

**PB95-963138
EPA/ESD/R08-93/104
March 1995**

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

**Marshall/Boulder Landfill,
Boulder County, CO
11/2/1992**



Marshall/Boulder Landfill

EXPLANATION OF SIGNIFICANT DIFFERENCES MARSHALL/BOULDER LANDFILL SUPERFUND SITE



EPA Region VIII

November, 1992

OVERVIEW

Groundwater underlying the Marshall/Boulder Landfill Site (Site) in southeast Boulder County, Colorado, is contaminated with high levels of organic and inorganic compounds as a result of surface water and groundwater leaching through waste material disposed of on the Site between 1969 and 1974. These concentrations pose a potential health risk to humans and aquatic life. Consequently, the Site has been targeted for cleanup under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or Superfund.

After thorough study and evaluation, the U.S. Environmental Protection Agency (EPA) issued a Record of Decision (ROD) in September 1986 which described the remedy chosen by EPA to clean up the Site. Between 1986 and 1990, additional information was obtained which warrants modifications to the 1986 ROD remedy. The revisions, which are described in detail in this Explanation of Significant Differences (ESD), are as follows:

1. The groundwater collection system will consist of a

well array along most of the eastern Site boundary and a collection trench along part of the southern and eastern Site boundaries instead of only a series of drains as previously stipulated.

2. The collected groundwater will be treated to remove ammonia using breakpoint chlorination/dechlorination prior to discharge.
3. In addition to the air stripper and air stripper off-gas carbon adsorption system specified in the ROD, a liquid-phase carbon adsorption system (liquid-phase granular activated carbon, or LGAC) will be used to remove volatile organic compounds (VOCs).
4. The effluent limitation for chloride (measured as a 30-day average) will be 320 milligrams per liter (mg/l) rather than 280 mg/l.

Construction of the treatment facility and groundwater collection system began in September 1992. Operations will commence after a construction period of approximately 14 months.

PUBLIC COMMENT

EPA is concerned that the selected remedy meets the needs of the community and also provides protection of human health and the environment. EPA encourages the public to make written or oral comments on the selected remedy. The Administrative Record, Fact Sheets and other pertinent documents are available for public review at the following locations:

EPA Superfund Records Center (303) 293-1807
999 - 18th Street
5th Floor - North Podium
Denver, CO 80202-2405

Boulder Public Library (303) 441-3100
11th & Arapahoe
Boulder, CO 80302

Louisville Public Library (303) 666-6037
950 Spruce Street
Louisville, CO 80027

Questions and comments regarding this ESD may be directed to:

Paula Schmitt diel (303) 293-1527
Remedial Project Manager

Mary Hagan, (303) 294-1160
Community Relations Coordinator

EPA maintains a mailing list of groups and individuals who are interested in the Marshall/Boulder Landfill Superfund Site. If you did not receive this ESD by mail and would like to be added to our mailing list, please send your name, affiliation, address and telephone number to:

Mary Hagan
U.S. EPA (80EA)
999 - 18th Street, Suite 500
Denver, Colorado 80202-2405

INTRODUCTION

This ESD has been prepared by EPA to explain the significant differences between the 1986 ROD Remedy and the remedy delineated in the Final Design Remedy dated September 6, 1991, at the Marshall/Boulder Landfill Site. EPA is the lead agency for overseeing cleanup of the Site and the Colorado Department of Health (CDH) is the support agency.

Section 117(c) of CERCLA and Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) require EPA to publish an ESD when the remedy implemented differs significantly from that remedy described in the ROD. This ESD provides a brief summary of the background of the Site, a description of the remedial design, and a comparison of the 1986 ROD Remedy to the Final Design Remedy.

Complete documentation of the remedial design is available for public review at the EPA Superfund Records Center in Denver, Colorado.

