



**Preliminary Close Out Report
Lowry Landfill Superfund Site
Arapahoe County, Colorado**

I. INTRODUCTION

This Preliminary Close Out Report, prepared in accordance with *Close Out Procedures for National Priority List Sites* (OSWER Directive 9320.02.09A-P), documents that construction activities at the Lowry Landfill Superfund Site (the Site) have been completed by the responsible parties under the oversight of the United States Environmental Protection Agency (EPA).

EPA and the Colorado Department of Public Health and Environment (the State) have conducted final inspections for and EPA has approved the Remedial Action Reports for all response actions for all Operable Units (OUs) at the Site except the final response action at the Former Tire Pile Area (FTPA) within OU-2. The final response action at the FTPA consists of:

- Construction of a Corrective Action Management Unit for treated soils excavated from the middle waste pit
- Single phase recovery of non-aqueous phase liquids (NAPL) from the north waste pit and the south waste pit
- Off-Site treatment and disposal of recovered NAPL

EPA and the State conducted a pre-final inspection of the remedial action for the FTPA on September 28, 2006, and determined that the remedial action contractors have constructed the remedy in accordance with the EPA-approved remedial design plans and specifications (EMSI, 2006a and 2006b), and no further response is anticipated. The responsible parties, under oversight of EPA, have initiated the activities necessary to achieve performance standards at the FTPA and site completion.

II. SUMMARY OF SITE CONDITIONS

Background

The Site covers approximately 507 acres and is located near the intersection of Quincy Avenue and Gun Club Road in Arapahoe County, Colorado, 15 miles southeast of Denver, Colorado and 2 miles east of Aurora, Colorado (Figure 1). The City and County of Denver (Denver) owns the Site. The Denver Arapahoe Disposal Site, an operating municipal solid waste landfill northeast of the intersection of Gun Club Road and East Hampden Avenue, forms the northern boundary of the Site.

Beginning in February, 1966 and continuing until 1980, Denver operated a "co-disposal" landfill at the Site, accepting liquid and solid municipal refuse and industrial wastes, including sewage sludge. These materials included hazardous substances pursuant to 40 CFR Section 302.4, such as volatile organic compounds and heavy metals. The liquids were placed into an estimated 75 unlined trenches over approximately 200 acres (mostly in the southern portion of the Site), and then solids such as soil, old tires and household refuse were added to the trenches to absorb the liquids. The types of waste disposed at the Site until 1980 using this practice included acid and

alkaline sludges; asbestos; caustic liquids and solids; brines, including plating wastes and other water-based sludges; laboratory wastes; organics, including petroleum based oils, grease, chlorinated solvents, and sludges; waste solvents, chemicals, and oil; biomedical wastes; low-level radioactive medical wastes; pesticides and garden chemicals; water-soluble oils; sewage sludge; paint and varnish waste, sludge and thinners; photographic chemicals; industrial solvents; construction waste; municipal refuse; household hazardous waste; appliances; tires; livestock carcasses; and metallic wastes

Over the period of co-disposal operations at the Site, EPA estimates that approximately 138 million gallons of liquid wastes were disposed. Nearly all of these wastes were disposed in the southern half of the Site within the 200-acre main landfill. A much smaller volume of waste was placed north of the main landfill in ponds and waste pits.

From 1969 until 1986, municipal sewage sludge was applied to approximately 160 acres along the northern and eastern boundaries of the Site. The sludge was applied to the surface of the land and then incorporated into the native soils. After 1980, leachate collected in onsite surface impoundments was injected in the same 160-acre area. Both the municipal sewage sludge and the leachate contained hazardous substances pursuant to 40 CFR Section 302.4.

During the 1970s, approximately 8 million tires were stockpiled at the Site. The tires were laid on top of other waste that had been placed in three separate pits north of the main landfill, each approximately 20-30 feet deep. From 1989 through 1992, Denver and its contractors removed, shredded and consolidated the tires and placed the tire shreds in a monofill on the east side of the Site for potential future re-use as fuel. The area and three waste pits that lay under the tires became known as the Former Tire Pile Area.

In 1980, Denver stopped co-disposal practices. Landfill operations continued at the Site until 1990. From 1980-1990, Waste Management of Colorado (WMC) operated the Site under a contract with Denver. At that time, waste disposal at the Site was restricted to municipal refuse and asbestos waste.

The waste disposed at the Site contaminated the soils and eventually contaminated shallow groundwater. Additionally, gases from the buried wastes contaminated the air spaces in subsurface soil.

EPA placed the Site on the National Priorities List on September 21, 1984 (49 FR 37083). EPA conceptually divided the Site into six OUs for response, and grouped the OUs according to the media which they address: OUs 1 and 6 address shallow groundwater, subsurface liquids, and deep groundwater; OUs 2 and 3 address landfill solids and gas; and OUs 4 and 5 address soils, surface water and sediments. From 1984 until 1993, EPA and the responsible parties performed remedial investigations/feasibility studies within the OUs to determine the nature and extent of contamination and to investigate the potential threats that the Site posed to human health and the environment.

