Final Remedial Action Completion Report For the Remedial Design/Remedial Action 48th and Holly Landfill Commerce City, Colorado

Prepared for

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1.0 INTRODUCTION

The final Remedial Action (RA) Completion Report for the 48th and Holly Landfill (the Landfill), Sand Creek Industrial Superfund Site (Sand Creek Site), was developed pursuant to the Unilateral Administrative Order (UAO) for Remedial Design/Remedial Action (RD/RA), Sand Creek Operable Units (OUs) No. 3 and No. 6, U.S. Environmental Protection Agency (EPA) Docket No. CERCLA VIII-93-27. The RA Completion Report has been prepared by Harding Lawson Associates (HLA), on behalf of Browning-Ferris Industries of Colorado, Inc. (BFI of Colorado) and Burlington Northern Railroad (BNR) in accordance with the requirements set forth in the EPA Statement of Work (SOW), Exhibit 2 to the UAO, and the EPA-approved final Work Plan/Remedial Design (WP/RD) Report for the project.

1.1 Purpose and Scope

The purpose of an RA Completion Report is to provide concise documentation of remedial action activities for a specific OU at a site. The report also supports EPA's preparation of a site closeout report. This RA Completion Report combines information regarding both OU 3 and OU 6 of the Sand Creek Site. Activities associated with OU 6 were previously documented in the Final Removal Action Report (HLA, 1991b). Although the remedial action identified by the current UAO for RD/RA includes continued operation and maintenance (O&M) of the OU 6 landfill gas-extraction system (LFGES), documentation of the system's implementation is provided in this report for completeness and convenience.

1.2 Report Organization

The RA Completion Report is divided into ten sections consistent with EPA Publication 9355.0-39FS, Remedial Action Report, Documentation for Operable Unit Completion. The remainder of Section 1.0 provides a general description of the site and the remedy implemented. Section 2.0 presents a chronology of major events associated with the RA. Section 3.0 discusses performance standards and construction quality control. Construction activities are described in Section 4.0. Section 5.0 documents the prefinal and final inspections. Section 6.0 presents certification of the

remedy constructed. A summary of operation and maintenance activities is provided in Section 7.0, and a summary of project costs is provided in Section 8.0. Sections 9.0 and 10.0 provide acronyms and a bibliography, respectively.

1.3 Landfill Description and History

The Sand Creek Site is located partly within the City and County of Denver (CCD), Colorado, and partly within Commerce City in Adams County, Colorado. The Landfill is in the southern portion of the Sand Creek Site and is bordered on the north by East 52nd Avenue, on the south by East 48th Avenue, and on the west by Dahlia Street (Figure 1.1). The surface area of the Landfill is approximately 150 acres.

The Landfill was operated as a municipal waste landfill beginning in 1968; however, a review of aerial photographs shows that landfilling began east of Ivy Street in 1967. The Landfill was closed in 1975, and the area was revegetated. During June 1977, two explosions of combustible gases occurred in a water conduit under construction by the Denver Water Department (DWD) northwest of the intersection of 52nd Avenue and Dahlia Street. Based on results from a subsequent sampling investigation, the Colorado Department of Health (CDH), Tri-County Health Department (TCHD), and the South Adams County Fire Prevention Bureau (SACFPB) concluded that the explosions were caused by methane gas migrating from the Landfill. In response to the explosions and the detection of combustible gases migrating offsite, two methane gas venting systems were installed at the Landfill. An experimental passive venting system utilizing wind turbines was installed along the perimeter of the western 25-acre portion of the Landfill in 1978. In early 1980, an additional passive methane gas venting system was installed in the eastern portion (east of Ivy Street) of the Landfill. TCHD determined that the passive venting system was ineffective, and in 1981 BNR installed an active venting system along the southwest and northwest edge of the Landfill. An active LFGES was installed by Landfill, Inc. (now BFI of Colorado) and BNR and placed in operation in June 1991 as part of OU 6 activities to replace previously installed systems.

In December 1982, the entire Sand Creek Site was listed by EPA as a Superfund site. Four potential sources of contamination were present at the Sand Creek Site. At that time, the Landfill was included in the Sand Creek Site because of the presence of volatile organic compounds (VOCs) downgradient from portions of the Landfill (Hydro-Search, Inc. [HSI], 1986). Most of those VOCs have since been attributed to other sources upgradient and southeast of the Landfill (HLA, 1992b; EPA, 1993). In 1983, BNR filed a request with EPA to exclude the Landfill from the Sand Creek Site; however, the request was denied by EPA.