SUMMARY OF SITE HISTORY AND CONTAMINATION PROBLEM

Site History

The Marshall/Boulder Landfill is located in southeast Boulder County, east of the town of Marshall (Exhibit 1). The Site is south of Colorado Highway 170 and is bounded on the east by South 66th Street. Marshall Lake is located approximately 2,000 feet to the west. Approximately two miles to the east is the town of Superior. The cities of Boulder and Louisville are three miles to the northwest and northeast, respectively.

Surface water flows from southwest to northeast through two parallel drainages on the Site. Cowdrey Drainage carries water from Cowdrey Reservoir No. 2 to South Boulder Creek; in the past some of this intermittent flow was diverted to Davidson Ditch, where it was used for irrigation. South of Cowdrey Drainage is Community Ditch, which carries water from Marshall Lake to the City of Louisville Water Treatment Plant. Groundwater in the shallow aquifer flows toward Cowdrey Drainage, or generally to the north on most of the Site and to the south in the northern part of the Site.

The Site consists of two adjacent landfills, each comprising approximately 80 acres. The Marshall Landfill, located to the north, began official operation in 1965, when the Richland Company, under contract with Boulder County, began a solid waste composting and disposal operation at the Site. Although the contract specified composting operations, landfilling comprised the

majority (80%) of waste handling activities. In 1969, the operation was sold to Salvage, Inc., which was later acquired by a group of local investors and renamed Urban Waste Resources. Between 1969 and 1974, the Marshall Landfill accepted municipal waste, unstabilized sewage sludge and many unknown and potentially hazardous wastes. In 1974, the Marshall Landfill was abandoned when Urban Waste Resources, along with Mesa Sand and Gravel, opened the Boulder Landfill to the south. Landfill, Inc., a wholly-owned subsidiary of Browning-Ferris Industries, purchased the landfill operation in 1975. The Boulder Landfill closed in January 1992.

In September 1983, the Marshall/Boulder Landfill was included on the National Priorities List due to the release of contamination to irrigation and drinking water. A major concern was the contamination of water flowing in Community Ditch, because it serves as a source of drinking water for the City of Louisville. In response to this concern, a 60-inch pressurized pipeline was installed to convey the water across the inactive landfill. The potential for contamination of shallow and deep groundwater is being addressed by this remedy.

Contamination Problems

Several sources of contamination were identified during the Remedial Investigation/Feasibility Study (RI/FS), which was conducted in 1986. These include:

- ⊕ Areas of saturated refuse within the northern portion of the Boulder Landfill and throughout the Marshall Landfill;
- ⊕ Trenches used for waste disposal between 1972 and 1974 at the Marshall Landfill;
- ⊕ Small, undefined areas within the Marshall Landfill where industrial wastes, primarily organic solvents, were disposed of along with solid wastes; and
- ⊕ Two unlined leachate lagoons in the southern portion of the Marshall Landfill.

Detected on-site contamination is characterized by elevated levels of:

- ⊕ Volatile organic compounds (VOCs) such as benzene, trichloroethylene and tetrachloroethylene;
- ⊕ Heavy metals such as barium, iron, manganese and zinc; and
- ⊕ Major ions such as chloride, nitrate and sulfate.

Based on the findings of the RI/FS, EPA selected a preferred remedy, which was described in 1986 ROD.

SUMMARY OF THE 1986 ROD REMEDY

The 1986 ROD Remedy involves: the collection of contaminated groundwater leaving the Site; treatment of the collected ground water; environmental monitoring; and landfill improvements. The 1986 ROD Remedy also includes off-site monitoring to determine the existence and detrimental effect of off-site sources of contamination to the area.

The major components of the 1986 ROD Remedy include:

- ④ Elimination of off-site transport of contaminants emanating from the Site by constructing a drain or series of drains to capture shallow groundwater along the entire southern and eastern Site boundaries;
- ④ Treatment of contaminated groundwater in a facility consisting of equalization/sedimentation basins,

an air stripper, and carbon adsorption of air stripper off-gas (vapor-phase granular activated carbon, or VGAC);

- ④ Implementation of an environmental monitoring program to verify the effectiveness of the remedial action and to assure protection of public health;
- ④ Landfill improvements, including regrading, revegetation, perimeter ditches and fences to minimize future environmental and public health impacts from the Site;
- ④ Drainage of the existing leachate lagoons and transfer of the liquid to the treatment system; and
- ④ Redirection of the discharge of the existing french drain to the treatment facility.

