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Colorado Department
of Public Health
and Environment

Lowry Landfill Superfund Site Information Update No. 15



JULY 2000

EPA Region VIII

The U.S. Environmental Protection Agency (EPA), in cooperation with the Colorado Department of Public Health and Environment (CDPHE), has prepared this information update to keep you informed about the progress of cleanup activities at the Lowry Landfill Superfund Site (Lowry Landfill Site).

This update will tell you about:

- Site History and Contamination Problems
- The Progress of Cleanup
- Ongoing Site Activities
- Five-Year Review

Summary of Site History and Contamination Problems

The Lowry Landfill Site is located northeast of the intersection of Quincy Avenue and Gun Club Road, approximately 15 miles southeast of downtown Denver and 2 miles east of Aurora.

From the mid-1960s until 1980, the City and County of Denver (Denver) operated an industrial liquid waste and municipal solid waste landfill at the Lowry Landfill Site.

During this period, more than 120 million gallons of liquid waste were disposed of at the Lowry Landfill Site, primarily using a technique known as co-disposal. The materials disposed of primarily included sewage sludges, metal plating wastes, petroleum-derived products, pesticides, and industrial solvents. These wastes were dumped into about 75 unlined trenches or pits. Refuse, tires, and soil were added to the pits to absorb the liquids.

Waste Management of Colorado, Inc. (WMC) began landfill operations in 1980 under a contract with Denver. At that time, waste disposal was restricted to municipal waste.

Over time, some of the contaminated liquids seeped out of the pits and mixed with the surrounding solid waste, ground water, and surface water.

Because of the Lowry Landfill Site's potential threat to public health and the environment, it was placed on the *National Priorities List* (NPL) in 1984.

From 1984 to 1993, studies were performed to define the contamination, to estimate potential health and environmental risks, and to evaluate cleanup alternatives for the Lowry Landfill Site.

From 1989 through 1992, WMC, under contract with Denver, shredded approximately 8 million old tires piled on the Lowry Landfill Site. Some of the shredded tires were sold and the remainder are being stored in a 25-foot-deep tire monofill at the Lowry Site. Removal of the tires reduced health and fire risks and allowed access to the area for site studies.

Some problems at the Lowry Landfill Site have been corrected by two interim cleanups. A ground-water barrier wall and water treatment facility have been operating since 1985 to stop the northward migration of contaminated ground water. A second interim remedial measure called the Surface Water Removal Action (SWRA) was built within the unnamed creek to separate contaminated ground water from rain and snow melt.

On March 10, 1994, EPA and CDPHE signed the Record of Decision (ROD) that formally selected the cleanup plan for the Lowry Landfill Site. The ROD outlines the rationale for selecting the sitewide remedy.

Under the selected remedy, contaminated ground water and landfill gas are being addressed through containment, collection, and treatment.

Landfill solids and soils are also being contained at the site. Contaminated seepage and surface water are addressed through drainage and underground collection as part of the SWRA. The response action for the Former Tire Pile Area (FTPA) waste pits will address principal threat wastes through treatment. EPA believes that the selected sitewide remedy will protect human health and the environment. (Figure 1.)

