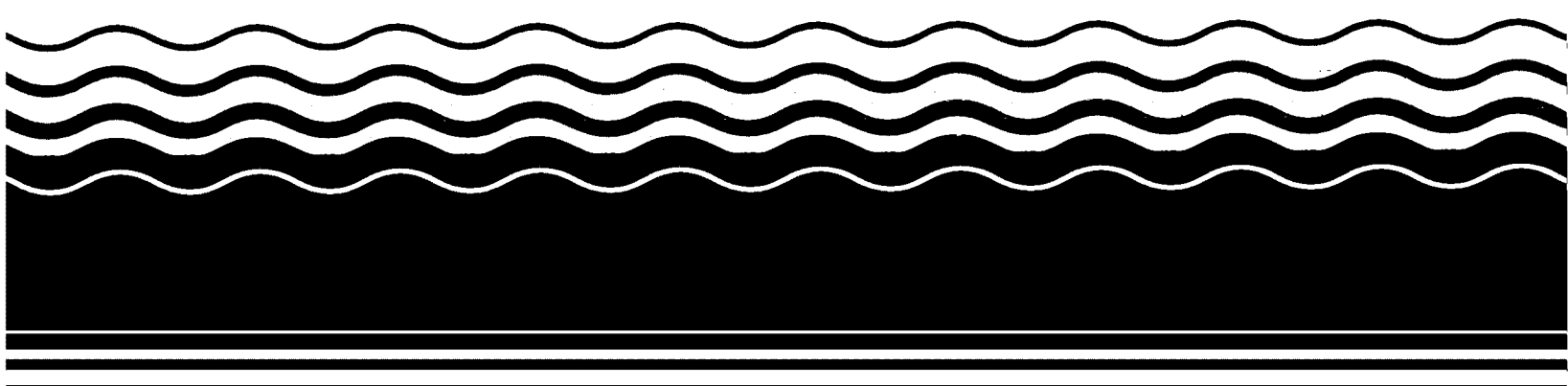


**PB95-963118
EPA/ESD/R08-94/093
March 1995**

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

**Denver Radium Superfund Site
(O.U. 3), Denver, CO
12/13/1993**



EXPLANATION OF SIGNIFICANT DIFFERENCES

DENVER RADIUM SITE OPERABLE UNIT III 1000 WEST LOUISIANA PROPERTIES

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 29, 1987, and the remedy which was implemented at Operable Unit III (OU III) of the Denver Radium Superfund Site. EPA is the lead agency at the OU with the support of the Colorado Department of Health (CDH).

Operable Unit III of the Denver Radium Site is located in southwest Denver, west of the South Platte River and north of Ruby Hill Park. The operable unit includes several properties known collectively as the 1000 West Louisiana Avenue properties. These properties are in the area of West Louisiana Avenue, South Jason Street, and South Platte River Drive (Figure 1). The properties cover approximately 11 acres in an area zoned for industrial use.

This Explanation of Significant Differences (ESD) describes changes to the remedy that were implemented at OU III. The ESD explains 1) why temporary storage was not required, 2) how the remedy was modified to address the discovery of much larger volumes of contamination than were anticipated at the time of the ROD, 3) why the remediation plan for the Creative Illumination building changed from decontamination and restoration to demolition, and 4) how contaminated soils left in place 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 III. It is available for public review at the following location:

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

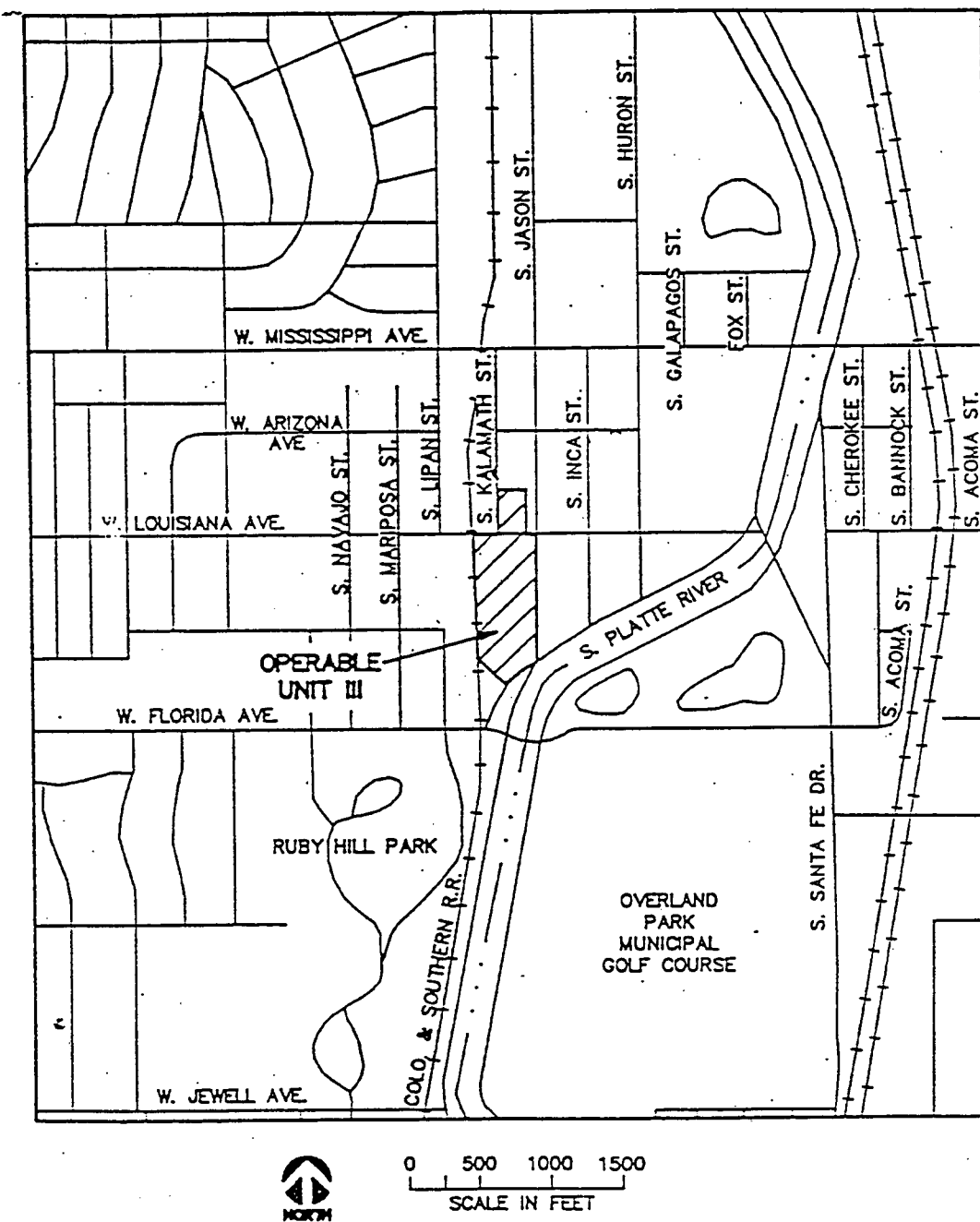


Figure 1. Operable Unit Location

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, 42 U.S.C. Section 9601, et seq. (CERCLA) (more commonly referred to as Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986, and Section 300.435(c)(2)(1) of the NCP.

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 or left on-site when the processing facilities were closed.

In 1979, EPA discovered the presence of the 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 determined that the properties should be divided into Operable Units based primarily upon site conditions and proximity to other Denver Radium properties. The 1000 West Louisiana properties, which are the subject of this ESD, comprise Operable Unit III of the site.