In 1990, all municipal solid waste landfill operations stopped at the Site to allow environmental investigations to proceed without interference. The landfill operator, WMC, constructed a soil cover over the 200-acre main landfill in the southern part of the Site. The landfill cover is at least 4 feet thick and up to 12 feet in thickness in some places.

The contaminants of concern at the Site include volatile and semivolatile organic compounds, metals, pesticides, polychlorinated biphenyls, and methane and other gases. Frequently detected chemicals include methane and many chlorinated solvents, especially 1,1,1-trichloroethane, 1,1-dichloroethane, chloroethane, methylene chloride, trichloroethylene, tetrachloroethylene, vinyl chloride, and 1,4-dioxane.

Removal Actions

North Boundary Barrier Wall

In 1984, Denver entered into an Administrative Order on Consent with EPA for the design, construction and operation of a groundwater control and treatment system at the northern boundary of the Site, known as the "North Boundary Barrier Wall (NBBW)". The system includes a 1,000-foot-long and 30-foot-deep subsurface clay wall constructed at the intersection of the unnamed creek alluvial channel and the northern Site boundary to provide a barrier to groundwater flow to the north and the construction of a groundwater treatment plant on-Site. At the upstream side of the NBBW, a gravel collection trench collects groundwater that is then pumped to the on-Site water treatment plant.

Surface Water Removal Action

In May, 1988, EPA issued an Engineering Evaluation/Cost Analysis which described and evaluated alternatives for enhancing the NBBW system. In November, 1990, EPA selected the Surface Water Removal Action (SWRA) consisting of an upgrade to the groundwater treatment plant and construction of a collection system within the unnamed creek. The SWRA prevents contaminated groundwater from coming into contact with surface water within the streambed. Permeable material was placed in the streambed and covered with a clay layer. The permeable material provides a pathway for groundwater to flow to the north without contacting surface water. The top of the clay cover is now the streambed, allowing uncontaminated surface water to run off the surrounding Site areas and migrate to the north without coming into contact with contaminated groundwater flowing underneath the cover. On August 15, 1991, the responsible parties Denver, WMC, and Chemical Waste Management, Inc. (CWM) entered into an Administrative Order on Consent with EPA to construct and operate the SWRA.

Drum Removal Action

EPA initiated a drum removal action at the drum storage area on the Site on March 1, 1989. The removal action consisted of construction of two temporary lined storage pads to contain damaged drums. In 1990, EPA conducted Phase II of the Drum Removal Action. Phase II consisted of re-packaging highly contaminated liquids and solids from the old drums, decontaminating and disposing empty drums, and closing the temporary drum storage pad.

Selection of Remedial Action

On March 10, 1994, the Regional Administrator for EPA Region 8 signed a Record of Decision (ROD) documenting the remedial action selected for all OUs at the Site. The State gave its

concurrence on the ROD. EPA issued minor modifications to the ROD on March 16, 1994, August 7, 1995, September 30, 2002, and July 14, 2006. EPA issued two Explanations of Significant Differences relative to the ROD, one in August 1995 and another in October 1997. EPA issued a ROD Amendment on August 12, 2005.

The Site-wide remedy utilizes containment, collection, treatment, and monitoring to address the contamination at the Site. The overall objective of the selected remedy is to prevent offsite migration of contamination above performance standards. EPA established points of compliance for the landfill gas remedy and the groundwater remedy at locations inside the Site boundaries, illustrated on Figure 2. The individual components of the selected remedy are as follows:

OU-1 (shallow groundwater and subsurface liquids) and OU-6 (deep groundwater)

- Shallow Groundwater Containment, Collection, and Diversion System. Construction of an 8,800-foot-long subsurface bentonite clay/soil wall, described in the ROD as the “East/South/West Barrier Wall”, to enclose the west, south and east sides of the main landfill in the southern part of the Site. The wall is below the ground surface, approximately 40 to 75 feet deep. The wall minimizes the flow of clean groundwater onto the Site from the south and the west, thereby reducing the volume of contaminated groundwater produced by contact with the wastes buried in the landfill. The wall also functions to minimize the flow of contaminated groundwater from within the main landfill mass away from the Site to the east.
- North Toe Extraction System. Installation and operation of a groundwater extraction system at the north toe of the main landfill. The 300-foot long lined trench collects contaminated groundwater flowing north from the buried wastes within the main landfill mass. The groundwater collected in the trench is transported via underground pipes to the on-Site water treatment plant.
- NBBW. Continued operation of the existing NBBW including evaluating its effectiveness and upgrading as necessary.
- Water Treatment Plant. Design and construction of a new groundwater treatment plant unless it can be demonstrated through pilot-scale testing that the existing groundwater treatment plant can effectively treat the more highly contaminated groundwater to achieve performance standards. Contaminated water collected from various areas of the Site is treated at the plant to a levels prescribed in an industrial pre-treatment discharge permit. The treated water is discharged into a sanitary sewer line. The discharged water eventually reaches the Metro Wastewater Reclamation District and Aurora’s wastewater treatment facilities, which are publicly owned treatment works located off-Site. The City of Aurora and the Metro Wastewater Reclamation District issued the industrial pretreatment discharge permit for the water treatment plant at the Site. The off-Site facilities only accept water that complies with the terms of the discharge permit.
- SWRA. Continued Operation of the SWRA.