EPA defined six OUs within the Sand Creek Site as follows:

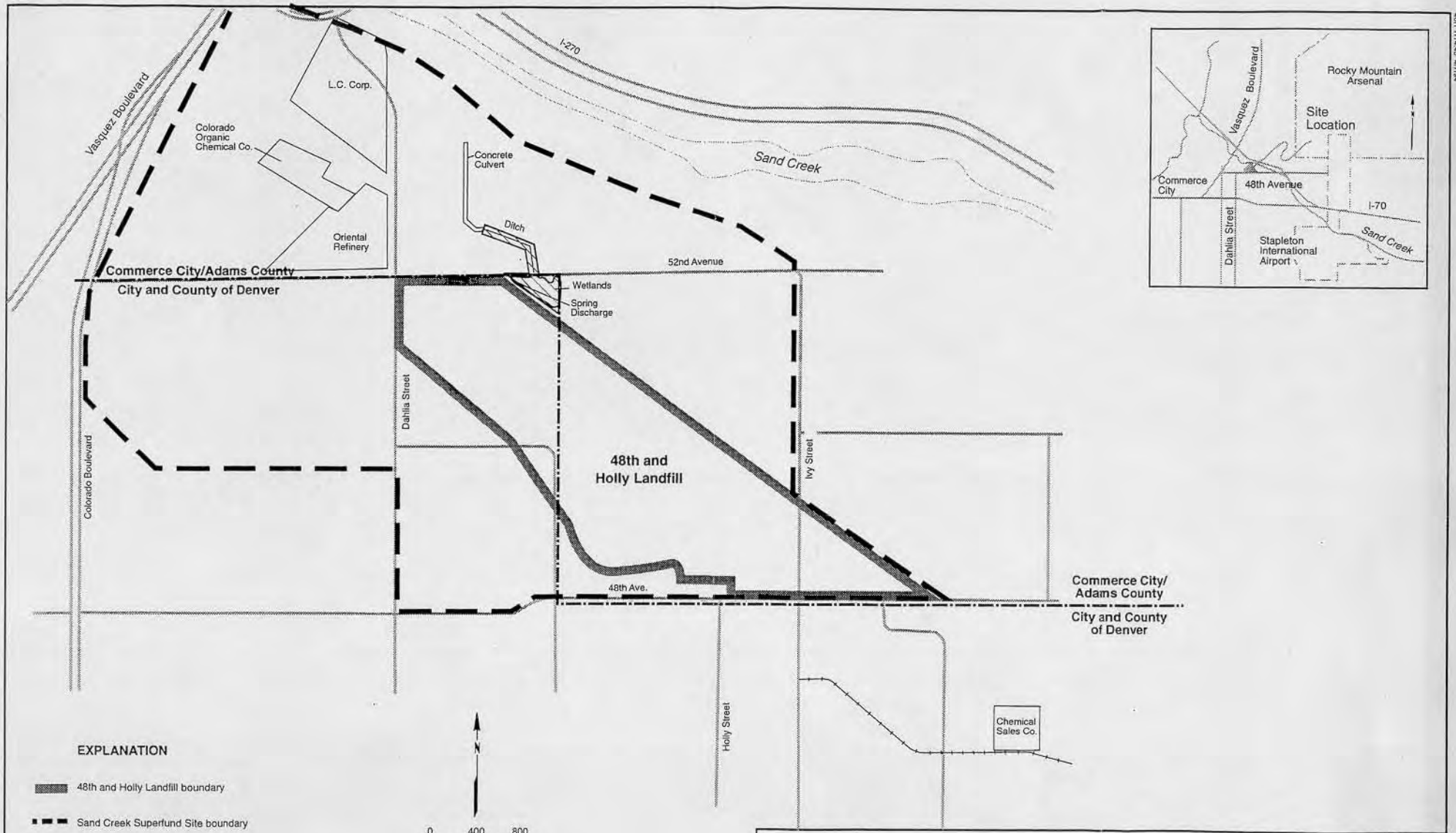
- OU 1: Within the Colorado Organic Chemical Company source area, 10 cubic yards (cy) of soil highly contaminated with pesticides; subsurface soil contaminated with VOCs; and contaminated buildings and tanks
- OU 2: Contaminated soil in the vicinity of the L.C. Corporation property
- OU 3: Contaminated groundwater, surface water, sediment, soil, and air in the vicinity of the Landfill
- OU 4: Contaminated groundwater underlying the Sand Creek Site
- OU 5: Within the Colorado Organic Chemical Company source area, surface soil to a depth of 5 feet with contaminant concentrations greater than action levels and less than or equal to 1000 parts per million (ppm)
- OU 6: Gaseous emissions from the Landfill

In addition to the Sand Creek Site sources of contamination in the vicinity of the Landfill, several other Superfund sites are located in the area including the Rocky Mountain Arsenal, Chemical Sales Company, and Woodbury (EPA, 1993).

1.4 Components of the Selected Remedy

The purpose of the RA activities is to ensure that:

- Emissions of landfill gas are controlled to prevent inhalation at levels that pose an endangerment to human health or the environment
- Accumulation of landfill gas is minimized to prevent explosion hazards



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Location of 48th and Holly Landfill
Sand Creek Superfund Site
Commerce City, Colorado

FIGURE 1.1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
LAM	27114,122		10/94	

- Dermal contact with landfill contents is prevented
- The use of groundwater underlying the Landfill as a drinking water source is prevented

In the Record of Decision (ROD) for OU 3/OU 6, EPA determined that a remedial action alternative comprising engineering and institutional controls was the most appropriate remedy for the Landfill. The remedy consists of the following tasks:

- Task 1 - Continue O&M of the LFGES with improvements, as required, during the normal course of O&M activities
- Task 2 - Continue maintenance of the soil cover system with improvements, as required, during the normal course of O&M activities
- Task 3 - Continue maintenance of the perimeter fence and warning signs
- Task 4 - Implement an environmental monitoring program
- Task 5 - Continue existing institutional controls and implement additional institutional controls, as necessary
- Task 6 - Conduct periodic site reviews