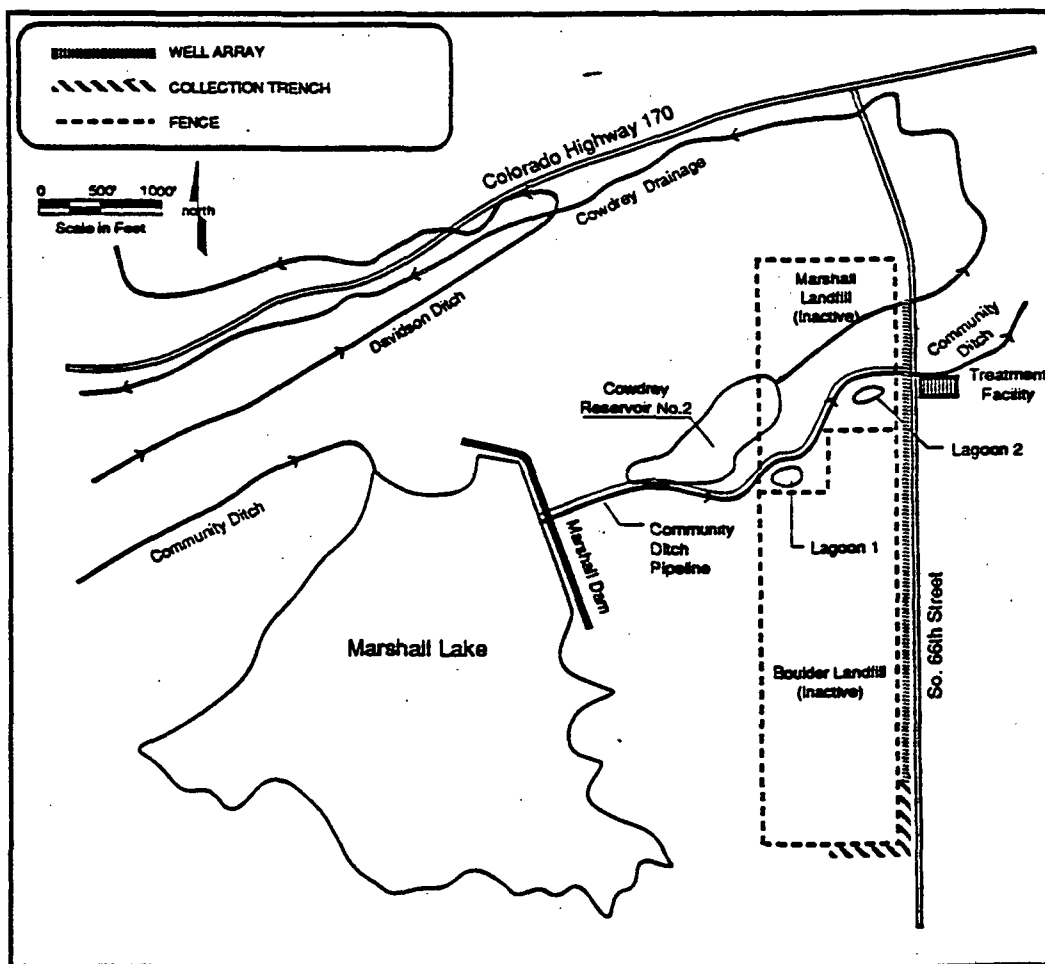


EXHIBIT 1
WITH FINAL DESIGN REMEDY

JUSTIFICATION FOR CHANGES

In order to design the collection and treatment systems described in the 1986 ROD Remedy, additional information was obtained during several sampling events in 1989 and 1990 and that information was summarized in the Additional Studies Final Report and two addenda. These reports are part of the Administrative Record. Based on the findings of these investigations and further work on the remedial design, the 1986 ROD Remedy is being modified to maximize its efficiency and protectiveness. The new findings are summarized in Exhibit 2.