OU-2 (landfill solids) and OU-3 (landfill gas)

- Maintain Existing Landfill Cover. The cover minimizes the amount of rainwater infiltration into the landfill, thus reducing the amount of groundwater that could become contaminated by contact with the wastes in the landfill.
- Construct North Face Cover. Placement of an additional 2-foot cover on the 29-acre north face of the landfill mass.
- Landfill Gas Collection and Treatment System. Installation of a landfill gas collection system and monitoring wells within the former landfill. Treatment of landfill gas using an enclosed flare.
- FTPA. Excavation of surface and subsurface drums, and contaminated soils within the middle waste pit of the FTPA. Off-Site treatment and disposal of liquids and on-Site treatment and disposal of soils. This remedy was modified in the August, 2005 ROD Amendment to NAPL extraction and off-Site treatment and disposal for the north waste pit and the south waste pit.

OU-4 (soil) and OU-5 (surface water and sediment)

- No further action to include maintenance of covered areas, periodic monitoring of surface water runoff, and construction of 0.67 acres of wetlands to replace those destroyed during the installation of the SWRA.

Sitewide Remedy Components

- Institutional Controls. On-Site and off-Site institutional controls include access restrictions, land use restrictions, notices, and groundwater use restrictions. EPA and the State have the authority to enforce the on-Site institutional controls. Off-Site institutional controls are enforceable by the Denver, the City of Aurora, and Arapahoe County. Table 1 summarizes the on-Site institutional controls and Table 2 summarizes the off-Site institutional controls.
- Performance and Compliance Monitoring. Long-term monitoring programs to evaluate the effectiveness of the containment and collection systems, and compliance with performance standards. This remedy component includes monitoring of landfill gas, groundwater, surface water, covers, soils, and sediment. If, during operation of the groundwater remedy, contaminant levels exceed performance standards at compliance boundaries, appropriate measures (e.g., pulse pumping or installation of additional extraction wells) shall be taken to prevent and remediate contaminant migration beyond the compliance boundary.

Remedial Action Construction Activities by Responsible Parties

On December 19, 1994, EPA issued a Unilateral Administrative Order for Remedial Design/Remedial Action, EPA Docket No. CERCLA VIII-95-05 (the UAO), to Adolph Coors Company, CWM, Denver, Conoco, Inc. (now ConocoPhillips Co.), Metro Wastewater Reclamation District, S.W. Shattuck Chemical Company, Syntex Chemicals, Inc. (now Roche Colorado Corp.) and WMC. The UAO required the respondents to implement the remedy selected in the ROD. Respondents Denver, WMC, and CWM performed the remedy on behalf of themselves and certain other respondents to the UAO. Remedial Action was initiated in August, 1996.

On November 17, 2005, the United States reached a settlement with Denver, WMC, CWM and five other responsible parties after nearly three years of litigation. Under the settlement, the settling defendants agreed to perform and finance the remainder of known work at the Site. Denver, WMC, and CWM (the Work Settling Defendants (WSDs)) are performing and financing the remainder of known work at the Site on behalf of themselves and the other settling defendants.

Redevelopment Potential at the Site

The on-Site institutional controls prevent redevelopment of the Site. Specifically:

- Land use is restricted to landfilling, monitoring or remediation activities;
- Construction of buildings or other structures is prohibited except as necessary for landfill purposes or for monitoring, or remediation;
- Excavation is prohibited except as necessary for landfill purposes or for monitoring or remediation; and
- Access to the Site is limited to only those authorized to be on the Site for the allowed land uses.

The off-Site areas have the potential to be redeveloped. Institutional controls are in place for a limited off-Site area (between ¼ mile and ½ mile surrounding the Site) and restrict the use of shallow groundwater and certain land uses but allow landfilling, monitoring, remediation activities, industrial, commercial, agricultural, transportation, utilities, open space, or recreation. The E-470 highway has interchanges at Quincy Avenue (the southern boundary of the Site) and East Jewell Avenue (two miles north of the Site). These interchanges improve access to the area and will likely encourage development. A new residential subdivision is currently planned for an area ¼ mile from the southwest Site boundary, just west of the area restricted by institutional controls.

Completion Status for Each Remedy Component

The following table summarizes the status of completion of each component of the remedial action selected in the ROD, as modified by the minor modifications, ESDs, and ROD Amendment.