2.0 CHRONOLOGY OF EVENTS

On February 8, 1990, EPA issued Administrative Order on Consent (AOC) Re: Remedial Investigation and Feasibility Study for Operable Unit 3, Docket No. CERCLA-VIII-90-08. BFI of Colorado (then Landfill, Inc.) and BNR performed the work in accordance with the OU 3 AOC and submitted the following major deliverables (among others) documenting the work:

- Revised Final Remedial Investigation Report - June 3, 1992
- Final Revised Risk Assessment Report - February 4, 1993
- Final Focused Feasibility Study Report - March 19, 1993

On August 15, 1990, EPA issued Unilateral Administrative Order (UAO) for Removal Action for Operable Unit 6, Docket No. CERCLA-VIII-90-20, which addressed risks associated with gaseous emissions from the Landfill. The Engineering Evaluation/Cost Analysis (EE/CA) was approved by EPA on December 11, 1990. On December 24, 1990, EPA issued the Action Memorandum for an Enforcement-Lead Removal Action. The Final Design Submittal for the OU 6 Landfill Gas-extraction System (LFGES) was approved by EPA on January 28, 1991. Major completed milestones associated with the OU 6 UAO include:

- Construction start - February 25, 1991
- Prefinal inspection - May 30, 1991
- System startup - May 31, 1991
- Final inspection - June 26, 1991
- Final Removal Action Report - October 31, 1991

EPA issued the Proposed Plan for OU 3/OU 6 to the public on March 19, 1993. On June 30, 1993, EPA issued a ROD for OU 3/OU 6 that identified a remedial action developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), applicable state laws, and the National Contingency Plan (NCP), Title 40 Code of Federal Regulations Part 300.

Subsequently, EPA issued the UAO for RD/RA at OU 3 and 6, which became effective January 31, 1994. In separate correspondence to BFI of Colorado and BNR, both dated February 25, 1994, EPA indicated they had begun the process of terminating the OU 3 AOC and the OU 6 UAO.

3.0 PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL

Construction activities associated with the remedial action for the Landfill were performed for OU 6. Quality control (QC) activities and performance standards associated with the construction of the OU 6 LFGES are described below.

3.1 Construction Quality Control

The OU 6 UAO did not require submittal of a formal construction QC plan. However, two primary types of construction QC inspection activities were identified in the final Work Plan (HLA, 1990a) and implemented as appropriate: (1) preconstruction and (2) construction oversight.

A preconstruction conference was conducted on February 25, 1991, to define and discuss procedures, requirements, and authorities regarding safety, communications, construction plans, submittals, site security, and other areas requiring coordination. Preconstruction photographic documentation was also prepared in support of construction oversight.

Services during construction included:

- Observing construction full-time and maintaining daily field and photograph logs
- Conducting weekly construction meetings and preparing meeting minutes
- Evaluating and processing change orders
- Reviewing shop drawings and other contractor submittals
- Interpreting contract documents
- Maintaining job site records
- Maintaining communication with EPA and its representatives as required
- Reviewing the progress of the construction contractor
- Conducting inspections and preparing punch lists (see Section 5.0)

4.0 CONSTRUCTION ACTIVITIES

As indicated previously, construction activities associated with the remedial action for the Landfill were performed for OU 6. Participants and specific activities undertaken for the construction of the OU 6 LFGES are described below.

4.1 Project Participants

Contractors were retained by BFI of Colorado and BNR for specific remedial action services. BFI Gas Systems, Inc., of Houston, Texas, designed the LFGES. The prime contract for construction was awarded to Organic Waste Technologies (OWT) Construction Company, Middleburg Heights, Ohio. HLA-Denver provided services during construction, including Resident Project Representative services. KRW Consulting, Inc. (KRW), Lakewood, Colorado, provided startup services as part of its long-term O&M contract.

4.2 Description

The LFGES consists of a series of gas-extraction wells interconnected by gas collection piping. Two centrifugal blowers that connect to a single point in the gas collection piping and operate alternately induce the flow of gases from the gas-extraction wells. The gas is diverted to an enclosed flare system for treatment before it is emitted to the atmosphere. Condensate generated in the gas collection piping is piped to a condensate storage tank before being discharged to a sanitary sewer. Condensate is pumped to the sanitary sewer by a submersible pump suspended in the condensate storage tank. Major components of this system are presented in Figure 4.1 and are further described as follows. The majority of the information regarding the OU 6 LFGES is documented in the Final Removal Action Report (HLA, 1991b).

Gas-extraction Wells

Seventy-five landfill gas-extraction wells were installed at the Landfill. Extraction wells were installed by drilling 36-inch-diameter boreholes to the bottom of the refuse. The base of the Landfill was assessed visually by the absence of trash in the drill cuttings. Extraction wells consist of solid

and perforated 6-inch high-density polyethylene (HDPE) pipe. The length of perforated pipe was determined by the depth of refuse. The length of solid pipe is 12 feet for wells that are 30 feet deep or less and 15 feet for wells more than 30 feet deep. Extraction wells are protected at the ground surface by fiberglass well encasements with removable locking lids.