OU III consists of property owned by Creative Illumination, Inc.; the building and vacant lot owned by Packaging Corporation of America (PCA); the Titan Labels Building; and several buildings east of South Jason Street. The vacant lot owned by PCA may have been the site of a smelter that operated in the late 19th century. This smelter may have been turned into a radium-processing facility in the early 20th century. Chemical Products Company occupied portions of OU III between 1918 and 1921, separating radium and vanadium from uranium ores for the National Radium Institute. Most of the buildings associated with radium processing were demolished prior to 1970. The exception was a brick building located at 1298 Kalamath, which was purchased by Creative Illumination, Inc., and used for light-fixture fabrication.

The Denver Radium Site was placed on the National Priorities List in September 1983. EPA released a Remedial Investigation for OU III in April 1986 and a Feasibility Study in August 1987. In September 1987, EPA issued a Record of Decision selecting a remedy for OU III. Additional characterization of the radiologic contamination was conducted during the design of the remedy, and is documented in Supplemental Data Releases for OU III by UNC Geotech dated April 1989 and May 1989.

SUMMARY OF CONTAMINATION PROBLEMS

Radium and its associated decay products are the primary contaminants of concern at the 1000 West Louisiana properties.

The radiologic contamination at the Denver Radium Site 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. In general, 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. (A general discussion of radiation and its associated units of measurement is presented in Appendix A of the Operable Unit III Feasibility Study.)

The Creative Illumination and PCA buildings on the West Louisiana properties were tested for radon. Levels exceeding the 0.02 working level (WL) standard were not detected in the PCA building, but the Creative Illumination building was found to contain elevated radon decay product concentrations. A maximum radon decay concentration of 0.17 WL was detected in the basement of this building. The average value for the building was 0.04 WL. The Creative Illumination building also contained elevated levels of alpha radioactivity.

Gamma radiation readings in excess of background were found over more than 200,000 square feet of the 1000 West Louisiana properties. Average gamma radiation measurements ranged from background to 154 microRoentgens per hour (microR/hr) above background. The maximum gamma radiation measurement was 2,189 microR/hr above background.

The presence of radium in soil was verified by radiochemical analyses of subsurface soil samples. The average radium concentration in the contaminated soil on the 1000 West Louisiana properties was determined to be 114 picocuries/gram (pCi/g). The maximum radium concentration found on the properties was 2,120 pCi/g. The maximum depth of contamination was 96 inches. The estimated total volume of radium contaminated soil and debris was 16,000 cubic yards.

SUMMARY OF THE REMEDY SELECTED IN THE 1987 RECORD OF DECISION

The remedial action alternative preferred by EPA for Operable Unit III was Off-Site Permanent Disposal. Because a permanent disposal facility was not available at the time the Record of Decision (ROD) was issued in September 1987, EPA selected the On-Site Temporary Containment (capping) with the Off-Site Permanent Disposal alternative.

The remedy selected in the ROD included the following:

- Cleaning up the Creative Illumination property and storing the approximately 200 cubic yards of contaminated material in a temporary storage facility at Operable Unit X;
- Excavating contaminated soil on the 1000 West Louisiana properties and consolidating and capping the material on the vacant lot at 1000 West Louisiana Avenue;
- Maintaining the cap at 1000 West Louisiana Avenue and the temporary storage facility at Operable Unit X until a facility suitable for the permanent disposal of Denver Radium wastes became available; and
- Final removal of the contaminated material from both units to the permanent disposal facility.

SUMMARY OF AND BASIS FOR SIGNIFICANT DIFFERENCES

The significant differences from the 1987 ROD are: 1) temporary storage of contamination was not required, 2) the area of contamination and associated volume of contaminated soils increased, 3) the Creative Illumination building was demolished, rather than decontaminated and restored, and 4) relatively small volumes of radium contamination were left in place.

Difference 1. On-site temporary storage of excavated contaminated material was not required since a permanent disposal facility became available before excavation began. The material was shipped by rail to the Envirocare of Utah, Inc. disposal facility in Tooele County, Utah.

Difference 2. Additional investigations were conducted during the remedial design which further characterized the extent of contamination at the 1000 West Louisiana Avenue properties. Contamination was found to extend east of Jason Street, while at the time of the ROD, contamination was assumed to extend no further than Jason Street. (Figures 2 and 3 show the actual extent of contamination.) The volume of contamination at OU III estimated during the Remedial Investigation was 15,738 yd³. The actual volume removed during remediation was 52,836 yd³.