Remedial Action Component	Date of Inspections	Date of Final RA Report	Completion Certification Status
Institutional Controls	NA	NA	EPA Approval dated September 26, 2002
Surface Water Removal Action (SWRA)	Final Inspection: January 7, 1993	January, 1993	EPA Certified RA Complete on August 11, 2005
Wetlands Mitigation	Final Inspection: May 21, 1999	December 20, 1999	EPA Certified RA Complete on December 23, 1999 EPA Certified Work Complete on August 12, 2005
Landfill Gas (LFG) Extraction and Treatment System	Final Inspection: December 16, 1996	July 18, 1997	EPA Certified RA Complete on February 11, 1998
North Boundary Barrier Wall (NBBW)	Final Inspection: May 1984 (subsurface wall) and July 1984 (injection trench)	June 1984 (subsurface wall) August 29, 1984 (injection trench)	EPA Certified RA Complete on March 27, 1998
North Toe Extraction System (NTES)	Final Inspection: August 3, 1998	August 28, 1998	EPA Certified RA Complete on September 10, 1998
Shallow Groundwater Containment, Collection, and Diversion System	Final Inspection: June 10, 1998	September 28, 1998	EPA Certified RA Complete on September 30, 1998 (slurry wall) and January 25, 1999 (monitoring system)
MW38 Area Gradient Control Contingency Measure	Final Inspection: February 22, 2005	June 30, 2005	EPA Certified RA Complete on August 11, 2005
New Water Treatment Plant	Final Inspection: May 13, 2004	May 5, 2005	EPA Certified RA Complete on August 11, 2005

Remedial Action Component	Date of Inspections	Date of Final RA Report	Completion Certification Status
North Face Cover	Final Inspection: September 10, 1999	December 23, 1999	EPA Certified RA Complete on January 7, 2000
Well Abandonment Program	Final Inspection: April 12, 1997	July 31, 1997	EPA Certified RA Complete on November 17, 1997
Performance and Compliance Monitoring	Final Inspection: Groundwater: June 1, 2005 LFG: February 9, 1997 Surface water: February 1996	Groundwater: February 15, 2005 Amended August 11, 2005 LFG: November 14, 1997 Surface water: February 16, 1996	EPA Certified Construction Complete on August 12, 2005
FTP Middle Waste Pit and Treatment Cell	Pre-Final Inspection (Middle Pit) : May 26, 1999 Final Inspection (Middle Pit): June 11, 1999 Pre-Final Inspection (South Pit, North Pit, Treatment Cell): September 28, 2006	August 3, 2005 (Middle Waste Pit)	EPA Certified that treatment cell Performance Standards have been met on August 12, 2005

III. DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

EPA and the State reviewed the final Remedial Designs and Construction Quality Assurance/Quality Control (QA/QC) Plans for each of the remedial action components. The responsible parties designated an independent QA Official in accordance with the Statements of Work attached to the enforcement agreements.

During remedial construction, an EPA contractor provided remedial action oversight. Construction activities at the Site were determined to be consistent with the ROD, the EPA-approved final Remedial Design documents, and the Statements of Work in the UAO and consent decree.

The responsible parties' construction contractors adhered to the construction QA/QC plans. All inspections, independent testing, audits, and evaluations of materials and workmanship were performed in accordance with the construction drawings, technical specifications and construction QA/QC plans. Construction change orders and modifications to the remedial designs are documented in Close Out Reports and as-built drawings submitted by the responsible parties. The Close Out Reports for the FTPA North and South Waste Pits and the Treatment Cell will be submitted to EPA and the State when performance standards for these components have been achieved. Construction quality assurance was performed by the independent Quality Assurance Official retained by the responsible parties. The EPA RPM and State Project Officer and other State officials visited the Site regularly during construction activities to review construction progress and to evaluate and review the results of QA/QC activities. Deviations or non-adherence to QA/QC protocols, drawings, or specifications were properly documented and resolved.

All required chemical analyses were performed in accordance with Quality Assurance Project Plans and using EPA analytical methods. EPA and the State determined that analytical results are accurate to the degree needed to assure satisfactory execution of the remedial action. .

IV. ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

The following Site activities are expected to be completed in accordance with the schedule described in the following table:

TASK	ESTIMATED COMPLETION DATE	RESPONSIBLE ORGANIZATION
2 nd Five-Year Review	September 29, 2006	EPA
Contract Final Inspection for FTPA	October 5, 2006	EPA/State/Responsible Parties
Pre-Certification Inspection for South Waste Pit and Treatment Cell, FTPA	December 6, 2006	EPA/State/Responsible Parties
Approve RA Report for South Waste Pit and Treatment Cell	March 6, 2007	EPA
Pre-Certification Inspection for North Waste Pit	March 13, 2009	EPA/State/Responsible Parties
Approve RA Report for North Waste Pit (final RA Report for the final OU at the Site)	June 13, 2009	EPA

TASK	ESTIMATED COMPLETION DATE	RESPONSIBLE ORGANIZATION
Approve Final Close-Out Report	September 30, 2009	EPA
3 rd Five-Year Review	September 30, 2011	EPA

V. SUMMARY OF REMEDIATION COSTS

As described above, the remedial action at the Site was performed by responsible parties. The following table compares the cost estimate from the ROD with the approximate costs of construction and operations and maintenance as reported to EPA by the responsible parties.