Piping

Approximately 15,700 feet of HDPE pipe were installed at the Landfill to transport landfill gas from the extraction wells to the enclosed flare system. Pipe was installed by excavating into the refuse and placing the pipe on compacted sand bedding as designed. Buried piping was backfilled using refuse-free soil. The landfill gas collection piping was installed with a minimum slope of 2 percent to allow condensate to drain into one of four condensate sumps located at low points in the piping system.

Blower Building

A 22-foot-wide by 26-foot-long, preengineered metal building was installed at the Landfill to house a condensate knockout pot and two centrifugal blowers. The building is equipped with an explosion-proof exhaust fan to provide ventilation and an explosion-proof heater to prevent condensate from freezing in the knockout pot.

The centrifugal blowers were mounted in the blower building to draw gas from the extraction wells. The outlet of the blowers is piped to the enclosed flare system. A knockout pot constructed of HDPE was also installed in the blower building to capture condensate in the gas stream. Before entering the blowers, gas is diverted through the knockout pot. The knockout pot is equipped with a sight glass to monitor the fluid level and a manual drain system that is connected to the 10,000-gallon condensate storage tank.

Condensate Sumps

Condensate sumps were installed at four locations in the gas collection piping. The condensate sumps are located at low points in the gas collection piping system to allow the condensate in the

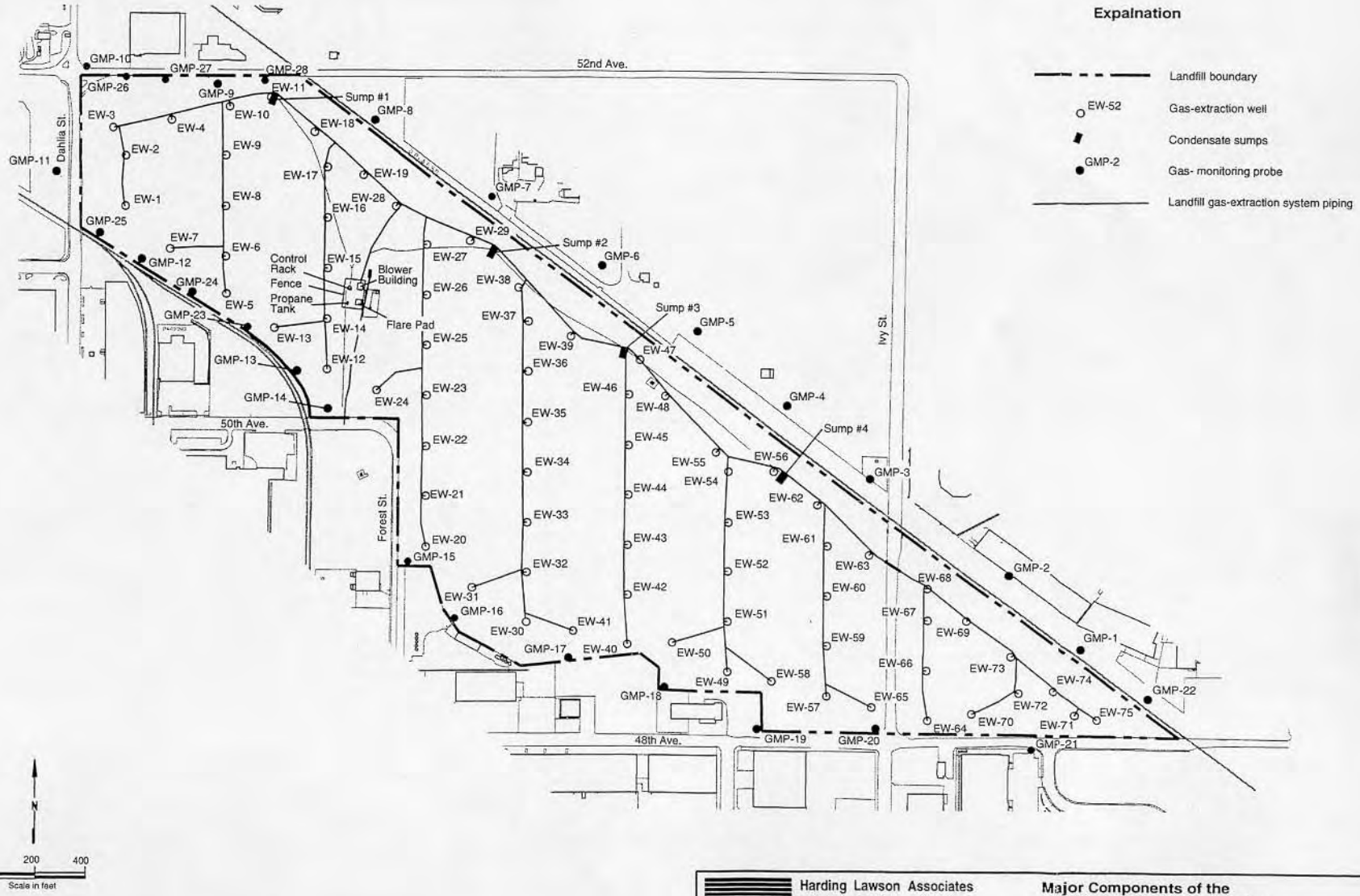
3.2 Performance Standards

Two hazards associated with landfill gas and addressed by the OU 6 removal action are (1) inhalation of VOCs in landfill gas and (2) accumulation of landfill gas, which may present an explosion hazard.

