

> "The estimated cost of remedial action to satisfy 40 CFR Section 192.12(a) at a ... site... is unreasonably high relative to the long-term benefits, and the residual radioactive materials do not pose a clear present or future hazard. The likelihood that buildings will be erected or that people will spend long periods of time at such a vicinity site should be considered in evaluating this hazard. Remedial action will generally not be necessary where residual radioactive materials have been placed semi-permanently in a location where site-specific factors limit their hazard and from which they are costly or difficult to remove, or where only minor quantities of residual radioactive materials are involved. Examples are residual radioactive materials under hard surface public roads and sidewalks, around public sewer lines or in fence post foundations."

The primary health risk posed by the radium (and thorium when it degrades to radium) contamination is from the accumulation of radon gas in overlying structures. Any radon gas emanating from the contaminated soil below the ground water will rise to the ground water and will tend to stay in solution. Since the radon will stay in solution, there will be little risk of the radon accumulating in overlying structures.

The residual radioactive material that was left in place at the OU IV meets the criteria for the application of supplemental standards. The estimated cost to remove the material left in place is unreasonably high relative to any long-term benefit, and the residual radioactive materials do not pose a clear present or future hazard. Institutional controls will be placed on the OU IV property to assure that interested parties are aware of the presence of radiological contamination. Institutional controls may include deed restrictions and special zoning.

Summary of Significant Differences

Original Remedy	Modified Remedy
1) Excavation and off-site disposal of 11,000 tons of contaminated soil	1) About 97,000 tons of contaminated soil was excavated for off-site disposal
2) Excavation of all contaminated soil	2) Small volumes of contaminated soil were left in place based on supplemental standards

SUPPORT AGENCY COMMENTS

The Colorado Department of Public Health and Environment concurs with the implementation of the remedy presented in this ESD.

STATUTORY FINDINGS

Considering the new information that has been developed and the changes that have been made to the selected remedy, EPA and the Colorado Department of Public Health and Environment believe that the remedy remains protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. Even though the remedy does not satisfy the statutory preference for treatment which reduces the toxicity, mobility, or volume of hazardous substances as its principal element, the principal threat at the properties will be addressed. Treatment was determined to be impracticable based upon effectiveness, technical feasibility, implementability, and cost factors.

PUBLIC PARTICIPATION

This ESD will become part of the Administrative Record File pursuant to Section 300.825(a)(2) of the NCP. The Administrative Record File is available for public review at the following location:

EPA Superfund Records Center
999 18th Street, Suite 500
Denver, CO 80202
(303) 293-1807
Hours: M-F 8:00 AM - 4:30 PM

EPA

PUBLIC NOTICE

DENVER RADIUM SUPERFUND SITE
OPERABLE UNIT IV/V - ROBCO
United States Environmental Protection Agency

The U.S. EPA has published an Explanation of Significant Differences (ESD) for Operable Unit IV/V of the Denver Radium Superfund Site. Operable Unit IV/V (OU IV/V) is located in Denver, Colorado at 500 South Santa Fe Drive, near the intersection of West Alameda Avenue and Interstate 25. This 17 acre site encompasses two properties; the Robinson Brick Company property (OU IV) and the adjacent Denver & Rio Grande Western Railroad property (OU V). The ESD explains the differences between the remedy selected in the 1986 Record of Decision (ROD) and the modified remedy.

The remedy selected in the 1986 ROD for OU IV/V called for the excavation of approximately 11,000 tons of radium-contaminated soils and disposal at an off-site facility permitted to accept such waste. In addition, approximately 200 cubic yards of debris from the demolition of a contaminated laboratory and office buildings were to be disposed of off-site.

The modified remedy differs significantly from the remedy selected in the 1986 ROD in the following ways:

* The volume of contaminated soils removed increased from the estimated 11,000 tons to a total of 96,984 tons.

* Small volumes of radium and thorium contaminated soil were left in place below the groundwater level. This remaining contaminated material does not pose a health or environmental hazard.

A copy of the ESD can be obtained by calling the Superfund Records Center at (303) 293-1807.

A copy of the ESD is available for public review at:

EPA Superfund Records Center
999 18th Street, Suite 500
Denver, CO 80202
Hours: M-F 8:00 AM to 4:30 PM

EPA Contact Person:
Rebecca Thomas (303) 293-1538

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

Ref: 8HWM-SR

MEMORANDUM

TO: Robert L. Duprey, Director
Hazardous Waste Management Division

FROM: Rebecca J. Thomas, RPM Thomas
Denver Radium Project

SUBJECT: Denver Radium Superfund Site
Operable Unit IV/V - ROBCO
Explanation of Significant Differences

Attached is an Explanation of Significant Differences (ESD) between the 1986 Record of Decision (ROD) and the remedy which was implemented at Operable Unit IV/V (OU IV/V) of the Denver Radium Superfund Site.

The remedy selected in the 1986 ROD for OU IV/V called for the excavation of radium-contaminated soils to meet cleanup levels identified in 40 CFR Part 192. Excavated soils were to be temporarily maintained on site until a permanent off-site disposal facility became available.

It became necessary to modify the selected remedy to address the following significant differences from the 1986 ROD:

1) the volume of contaminated soils increased, and

2) relatively small volumes of contaminated soils were left in place (based on supplemental standards).

The Colorado Department of Public Health and Environment supported implementation of the remedy as described in this ESD. In addition, EPA Headquarters was consulted regarding this ESD and had no comments. I recommend approval of the changes to the remedy described in this ESD.

STATE OF COLORADO

Roy Romer, Governor
Patricia A. Nolan, MD, MPH, Executive Director
Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80222-1530
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Laboratory Building
4210 E. 11th Avenue
Denver, Colorado 80220-3716
(303) 691-4700

Colorado Department
of Public Health
and Environment

November 22, 1994

Mr. Robert L. Duprey, Director
Hazardous Waste Management Division
U.S. EPA, Region VIII
999 18th Street, Suite 500
Denver, CO 80202

Re: Explanation Of Significant Differences, Denver Radium Site, Operable Unit IV/V

Dear Mr. Duprey:

This letter confirms the Colorado Department of Public Health and Environment's (CDPHE) support of the U.S. Environmental Protection Agency's (EPA) issuance of the Explanation Of Significant Differences (ESD) for the Denver Radium Site, Operable Unit (OU) IV/V.

The ESD accounts for differences between the original Record Of Decision (ROD) and the remedial action performed. The changes were necessary because 1) the volume of contaminated materials excavated and removed increased from an estimated 11,000 tons to 96,984 tons; and 2) relatively small volumes of contaminated materials were left in place, based on supplemental standards. The contaminated materials which remains in place will be managed through the use of institutional controls.

CDPHE agrees that the revised remedy remains protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate, and is cost effective.

Sincerely,

Howard Roitman
Acting Director
Hazardous Materials and Waste
Management Division

EXPLANATION OF SIGNIFICANT DIFFERENCES
RECORD OF DECISION (ROD) - OPERABLE UNIT IV/V
DENVER RADIUM SUPERFUND SITE

DECLARATION

Considering the new information that has been developed and the changes that have been made to the selected remedy chosen in the September 1986 ROD, EPA has determined that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. The remedy utilized permanent solutions and alternative treatment technologies to the extent practicable. Even though the revised remedy does not satisfy the statutory preference for treatment which reduces the toxicity, mobility, or volume of hazardous substances as its principal element, the principal threat at the properties will be addressed. Treatment was determined to be impracticable based upon effectiveness, technical feasibility, implementability, and cost factors.

Robert L. Duprey, Director
Hazardous Waste Management Division

12/7/94
Date