OU	REMEDIAL ACTION COMPONENTS	CAPITAL COSTS, ROD ESTIMATE	ANNUAL O&M, ROD ESTIMATE	30 YEAR PRESENT WORTH, CAPITAL + O&M, ROD ESTIMATE	APPROXIMATE COST TO DATE
	Institutional Controls	Not included	Not included	Not included	\$ 5,000,000 ²
	Project Planning and Management ¹			\$28,263,000	\$10,000,000 ³
1/6	Shallow Groundwater Containment, Collection, and Diversion System	\$ 2,841,000	\$ 83,000	\$ 4,117,000	\$ 5,000,000
	North Toe Extraction System	\$ 261,000	\$ 11,000	\$ 430,000	\$ 800,000
	NBBW	\$ 60,000	\$ 10,000	\$ 214,000	\$ 130,000
	Water Treatment Plant	\$ 4,357,000	\$ 618,000	\$13,857,000	\$15,000,000
	Mobilization and infrastructure ⁴	\$ 1,550,000	\$ 30,000	\$ 2,011,000	
	Groundwater monitoring	\$ 508,000	\$ 840,000	\$12,913,000	\$16,000,000
2/3	Maintain Landfill Cover	\$ 4,054,000	\$ 243,000	\$ 7,790,000	\$ 2,000,000
	North Face Cover	\$ 736,000	\$ 0	\$ 736,000	Included above ⁵
	Landfill Gas Collection and Treatment System	\$ 1,769,000	\$ 258,000	\$ 3,966,000	\$ 2,000,000
	Landfill Gas Monitoring	Included above	Included above	Included above	\$ 900,000
	FTP	\$ 4,054,000	\$ 243,000	\$ 7,790,000	\$15,000,000
4/5	Wetlands mitigation	Not included	Not included	Not included	\$ 300,000
	SWRA	\$ 41,000	\$ 789,000	\$12,170,000	\$15,000,000
	Soil and sediment monitoring	\$ 48,000	\$ 48,000	\$ 787,000	Not included
	Total			\$95,044,000	\$87,130,000

¹Project Planning and Management is included as "indirects" in Table 11-8 of the ROD, "Cost Estimate Summary, Selected Site-wide Remedy"

²Includes purchase of land to create a ½ mile buffer zone surrounding the Site – not specifically included in ROD

³Includes waste disposal costs

⁴Includes well abandonment, command post demolition, and decommissioning

⁵Cost of North Face Cover is included in the cost of maintaining the landfill cover

VI. FIVE-YEAR REVIEW

Upon completion of remedial action at the Site, hazardous substances will remain at the Site above levels that allow unlimited use and unrestricted exposure. Pursuant to CERCLA 121 (c) and as provided in EPA's *Comprehensive Five-Year Review Guidance*, OSWER Directive 9355.7-03B-P, June, 2001, EPA must conduct a statutory review of the remedial action no less often than every five years after the initiation of the selected remedial action. The 2nd Five-Year Review for the Site will be completed prior to September 30, 2006.



Assistant Regional Administrator,
Office of Ecosystems Protection
And Remediation
EPA Region 8