Operation and maintenance of the flare as designed and subsequent monitoring of flare performance provide for destruction of VOCs to levels that do not pose an unacceptable risk to human health and the environment. Flare performance monitoring includes measurements of gas flow rate, percent methane, and flare temperature (see Section 7.4).

Accumulation of landfill gas is currently being addressed by the LFGES as supported by the following:

- Methane concentrations in extraction wells have decreased since operations began (May 1991).
- Nine of the 75 gas-extraction wells have been shut down because of limited methane production.
- The system is operated such that concentrations of methane within the gas monitoring probes do not exceed 5 percent by volume in air. According to the June 10, 1994, O&M report, the probes monitored exhibited monthly methane gas concentrations of less than 1 percent by volume in air for the reporting period (HLA, 1994a).



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Major Components of the Landfill Gas-extraction System
48th and Holly Landfill
Commerce City, Colorado

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LDZ	27114.122		10/94	

FIGURE
4.1

48th & Holly/27114.100 10/10/94 LDZ

piping to drain by gravity. Condensate drains to the sumps and is transferred to the 10,000-gallon condensate storage tank using a submersible pump suspended in each sump. Approximately 2800 feet of HDPE condensate piping were installed to transfer condensate from tanks located in each of the four condensate sumps. The submersible pumps are automatically activated by electronic level controls in the sumps.

Condensate Storage Tank

An underground condensate storage tank was installed to collect condensate from the condensate sumps located in the gas collection piping and the knockout pot located in the blower building. The tank is double-walled and constructed of fiberglass-reinforced plastic with a condensate-holding capacity of 10,000 gallons. The annular space between the primary and secondary tanks is filled with a colored brine solution for leak detection during and after installation. A monitoring system continuously monitors the level of brine solution in the annular space and provides an audible and visual alarm that will sound if a leak occurs from the primary tank.

Enclosed Flare System

An enclosed flare was installed for the purpose of flaring collected gases. The enclosed flare system consists of a 50-foot-tall by 8-foot-diameter stack with three burners, flare pilot assembly, purge blower, and control panel. A propane tank supplies the flare pilot assembly with fuel to ignite a pilot flame. Landfill gas entering the system is diverted through the burners and ignited by the flare pilot assembly.

Gas Monitoring Probes

Twenty-two gas monitoring probes were installed around the perimeter of the Landfill to monitor gas-extraction system performance. Six existing gas monitoring probes are also maintained and monitored as part of the probe network.

5.0 INSPECTION

Prefinal and final inspections of the LFGES construction were conducted in accordance with the OU 6 AOC and are described below. Weekly construction progress meetings were also held throughout the construction period and documented as part of the construction activities.

5.1 Prefinal Inspection

On May 30, 1991, a prefinal inspection of the LFGES was conducted by representatives of EPA; Science Applications International Corporation (consultant for EPA); Landfill, Inc. (now BFI of Colorado); BNR; BFI Gas Systems, Inc.; KRW; and HLA. During this inspection, outstanding construction items were identified. Expected completion dates for each outstanding construction item were also established. Outstanding construction items identified at the prefinal inspection, actions required to complete these items, and the actual dates that the construction items were completed are identified in the Final Removal Action Report. The prefinal inspection was documented in the Prefinal Inspection Report (HLA, 1991a).

5.2 Final Inspection

A final inspection of the LFGES was conducted by representatives of EPA, CDH, BFI Gas Systems, Inc., KRW Consulting, Inc., and HLA on June 26, 1991. The final inspection consisted of a walk-through inspection of the site, including the blower building, enclosed flare system, and one of the condensate sumps. System operation was described in detail during the walk-through. In addition, operation of the combustible gas sensor in the blower building was demonstrated. A summary of completed construction activities, including dates of completion, was provided at the inspection.

At the time of the final inspection, the perimeter fence and nine gas monitoring probes remained to be installed. The fence installation was completed in August 1991. Six probes were installed in October 1991 and the remaining three in May 1992 after resolution of property access.

6.0 CERTIFICATION

The OU 6 AOC required the submittal of a Removal Action Report, including "certification by a professional engineer licensed in the State of Colorado that the remedy is operational and functional." This certification was included in the Final Removal Action Report for OU 6 (HLA, 1991b) and is reprinted in Appendix A for convenience.

7.0 OPERATION AND MAINTENANCE

Quarterly reports of O&M activities associated with the OU 6 LFGES, landfill gas monitoring, soil cover system, and fencing were submitted by KRW, on behalf of BFI of Colorado and BNR, from September 1991 through December 1993 in accordance with the O&M Plan. The first semiannual O&M report required by the UAO for RD/RA was submitted June 10, 1994. The following sections summarize the activities associated with the O&M phase of the project.