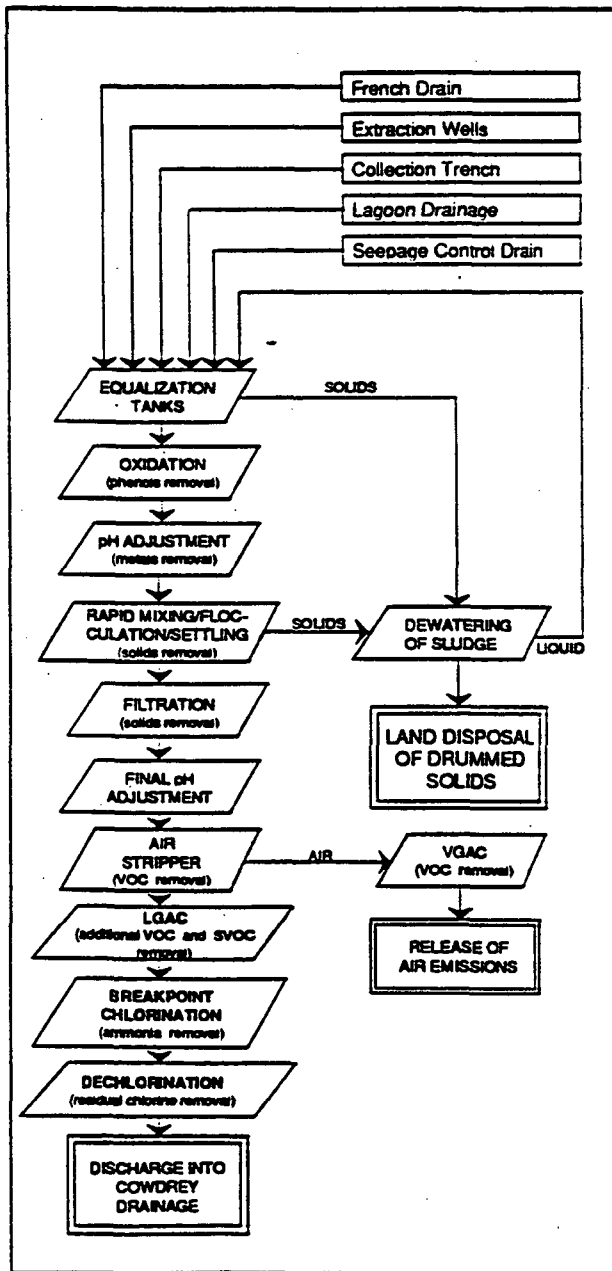


EXHIBIT 2
TREATMENT PROCESS FLOW DIAGRAM AS PER FINAL DESIGN

- ⊕ Shallow groundwater was not encountered in wells drilled at the western extent of the southern Site boundary and the northern end of the eastern Site boundary. Additionally, the base of the shallow aquifer along part of the eastern Site boundary is deeper than the original estimation. The saturated thickness in this area is greater than originally determined as well.
- ⊕ Estimated ammonia concentrations in the treatment facility influent were revised to reflect the higher concentrations found in certain groundwater wells and in the discharge at the seepage face, where landfill leachate flows to the surface.
- ⊕ During remedial design it was determined that an air stripper and VGAC may not consistently remove detected levels of volatile and semi-volatile organic compounds (SVOCs). Icing of the air stripper and VGAC may occur during the winter months which would reduce their efficiency.
- ⊕ The numeric chloride water quality stream standard for Cowdrey Drainage was amended from 250 mg/l to 320 mg/l by the Colorado Water Quality Control Commission.