Difference 3. An engineering evaluation of the brick Creative Illumination building showed that it did not possess the structural integrity to withstand the stresses of the required decontamination efforts. Consequently, the safest and most cost-effective remedy involved the demolition of the building. The radium-contaminated remnants of the brick building and the contaminated soil surrounding and beneath the demolished building were shipped to the permanent disposal facility.

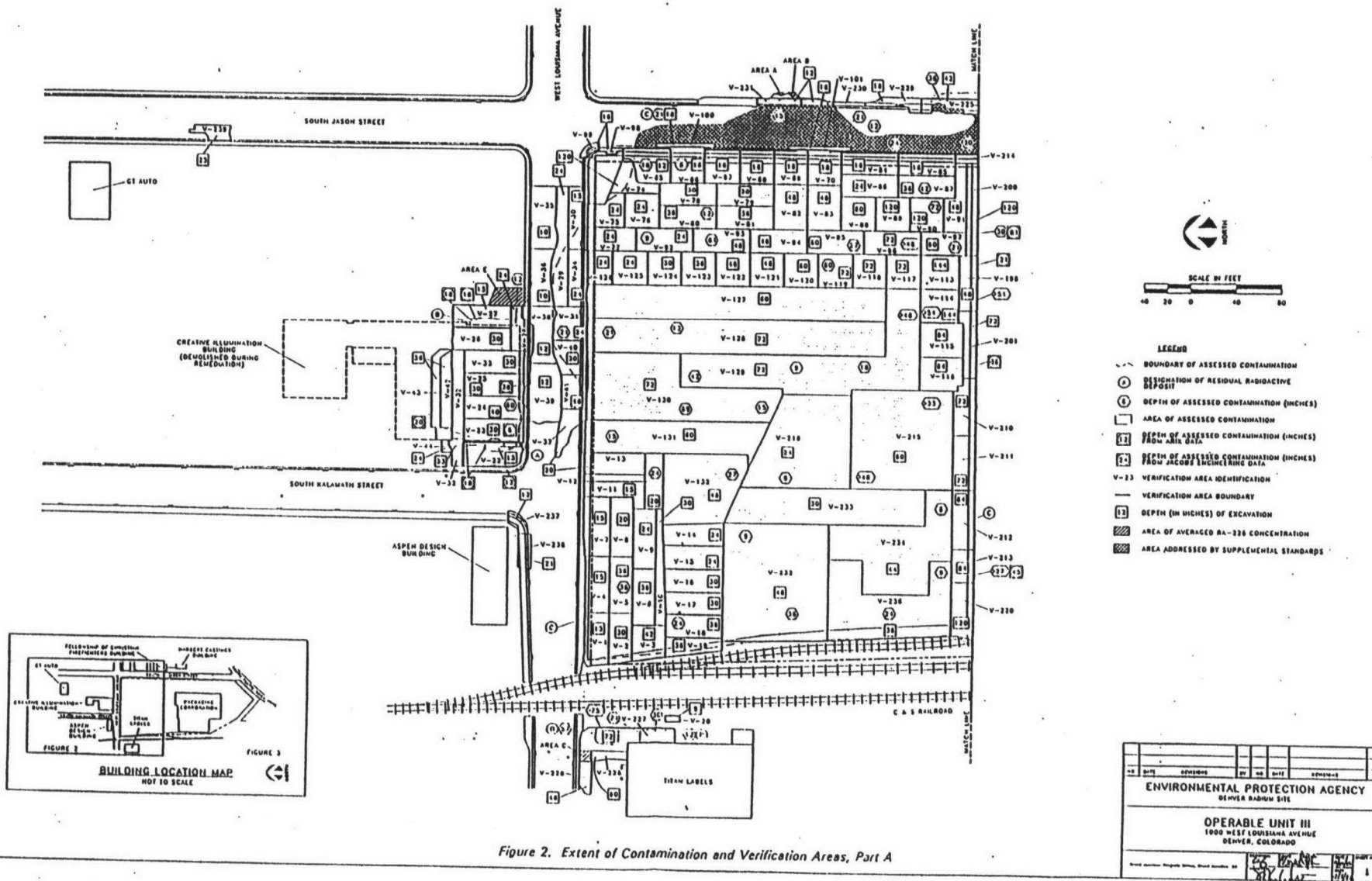


Figure 2. Extent of Contamination and Verification Areas, Part A

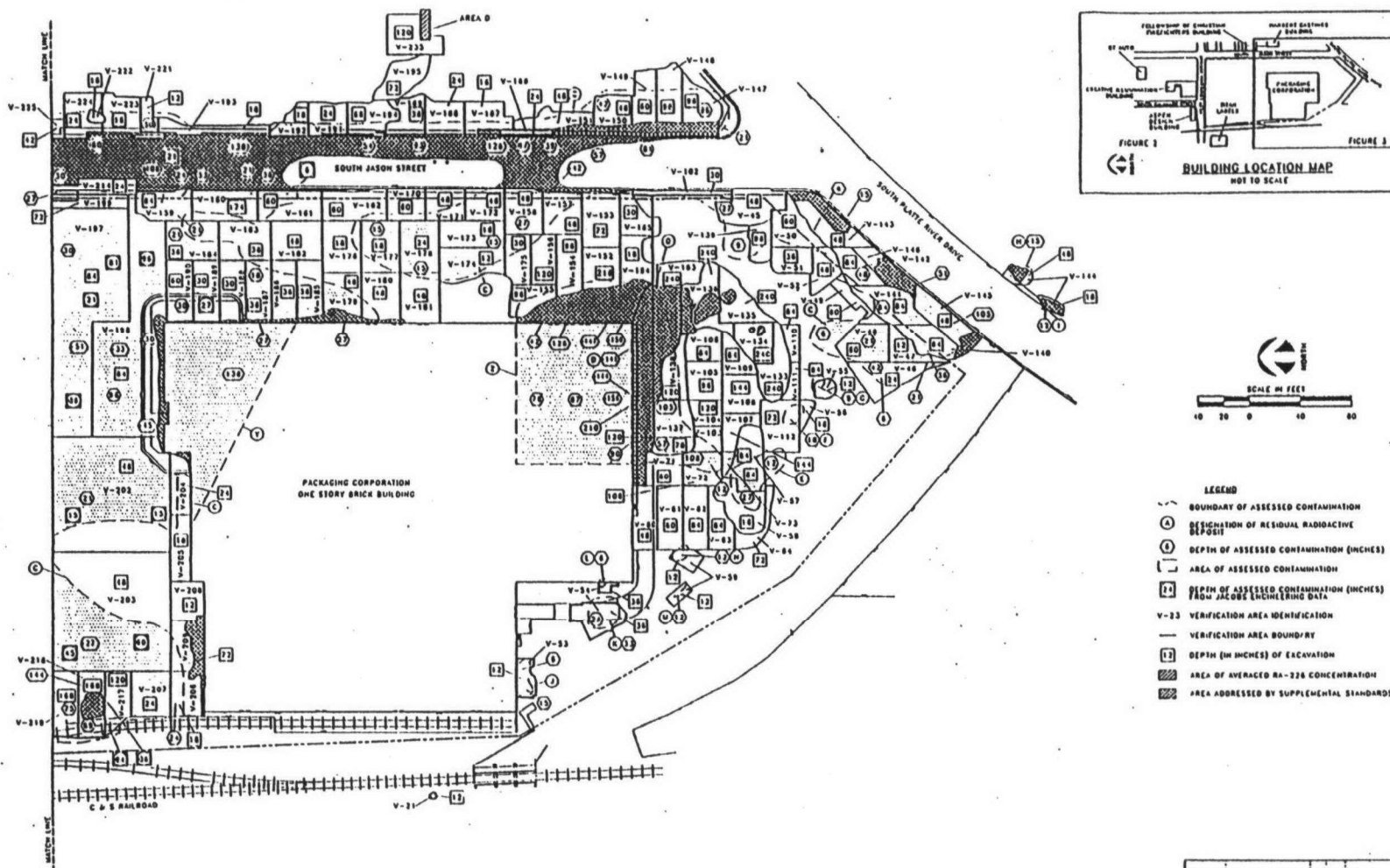


Figure 3. Extent of Contamination and Verification Areas, Part B

Difference 4. Radium-contaminated soil was left in place in the following locations: a) below the groundwater level, b) near an underground water line at the southern boundary of the PCA property, c) under areas of South Jason Street and South Platte River Drive, and d) under the PCA building. It was not known at the time of the ROD that contamination existed near the water line or beneath the streets. The reasons that radiologic contamination was not excavated from these locations are summarized below.

a) EPA decided not to excavate radium contamination below ground water. The primary health risk posed by radium contamination is from the accumulation of radon gas in overlying structures, and radon gas in ground water will tend to stay in solution and not migrate upward to the surface.

b) Hand excavation was conducted near the water line at the southern boundary of the PCA property to remove as much contamination as possible. Any additional earth work around this line could have caused a break in the line. There is no threat of contamination to the water. The remaining contamination is overlain by five to twenty feet of clean fill material and does not pose a risk to human health or the environment.