7.1 Landfill Gas-extraction System

Since the startup of the system on May 31, 1991, the LFGES has been in continuous operation except for brief periodic maintenance activities. After the first year of operations (shakedown), routine O&M of the LFGES was established. To date approximately 7200 gallons of condensate have been generated, of which approximately 5500 gallons have been discharged to the sanitary sewer. Discharge occurs on a batch basis after analysis of the condensate in accordance with Wastewater Discharge Permit No. S0330-1. KRW, on behalf of BFI of Colorado and BNR, performs O&M of the LFGES in accordance with the equipment manufacturer's specifications and the EPA-approved final O&M Manual (HLA, 1992a), as amended. Performance of the LFGES will continue to be monitored as described in Section 7.4. BFI of Colorado and BNR will evaluate and implement, if necessary, improvements to the LFGES during the normal performance of O&M activities. Pursuant to the EPA SOW, continuous operation of the LFGES may be modified or terminated, with EPA approval, if the monitoring data indicate that methane gas levels in the perimeter gas monitoring probes are below levels of regulatory concern.

7.2 Soil Cover System

In 1992, a soil cover system improvement program was implemented to address erosion, poor drainage, and lack of vegetative cover identified during the normal course of O&M activities at the Landfill. The program included fill placement, erosion control, and reclamation.

BFI of Colorado and BNR will evaluate and implement, if necessary, improvements to the soil cover system (e.g., placement and grading of fill) during the normal performance of the O&M activities.

7.3 Fencing

A three-strand, smooth-wire fence was installed around the perimeter of the Landfill in 1991 as part of the OU 6 activities. The wires are equally spaced and supported by 4-foot-high steel posts. Warning signs are posted along the entire length of the fence. KRW performs maintenance including the following:

- Maintaining/repairing fence posts
- Repairing cut strands of wire
- Replacing warning signs

7.4 Environmental Monitoring Program

The environmental monitoring program comprises landfill gas monitoring and groundwater monitoring. Landfill gas monitoring was implemented with the startup of the LFGES in 1991. The field activities for the groundwater monitoring program were implemented in September 1994.

7.4.1 Landfill Gas Monitoring

Landfill gas monitoring is performed to evaluate the operation and performance of the LFGES and to maintain the effectiveness and continued safe operation of the system. On the basis of such monitoring, operational modifications can be made to ensure the system extracts sufficient landfill gas to minimize vertical and horizontal migration and intrusion of atmospheric air into the Landfill. KRW monitors the following parameters at least monthly at the following locations:

- At each extraction well
  - Vacuum
  - Gas temperature
  - Percent methane

- At the flare
  - Gas flow rate
  - Percent methane
  - Flare temperature
- Building inlet sample ports (on main header)
  - Gas temperature
  - Inlet vacuum

Additionally, KRW monitors, on a monthly basis, the gas monitoring probes along the landfill perimeter for percent methane and well pressure to evaluate the performance of the system and to modify operations to prevent lateral migration of gas.

If gaseous emissions from the Landfill no longer pose an endangerment to human health and the environment, the LFGES and landfill gas monitoring may be modified or terminated, with EPA approval.

7.4.2 Groundwater Monitoring

The design of the groundwater monitoring program was approved by EPA on August 24, 1994, as part of the final WP/RD Report. In summary, water levels will be measured in and water quality samples collected from three monitoring wells upgradient and six monitoring wells downgradient of the Landfill semiannually (Figure 7.1). One sample will also be collected at the surface location of the groundwater discharge to the spring. Groundwater samples will be analyzed for the following VOCs and metals:

- Volatile Organics
  - Benzene
  - Chloroform
  - 1,1-Dichloroethene (1,1-DCE)