9/28/06
Date

FIGURES

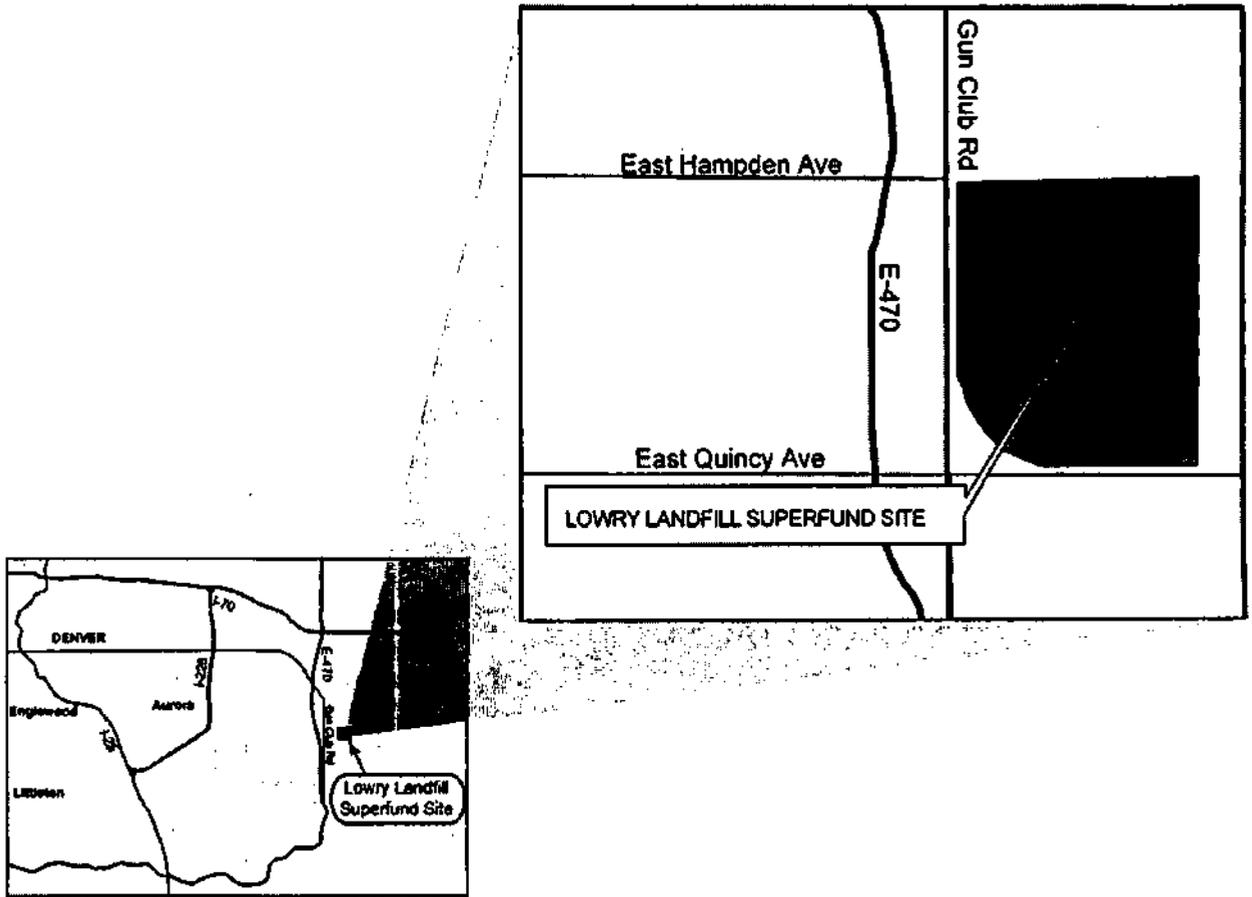


Figure 1: Site Location

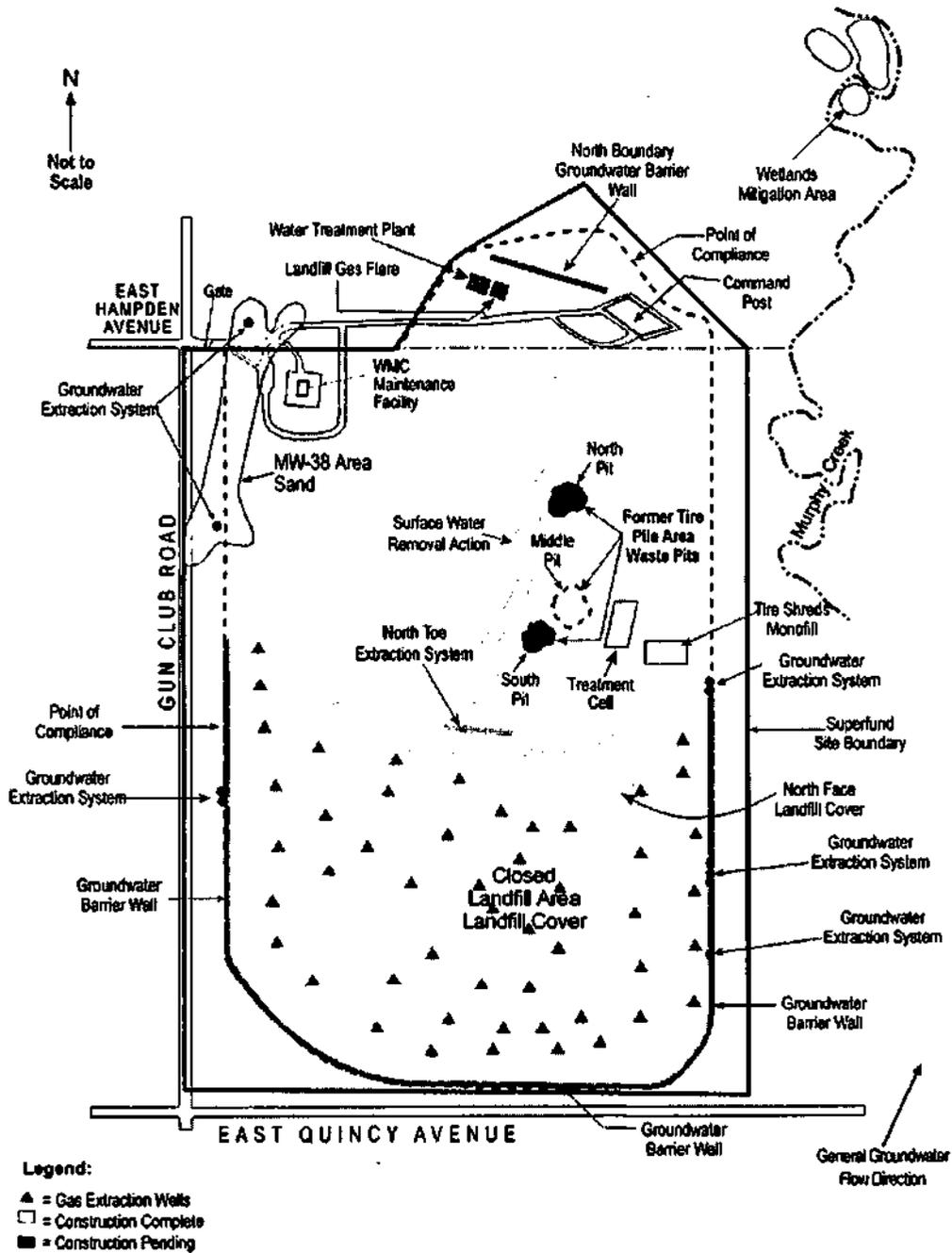


Figure 2: Sitewide Remedy Components

TABLES

Table 1: Summary of On-Site Institutional Controls, Lowry Landfill Superfund Site