c) A risk assessment prepared by UNC Geotech for EPA in March 1991, shows that the contamination remaining under Jason Street does not pose a threat to human health or the environment as long as it remains buried. At OU VII, EPA determined that any contamination that might be excavated during maintenance, repair, or other construction activities will be retained and re-buried on-site, provided that the area to be excavated is not greater than 20% of the total area of the street. The State of Colorado and the City and County of Denver are responsible for ensuring that contaminated soil under the streets is managed appropriately. The City has developed a Management Plan for the Operable Unit VII streets. This Management Plan should be amended to include South Jason Street and South Platte River Drive. The radium contaminated materials under South Jason Street and South Platte River Drive, however, may be reburied on site without regard to the amount of area excavated.

d) Contamination was not excavated from under the PCA building since EPA determined that it was not necessary for the remedy to be protective and to meet the interior cleanup standards set forth in 40 CFR Section 192.12(b). That section states that in any occupied or habitable building:

- i) The objective of remedial action shall be, and reasonable effort shall be made to achieve, annual radon decay product concentration not to exceed 0.02 WL. In any case, the radon decay product concentration shall not exceed 0.03 WL, and

- ii) The level of gamma radiation shall not exceed the background level by more than 20 microroentgens per hour.

The radon concentration and gamma radiation levels in the PCA building meet these standards.