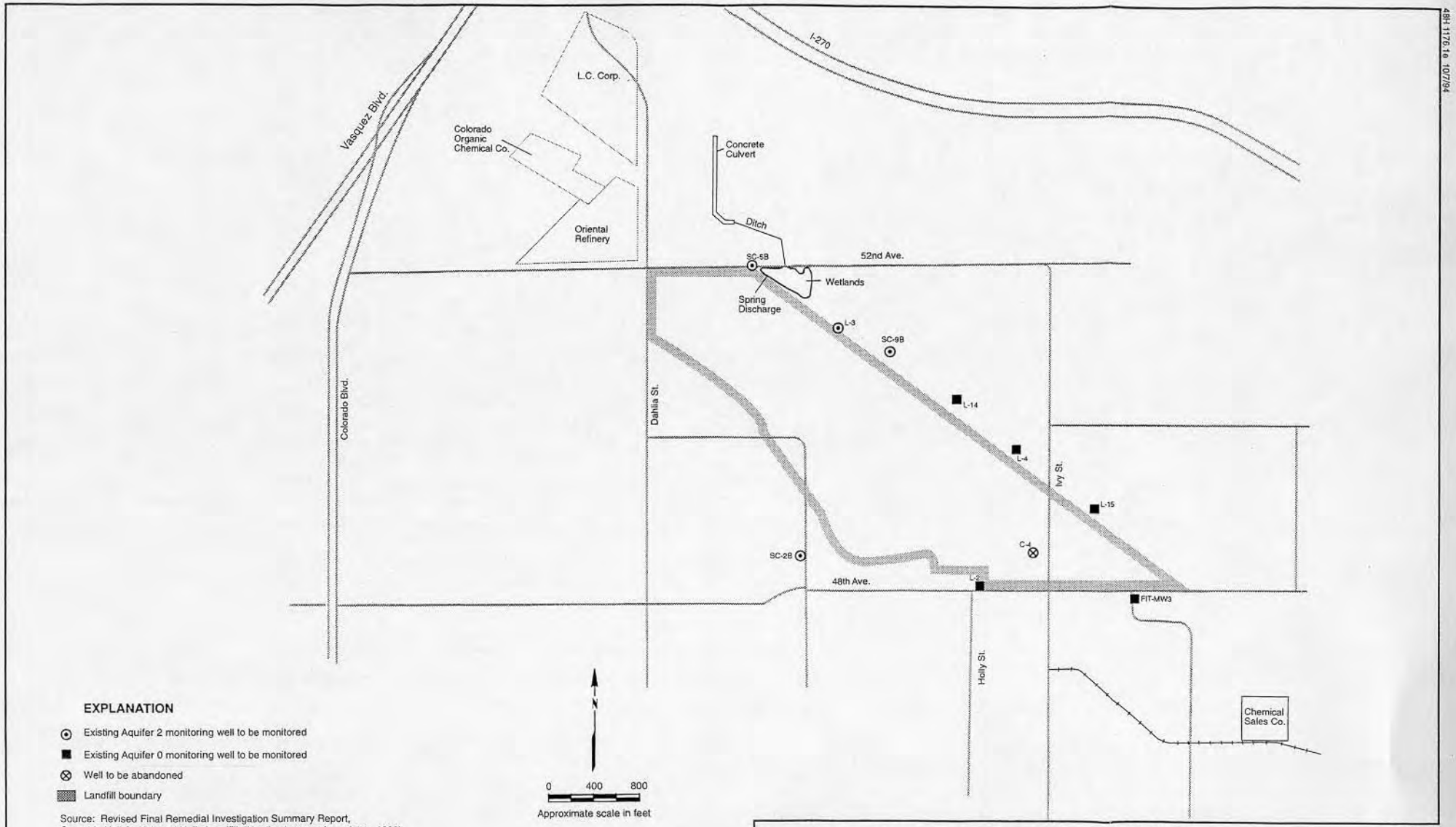
Fill placement was undertaken in the areas of the Landfill where the thickness of the cover material was less than 2 feet. Fill placement activities included (1) preparing the site (clearing and recompaction), (2) delivering approximately 62,000 cy of fill to the Landfill, (3) placing the fill in the designated areas, (4) grading the fill to the elevations specified, and (5) compacting the fill. Revegetation, which was conducted for the areas of the Landfill that received fill, included a native seed mixture, an organic fertilizer, a mulch, crimping, and application of a tackifier.

Erosion control activities were performed for the areas of the Landfill where channelized flow, high flow velocities, and/or erosion to the existing cover were jeopardizing cover integrity. Fill was placed and compacted in existing gullies, trenches, and depressions that were caused by erosion. Several terraces were constructed across portions of the Landfill where the potential for runoff was high. Also, several straw bale dikes were constructed to control runoff. The straw bale dikes were constructed in areas that historically experienced severe erosion.

Reclamation activities were performed over approximately 30 acres of the Landfill that were void of perennial vegetation. Any existing vegetation was disked and tilled to prepare the soil surface for revegetation. Revegetation involved applying the following materials: (1) a native seed mixture, (2) an organic fertilizer/soil amendment, (3) a mulch, and (4) a tackifier. In addition to the revegetation, approximately 8 acres of the Landfill that contained weak stands of grass, poor quality vegetation, and/or annual plants were interseeded.

KRW, on behalf of BFI of Colorado and BNR, performs maintenance of the soil cover system. Ongoing maintenance includes the following:

- Periodic visual inspection of the cover during routine LFGES O&M activities at the Landfill
- Spot reseeding of areas as required to maintain grass cover
- Mowing as required to maintain grass cover and control weeds



EXPLANATION

- ⊙ Existing Aquifer 2 monitoring well to be monitored
- ■ Existing Aquifer 0 monitoring well to be monitored
- ⊗ Well to be abandoned
- ▒ Landfill boundary

Source: Revised Final Remedial Investigation Summary Report, Operable Unit 3, 48th and Holly Landfill (Harding Lawson Associates, 1992)

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Groundwater Monitoring Well Network
48th and Holly Landfill
Commerce City, Colorado

FIGURE **7.1**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RLB	27114,122		10/94	

48H 1176.1e 10/7/94

- 1,2-Dichloroethene (1,2-DCE)
- Tetrachloroethene (PCE)
- 1,1,1-Trichloroethane (1,1,1-TCA)
- Trichloroethene (TCE)
- Vinyl chloride

• Metals
- Antimony
- Arsenic
- Manganese

Pursuant to the UAO for RD/RA, the constituents and monitoring locations may be modified, with EPA approval, if after two years of monitoring, the evaluation of groundwater monitoring data shows no significant degradation of groundwater quality directly attributable to the Landfill.

The following activities associated with implementation of the groundwater monitoring program and the first groundwater monitoring event have been completed:

- Well inspection and development - September 15 through September 21, 1994
- Water-level measurements - September 25, 1994
- Water quality sampling - September 28 through October 3, 1994

As described in the final WP/RD report, Well C-4 will also be abandoned as part of the OU 3/OU 6 RA.