DESCRIPTION OF SIGNIFICANT DIFFERENCES AND BASIS FOR THE CHANGES

There are four significant modifications to the 1986 ROD Remedy based on new information obtained since the ROD was issued. They are as follows:

- ⊕ Change in type and extent of groundwater collection system;
- ⊕ Addition of treatment for ammonia in waste stream;
- ⊕ Addition of liquid-phase carbon adsorption;
- ⊕ Revision of the effluent limitation for chloride.

Change in Type and Extent of Groundwater Collection System

The 1986 ROD Remedy requires the collection of groundwater using a drain or series of drains along the southern and eastern Site boundaries. A collection trench as originally conceived is not feasible along the southern portion of the eastern boundary given the revised thickness and overall depth of the base of the saturated zone. A well array consisting of 30 extraction wells will replace the collection trench from a point approximately 600 feet north from the southeast corner of the Site to a point approximately 4,000 feet to the north, as shown in Exhibit 1. The well array will be designed to remove contaminated groundwater from the entire saturated thickness of the shallow aquifer in a more efficient and effective manner.

The groundwater collection system will not extend along the entire length of the southern and eastern Site boundaries, as called for in the ROD, for two reasons: 1) the alluvium near the southwestern and northeastern corners of the Site is apparently unsaturated and 2) existing piezometric data indicate that shallow groundwater along the western 700 feet of the southern Site boundary, if present, would migrate northward onto the Site. The intent of the 1986 remedy was to collect and treat groundwater leaving, rather than entering, the Site. The collection trench will be approximately 1,200 feet in length, beginning approximately 600 feet west of the southeastern corner of the Site and extending approximately 600 feet north to the well array, as shown in Exhibit 1. The western extent of the collection trench is midway between a well in which groundwater was encountered and a well in which groundwater was not encountered.

During the monitoring program, both water quality and piezometric data will be collected along the entire southern and eastern Site boundaries to confirm the presence of groundwater and the direction of groundwater flow. The collection system will be extended if shallow groundwater is detected in areas not included in the collection system. The revised configuration of the groundwater collection system is shown in Exhibit 1.

Addition of Treatment for Ammonia in Waste Stream

The 1986 ROD Remedy did not address treatment for ammonia since ammonia levels were not believed to exist in concentrations which exceeded discharge standards. In September 1990, several on-site wells, the seepage face and French Drain were sampled and analyzed for ammonia. These data resulted in higher estimated ammonia concentrations, which could cause the treatment facility effluent to intermittently exceed the discharge standard for ammonia if not treated.

Breakpoint chlorination and dechlorination are being added to the treatment process to remove ammonia. During breakpoint chlorination, ammonia is oxidized to nitrogen gas by the addition of chlorine. Residual chlorine is then removed by adding sulfur dioxide. Dechlorination will be the final treatment step before discharge.

Addition of Liquid-Phase Carbon Adsorption

The 1986 ROD Remedy calls for the removal of VOCs with an air stripper and air stripper off-gas carbon adsorption. During remedial design, the Potentially Responsible Parties proposed adding an LGAC after they determined that discharge standards for VOCs

may not be consistently met. By passing the air stripper outflow through an LGAC, increased removal of VOCs and SVOCs would be achieved, assuring compliance with the discharge standards. Another benefit of the LGAC is its capacity to remove a wide range of organic compounds. Exhibit 2 shows the treatment process as revised by the modifications described in this ESD.

Revision of the Effluent Limitation for Chloride

At a public hearing on May 5, 1992, the City of Boulder and Landfill, Inc. requested that the Colorado Water Quality Control Commission permanently modify the chloride water quality stream standard on Upper and Lower Cowdrey Drainage. In response to this request, the numeric standard was changed from 250 mg/l to 320 mg/l, measured as a 30-day average. This change should not pose any threat to human health or the environment. A monitoring plan for chloride will be implemented to ensure that the water supply use classification for Cowdrey Drainage is protected at the higher limit.