40 CFR Part 192 provides that under certain 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). Under 40 CFR Section 192.21(c), "supplemental standards" can be applied when:

"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 residual radioactive material that was left in place at the 1000 West Louisiana properties meets the criteria for the application of supplemental standards. Detailed maps, included in the December 1992 Operable Unit III Closeout Report, show the location and estimated volume of the radium contamination that remains on the OU III properties. This Closeout Report is included in the Administrative Record so that any agencies or individuals who conduct maintenance or excavation activities on the property will be aware of the presence of radiologically contaminated materials. Institutional controls will be placed on these properties to assure that interested parties are aware of the presence of radiological contamination on OU III. Institutional controls may include deed restrictions and special zoning.

Summary of Significant Differences

Original Remedy

- 1) Temporary on-site storage of contaminated material and removal to permanent disposal facility when one becomes available
- 2) Excavation of 15,738 yd³ of contaminated soil
- 3) Decontamination and restoration of Creative Illumination building
- 4) Excavation of all contaminated soil

Modified Remedy

- 1) No temporary storage prior to removal to permanent disposal facility
- 2) Over 52,000 yd³ of soil excavated, area of contamination extended east of Jason Street
- 3) Demolition of the Creative Illumination building
- 4) No excavation of contaminated soil
 - below ground water
 - near water line
 - under S. Jason Street
 - under Platte River Dr.
 - under PCA building

SUPPORT AGENCY COMMENTS

The State of Colorado concurs with the implementation of the remedy presented in this ESD.