7.5 Institutional Controls

The primary purposes of institutional controls are to (1) protect the integrity of the soil cover system to prevent dermal or direct contact with landfill contents, (2) prevent the use of the groundwater underlying the Landfill as a drinking water source, and (3) protect the LFGES. The perimeter fencing and signs deter access to the Landfill, warn against trespassing, and identify the hazardous

conditions. As described above in Section 7.3, the Landfill fencing will continue to be maintained as part of the remedial action. Also, current zoning prohibits residential development on most of the Landfill.

In addition, EPA has issued an access order to Colorado Paint Company that allows EPA, BFI of Colorado, and BNR, and their authorized representatives to control the activities that can be conducted on the Colorado Paint Company portion of the Landfill property to protect the integrity of the remedy in place for the Landfill. Likewise, EPA has entered into an access agreement with the Colorado and Eastern Railroad Company that allows EPA and its authorized representatives to conduct and maintain response actions on the Colorado and Eastern Railroad Company portion of the Landfill property. Additional institutional controls may be implemented, if necessary, to ensure the RD/RA program objectives are met.

7.6 Five-year Reviews

EPA will conduct five-year reviews of the Sand Creek Site beginning December 1995 and every five years thereafter until completion of the obligations under the UAO for RD/RA. BFI of Colorado and BNR will prepare reports as required by the UAO for RD/RA in support of these reviews.

8.0 SUMMARY OF PROJECT COSTS

The capital costs for construction of the OU 6 remedial action as described in Section 4.0 of this report are summarized as follows:

- Landfill gas-extraction system $2,470,000
- Soil cover system $673,000
- Perimeter fence $16,000

These costs were previously identified in the ROD for OU 3/OU 6 (EPA, 1993).

9.0 ACRONYMS

AOC	Administrative Order on Consent
BFI of Colorado	Browning-Ferris Industries of Colorado, Inc.
BNR	Burlington Northern Railroad
CCD	City and County of Denver
CDH	Colorado Department of Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSC	Chemical Sales Company
cy	Cubic yard
DWD	Denver Water Department
EE/CA	Engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ES	Engineering-Science, Inc.
HDPE	High-density polyethylene
HLA	Harding Lawson Associates
HSI	Hydro-Search, Inc.
KRW	KRW Consulting, Inc.
Landfill	48th and Holly Landfill
LFGES	Landfill gas-extraction system
NCP	National Contingency Plan
O&M	Operation and maintenance
OU	Operable unit
OU 3 RI	Operable Unit 3 Remedial Investigation
OWT	Organic Waste Technologies
ppm	Parts per million
PVC	Polyvinyl chloride
QC	Quality control

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U.S. Environmental Protection Agency. 1994c. Letter from U.S. Environmental Protection Agency Region VIII to Ms. Judith McDonough, Burlington Northern Railroad, regarding clarification of issues, EPA Docket No. CERCLA VIII-93-27, February 25.

RA	Remedial action
RD/RA	Remedial design/remedial action
RI	Remedial investigation
RI/FS	Remedial investigation/feasibility study
ROD	Record of Decision
SACFPB	South Adams County Fire Prevention Bureau
Sand Creek Site	Sand Creek Industrial Superfund Site
SARA	Superfund Amendments and Reauthorization Act
SOW	Statement of Work
TCHD	Tri-County Health Department
UAO	Unilateral Administrative Order
VOC	Volatile organic compound
WP/RD	Work plan/remedial design

Appendix A

CERTIFICATION OF SYSTEM OPERATION

KRW CONSULTING, INC.

Kip R. White, P.E.
President

July 14, 1991

Landfill Inc.
P.O. Box 3151
Houston, Texas 77001

Subject: Landfill Gas Extraction System at the 48th and Holly Landfill Located in Denver and Commerce City, Colorado

Dear Bruce:

The purpose of this letter is to provide certification that the landfill gas collection system for the 48th and Holly Landfill has been constructed and is operating as designed. As a registered engineer in the State of Colorado, I do so certify. This certification is based on my observations conducted during various construction operations at the site and on data accumulated by KRW Consulting, Inc. during operations and maintenance of the system since it became operational in June, 1991.

This certification does not extend to an endorsement of the system design nor does it imply that the system operations or function are static. The landfill environment is very dynamic, and while the landfill gas collection system at the site has functioned as designed to date, changing site conditions may necessitate modifications to the system in the future.

If you have any questions regarding this letter, please feel free to call me.

Sincerely,

Kip R. White, P.E.

COLORADO REGISTERED
KIP R. WHITE
27475
PROFESSIONAL ENGINEER

cc. Chet Culley, Burlington Northern Railroad
Susan Wienand, Harding Lawson Associates

630 Ammons Way • Lakewood, Colorado 80215 • (303) 239-9011

DISTRIBUTION

Final Remedial Action Completion Report
for the Remedial Design/Remedial Action
48th and Holly Landfill
Commerce City, Colorado

November 22, 1994

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Copy 2:	Ms. Judith McDonough Burlington Northern Railroad 777 Main Street Ft. Worth, TX 76102-5384
Copies 3 - 5:	Ms. Erna Acheson U.S. Environmental Protection Agency Region VIII 999 Eighteenth Street, Suite 500 Denver, CO 80202-2405
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Quality Control Reviewer

Michael P. Phillips

Michael P. Phillips, Ph.D.
Associate Chemist

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