TYPE OF CONTROL	LAND USE RESTRICTIONS	ACTIVITY RESTRICTIONS	GROUNDWATER USE RESTRICTIONS	ACCESS RESTRICTIONS	OTHER REQUIREMENTS	ENFORCED BY
<p>Amended Onsite Restrictive Covenants – Amended Declaratory Statement of Environmental Covenants to Run with Land for Section 6 and a Portion of Section 31 of the Lowry Landfill</p>	<p>Site shall not be used for day care centers, schools, nursing homes, hospitals, or residential purposes Land use restricted to landfilling, monitoring or remediation activities or other uses not inconsistent with the purposes to be served by the covenants or the selected remedy</p>	<p>No structures shall be constructed onsite except as necessary for landfill purposes, or for monitoring, or remediation necessary to implement the selected remedy No excavation shall be conducted onsite except as necessary for landfill purposes or for monitoring or remediation necessary to implement the selected remedy</p>	<p>No new wells for any use of groundwater shall be constructed, except for monitoring or remediation purposes necessary for implementation of the selected remedy or other wells not inconsistent with the purposes to be served by the covenants</p>	<p>Access limited to persons authorized to be on the Site for allowed land uses Access limited to areas approved the Mayor of the City of Denver or his designee</p>		<p>Any person owning any part of the property, the Mayor of the City of Denver, the Lowry Trust or its approved successors and assigns, CDPHE, or EPA</p>
<p>Provisions in decrees governing Denver’s right to withdraw water from aquifers underlying Site</p>			<p>Decree does not override or modify restrictions on groundwater use required by the restrictive covenants</p>		<p>Use water well construction and maintenance techniques to prevent potential cross contamination between aquifers or withdrawal of groundwater from other aquifers</p>	<p>District Court , Water Division 1, Colorado</p>

Table 1: Summary of On-Site Institutional Controls, Lowry Landfill Superfund Site

TYPE OF CONTROL	LAND USE RESTRICTIONS	ACTIVITY RESTRICTIONS	GROUNDWATER USE RESTRICTIONS	ACCESS RESTRICTIONS	OTHER REQUIREMENTS	ENFORCED BY
Regular survey of wells under Sitewide Monitoring Plan					EPA and Respondents under UAO for RD/RA will develop plan, to be included in Sitewide Monitoring Plan, for regular survey of wells constructed onsite to ensure all new wells will not interfere or be incompatible with, and will not reduce or impair the effectiveness or protectiveness of the remedy	EPA, in consultation with CDPHE
Zoning	Residential use restricted within Buckley LDN 60 noise contour					City of Aurora and Arapahoe County
Zoning	Aurora's comprehensive plans describe the Site as a "public facility" reflecting the anticipated long-term remediation and landfill use of the facility					City of Aurora

Table 1: Summary of On-Site Institutional Controls, Lowry Landfill Superfund Site

TYPE OF CONTROL	LAND USE RESTRICTIONS	ACTIVITY RESTRICTIONS	GROUNDWATER USE RESTRICTIONS	ACCESS RESTRICTIONS	OTHER REQUIREMENTS	ENFORCED BY
Federal Lien					Provides inquiry notice to prospective purchaser that Site is a Superfund Site	United States
Certificate of Designation	Under State of Colorado's Solid Waste Act, State has authority to regulate land use of closed landfills					Arapahoe County and State of Colorado
Notice of Nonconsent for the Withdrawal of Groundwater			No water provider may include the landfill in its service area and obtain the right to use the groundwater underlying the landfill by implied consent			City of Denver

Table 2: Summary of Off-Site Institutional Controls, Lowry Landfill Superfund Site