STATUTORY DETERMINATIONS

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 Health 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 pursuant to Section 300.825(a)(2) of the NCP. The Administrative Record is available for public review at the following location:

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

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Laboratory Building
Denver, Colorado 80222-1530 4210 E. 11th Avenue
Phone (303) 692-2000 Denver, Colorado 80220-3716
(303) 691-4700



Roy Romer
Governor

Patricia A. Nolan, MD, MPH
Executive Director

November 5, 1993

Mr. Jack W. McGraw
Acting Regional Director
U.S. EPA, Region VIII
999 18th Street, Suite 500
Denver, CO 80202

Re: Explanation of Significant Differences, Denver Radium Site, Operable Unit III

Dear Mr. McGraw:

This letter confirms the Colorado Department of Health's (CDH) support of the U.S. Environmental Protection Agency's (EPA) issuance of an Explanation of Significant Differences (ESD) to the Denver Radium Superfund Site, Operable Unit (OU) III.

The ESD accounts for differences between the original Record of Decision (ROD) and the remedial action performed. The changes were necessary because 1) temporary storage was not required prior to removal of contaminated material to a permanent disposal facility; 2) excavation of over 52,000 cy³ was performed, rather than the 15,738 yd³ estimated in the ROD; 3) demolition of the Creative Illumination building, rather than decontamination and restoration, and; 4) no excavation of contaminated soils in selected areas, including below ground water, near an existing water line, under S. Jason St., under S. Platte River Dr., and under the PCA building. The contaminated material which remains in place will be managed through the use of institutional controls.

CDH 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,

Thomas P. Looby
Director
Office of Environment



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

NOV 10 1993

MEMORANDUM

SUBJECT: Concurrence on the ESD for the Denver Radium Superfund Site, OU III

FROM: Darlene H. Boerlage
ONPE Regional Coordinator

TO: Rebecca Thomas
Remedial Project Manager

The purpose of this memorandum is to confirm Headquarter's support of the October 1993, Explanation of Significant Differences (ESD) for the Denver Radium Site, Operable Unit III. ONPE has completed review of this document on October 15, 1993.

Because the ESD proposes the relatively minor changes in the remedy (requirement not to use temporary storage, addressing larger volumes of contaminated soils, demolition of a building opposed to restoration, and the management of soils left in place) the Office of Waste Programs Enforcement is in agreement with the ESD. Note: As stated in the ESD, these changes are required to remain protective of human health and the environment. Accordingly, EPA Region VIII has met the consultation requirement of the Twenty Fifth Remedy Delegation Report.

cc: Gary Northman, EPA Region VIII, Denver, CO

RECEIVED: November 10, 1993
17:51
RECEIVED: November 10, 1993

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cc: Gary Northman, EPA Region VIII, Denver, CO

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466



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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 III - 1000 West Louisiana Properties
Explanation of Significant Differences

Attached is the Explanation of Significant Differences (ESD) between the 1987 Record of Decision (ROD) and the remedy which was implemented at Operable Unit III of the Denver Radium Superfund Site.

The remedy selected in the 1987 ROD for OU III 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 1987 ROD:

- 1) temporary storage of contamination was not required,
- 2) the area of contamination and associated volume of contaminated soils increased,
- 3) the Creative Illumination building was demolished, rather than decontaminated and restored, and
- 4) relatively small volumes of radium contamination were left in place.

The State of Colorado supported implementation of the remedy as described in this ESD. In addition, EPA headquarters has reviewed this ESD and has provided written concurrence to the Region (attached). I recommend approval of the changes to the remedy described in this ESD.

Attachments



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EXPLANATION OF SIGNIFICANT DIFFERENCES
RECORD OF DECISION (ROD) - OPERABLE UNIT III
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 1987 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 utilizes permanent solutions and alternative treatment technologies to the maximum 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

10/13/93
Date