SUMMARY OF SIGNIFICANT DIFFERENCES

<u>Original 1986 ROD Remedy</u>	<u>Final Design Remedy</u>
Groundwater collection along entire southern and eastern Site boundaries using a drain or series of drains.	Groundwater collection along most of the southern and eastern site boundaries using a collection trench and well array.
Treatment to reduce ammonia not addressed.	Removal of ammonia using breakpoint chlorination.
Removal of VOCs from collected groundwater with an air stripper and air stripper off-gas carbon adsorption.	Removal of VOCs from collected groundwater with an air stripper, off-gas carbon adsorption and LGAC.
Proposed chloride effluent limitation of 280 mg/L.	Chloride effluent limitation modified to 320 mg/L.

SUPPORT AGENCY COMMENTS

CDH has reviewed the Final Design Remedy described in this ESD and has provided comments to EPA. These comments have been incorporated into this ESD to the maximum extent practicable. CDH supports implementation of the Final Design Remedy as presented in this ESD.

STATUTORY DETERMINATIONS

The changes to the 1986 ROD Remedy were made in accordance with all applicable regulatory and statutory requirements, as required by Section 121 of CERCLA. Considering the new information that has been developed and the changes that have been made to the selected remedy, EPA and CDH believe that the Final Design Remedy remains protective of human health and the environment, complies with federal and state requirements that were identified in the ROD as applicable or relevant and appropriate to this remedial action at the time the original ROD was signed and is cost-effective. In addition, the revised Final Design Remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable on this Site.

**U.S. Environmental Protection Agency
Office of External Affairs
999 18th Street, Suite 500
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

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



OCT 26 1992

FILE PLAN

4.3

Ref: 8HWM-SR

ADMINISTRATIVE RECORD

MEMORANDUM

TO: Jack W. McGraw, Acting Regional Administrator

FROM: Robert L. Duprey, Director
Hazardous Waste Management Division *[Signature]*

SUBJECT: ESD - Marshall-Boulder Landfill

Attached to this memorandum for your approval is an Explanation of Significant Differences (ESD) to the 1986 Record of Decision (ROD) for the Marshall-Boulder Landfill. This ESD documents changes made to the remedy during the remedial design process. The changes are considered significant but not fundamental to the original remedy selected in the ROD.

The specific changes include 1) a change in the type and extent of ground water collection; 2) the addition of treatment for ammonia in the waste stream; 3) the addition of liquid-phase carbon absorption, and 4) revision of the effluent limitation for chloride based on an administrative change by the Colorado Water Quality Control Commission.

The changes to the remedy were made in accordance with all applicable regulatory and statutory requirements, as required by CERCLA section 121. The remedy remains protective of human health and the environment, complies with federal and state requirements identified in the 1986 ROD, and remains cost-effective. EPA Headquarters has been consulted and has concurred on the ESD. Likewise, both the Office of Regional Counsel and the State of Colorado Department of Health have reviewed the ESD and had only minor comments, which have been addressed.

The final remedial design has been approved and the PRPs have begun construction of the remedy. The Hazardous Waste Management Division recommends approval of the ESD as proposed.

cc: Diana Shannon, SRB
Marc Alston, SRB
Paula Schmittiel, SRB
Wendy Silver, ORC
John Cordova, CDH

ADMINISTRATIVE RECORD



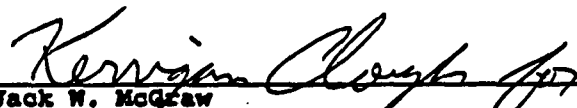
EXPLANATION OF SIGNIFICANT DIFFERENCES

RECORD OF DECISION (ROD) - MARSHALL-BOULDER LANDFILL

FILE PLAN
4.3

DECLARATIONS

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, except those for which a waiver is invoked, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site.


Jack W. McGraw
Acting Regional Administrator

11/2/92
Date