TYPE OF CONTROL	LAND USE RESTRICTIONS	ACTIVITY RESTRICTIONS	GROUNDWATER USE RESTRICTIONS	ACCESS RESTRICTIONS	OTHER REQUIREMENTS	ENFORCED BY
<p>Offsite Restrictive Covenants – the below-listed Declaratory Statements, taken together, address the following offsite properties: East ½ of Section 36, East ½ of Section 1, North ½ of Section 7, Eastern ¼ of Section 6, Western 1/8 of Section 5, Southern ¼ of Section 32</p> <p>1. Declaratory Statement of Environmental Covenants to Run with Water Rights</p> <p>2. Declaratory Statement of Environmental Covenants to Run with Land</p> <p>3. Declaratory Statement of Environmental Covenants to Run with Land for a Portion of Section 31</p>	<p>Shall not be used for day care centers, schools, nursing homes, hospitals, or residential purposes.</p> <p>Land use is restricted to landfilling, monitoring or remediation activities, industrial, commercial (including office space) agricultural, transportation, utilities, open space, recreation, or other uses not inconsistent with the purposes to be served by the covenants.</p>		<p>Precludes the drilling of new wells for use of groundwater from the Dawson or Denver aquifers, except for monitoring or remediation purposes necessary for closure of the landfill in Section 31 or implementation of the remedy for Lowry Landfill, or other wells which are not inconsistent with the purposes served by the covenants.</p>			<p>Any person owning any part of the Water Rights and/or the Site, and/or the property, the Lowry Trust, and/or the Mayor of the City and County of Denver, or their successors and assigns</p>

Table 2: Summary of Off-Site Institutional Controls, Lowry Landfill Superfund Site

TYPE OF CONTROL	LAND USE RESTRICTIONS	ACTIVITY RESTRICTIONS	GROUNDWATER USE RESTRICTIONS	ACCESS RESTRICTIONS	OTHER REQUIREMENTS	ENFORCED BY
Provisions in decrees governing Denver's right to withdraw water from the Lower Dawson, Denver, Upper and Lower Arapahoe, and Laramie Fox Hills aquifers underlying Section 31 excluding the Superfund site, and the northern ¾ of Section 32			Decree does not override or modify restrictions on use of groundwater underlying the Superfund site required by the environmental covenants.		Use water well construction and maintenance techniques to prevent potential cross contamination between aquifers or withdrawal of groundwater from other aquifers.	District Court , Water Division 1, Colorado
Regular survey of wells under Sitewide Monitoring Plan					EPA and Respondents under UAO for RD/RA will develop plan, to be included in Sitewide Monitoring Plan, for regular survey of wells constructed within ½ mile from the Site to ensure all new wells will not interfere or be incompatible with, and will not reduce or impair the effectiveness or protectiveness of the remedy.	EPA, in consultation with CDPHE
Zoning	Residential use restricted within Buckley LDN 60 noise contour					City of Aurora

Table 2: Summary of Off-Site Institutional Controls, Lowry Landfill Superfund Site

TYPE OF CONTROL	LAND USE RESTRICTIONS	ACTIVITY RESTRICTIONS	GROUNDWATER USE RESTRICTIONS	ACCESS RESTRICTIONS	OTHER REQUIREMENTS	ENFORCED BY
Zoning	Arapahoe County zoning mandates that Site and properties contiguous to Site be zoned for Regional Park and Open Space uses, except the northeast corner of Section 12, part of the E-470 corridor.					Arapahoe County
Aurora City Ordinance No. 93-88		<p>Prohibits development or construction of buildings within ¼ mile of the east, south, or west exterior boundaries of Section 6. Does not apply to development or construction of buildings used for characterizing or remediating the contamination at the Site, nor does it apply to development or construction of roadways, public utilities, and structures accessory thereto.</p> <p>Prohibition applies until the remedy is implemented and the 5-year review confirms the remedy is protective at compliance boundary</p>	<p>Prohibits drilling, development, or use of any wells in the Dawson Aquifer within ½ mile of the exterior boundaries of Section 6 until EPA's groundwater remedy has been implemented and EPA's 5-year review has occurred. Does not apply to wells used for monitoring groundwater quality, extracting groundwater for remediation, or reinjecting treated groundwater. Prohibition expires after the 5-year review has occurred and EPA has determined that the remedy is protective at the compliance boundary, provided that drilling or use of such wells shall only occur with the approval of Aurora.</p>		<p>Adopts by reference the Colorado Primary Drinking Water regulations found in Volume 5 of the Colorado Code of Regulations 1007-3, as Amended. Requires sellers of real property located within ¼ mile of the south, or west exterior boundaries to give notice to prospective purchasers that the property is located near a Superfund site.</p>	City of Aurora

Table 2: Summary of Off-Site Institutional Controls, Lowry Landfill Superfund Site

TYPE OF CONTROL	LAND USE RESTRICTIONS	ACTIVITY RESTRICTIONS	GROUNDWATER USE RESTRICTIONS	ACCESS RESTRICTIONS	OTHER REQUIREMENTS	ENFORCED BY
Certificate of Designation – applies to all or portions of Sections 4, 9, 31 and 32	Under State of Colorado Solid Waste Act, State has authority to regulate land use of closed landfills.					Arapahoe County and State of Colorado
Federal Lien - applies to non-Superfund site portion of Section 31					Provides inquiry notice to prospective purchaser that property is adjacent to a Superfund site	United States
Deed Restrictions that run with the land - East ½ of Section 1, East ½ of Section 36	Limit the property's use to open lands, park, recreational uses, farming, grazing, construction and operation of water supply wells, and certain defined transportation improvements, including but not limited to rail, light rail and public highway					Lowry Trust The Trust may assign the right to enforce the deed restrictions to third parties. Denver has independent enforcement rights so long as it owns any or all of Section 6.