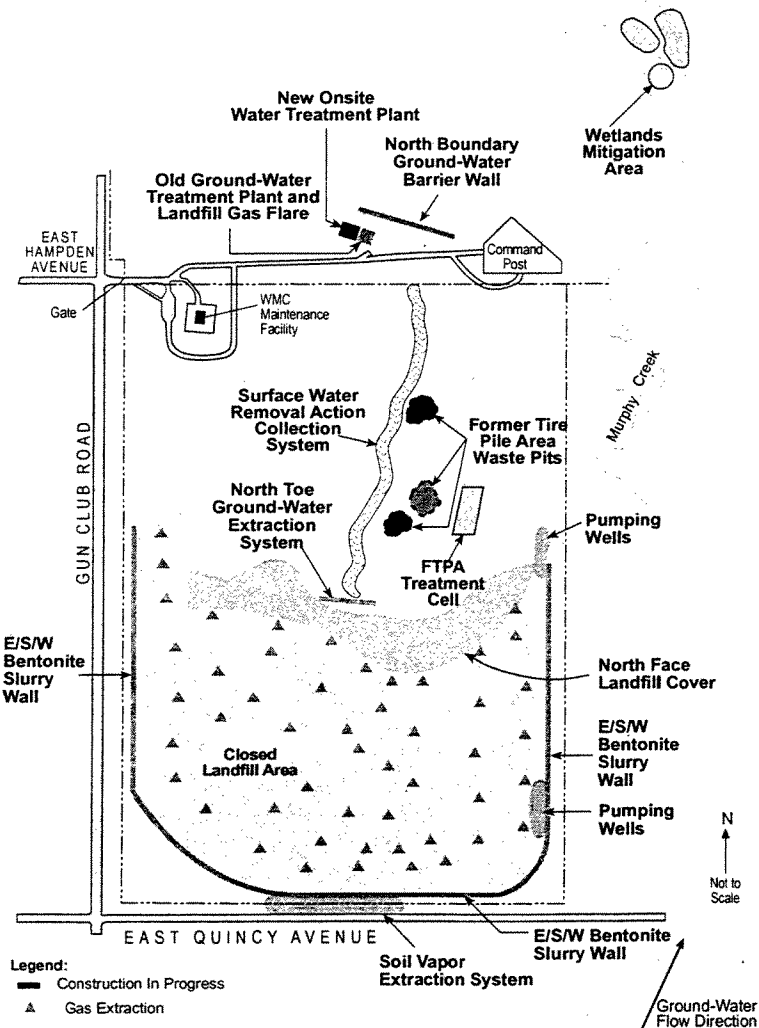


Figure 1
Lowry Landfill Site Cleanup Construction

On November 18, 1994, EPA issued a Unilateral Order for Remedial Design/Remedial Action (RD/RA Order) to 34 Potentially Responsible Parties. The RD/RA Order directs these parties to develop designs for the sitewide remedy and to perform the cleanup. Three of the parties (Denver, WMC, and Chemical Waste Management, Inc.), referred to as the "Respondents" to the RD/RA

Order, reached agreements with 23 other parties to perform the RD/RA on their behalf.

In August 1995, EPA and CDPHE issued the first Explanation of Significant Differences (ESD) to the ROD. This document clarified minor details of the sitewide cleanup plan.

In October 1997, EPA and CDPHE issued the second ESD, which listed additional changes to the ROD. These changes affected the methods of treating and discharging ground water, and treating and disposing of drums, waste pit materials, and contaminated soils from the FTPA.

The Progress of Cleanup

The Respondents developed the remedial designs for the Lowry Landfill and are doing the cleanup. Ninety percent of the cleanup components are now in place (Figure 2). EPA and CDPHE are overseeing all cleanup plans and activities. All parts of the remedy should be in place by 2002. These cleanup components (e.g., landfill gas extraction, ground-water barrier walls, water treatment plant) will continue to operate in perpetuity or until the cleanup goals are met.

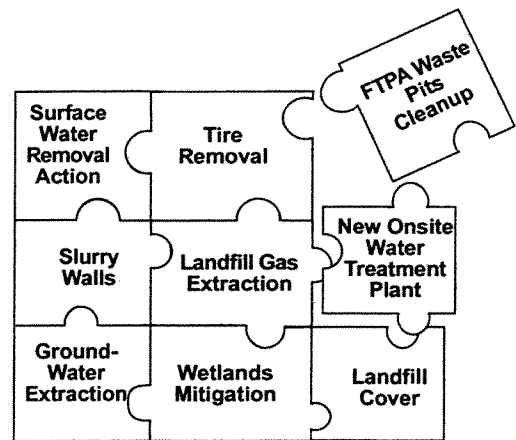


Figure 2
Cleanup Progress—Construction is 90% Complete

FTPA Waste Pits Remedy. The purpose of the FTPA Waste Pits Remedy is to address principal threat wastes including drums, soils, debris, and liquids. There are three waste pits: north, south, and middle (Please refer to Figure 1). Excavation of the middle waste pit began in September 1998 and was completed in February 1999 (Figure 3 on Page 3).



Figure 3
Middle Waste Pit Excavation

During excavation of the middle waste pit, we found that additional emission and odor control measures were needed. Excavation began on the north waste pit under a structure designed to control emissions. The ventilation system in the structure was inadequate in controlling worker exposure so excavation stopped. To address these concerns, EPA, CDPHE, the Respondents, and the Lowry Landfill Technical Advisory Group looked at other cleanup options for the north and south waste pits. After months of research, evaluation, and discussion, we decided that an innovative technology is the best treatment for the two remaining waste pits. This technology, referred to as "Six-Phase Heating," will treat the waste in place with heat.

The Respondents are now designing a treatability study (using the innovative treatment technology) for the FTPA north and south waste pits. The treatment technology will include soil covers over both pits, a "Surface Emission Recovery System," vapor and liquid extraction wells, and monitoring probes in both pits. The treatability study will also include an off-gas collection and treatment system, a liquid-phase handling system, and subsurface heating with six-phase heating electrodes (Figure 4). Pilot tests will be performed this summer. Full-scale treatment will begin after the pilot studies are complete.

Upon successful treatment at the full-scale level, (defined by EPA as meeting the performance standards and goals for the new technology), EPA will prepare another ESD to the ROD. The FTPA waste pit cleanup should be complete in 2002.

Landfill Gas Collection and Treatment System. This system was constructed in late 1996, began operating in January 1997, and is continuing to operate. Because of the low volume of gas, the gas collection and extraction system is currently operating about 38 hours per week. The flare operates at about 1,400° Fahrenheit. The blowers are delivering an average flow rate of approximately 950 standard cubic feet per minute. The landfill gas is treated in a flare while condensate from the collection lines (landfill gas condensate) is treated at the onsite water treatment plant.

Well Plugging Program. In November 1996, EPA and CDPHE approved a program to plug and abandon about 67 of the more than 300 wells at the Lowry Landfill. These wells were no longer being used to monitor either ground water or landfill gas and plugging these wells helps ensure the integrity of the landfill cap. The Respondents completed the well plugging program in March 1997.

Wetlands Mitigation. In August 1996, EPA and CDPHE approved the Wetlands Mitigation Plan to replace about an acre of wetlands lost during construction of Lowry Landfill remedies. Wetlands construction was completed in spring 1997, but heavy flooding that same summer severely damaged the newly built wetlands. The Respondents reconstructed the wetlands in spring 1999 (Figure 5 on Page 4).

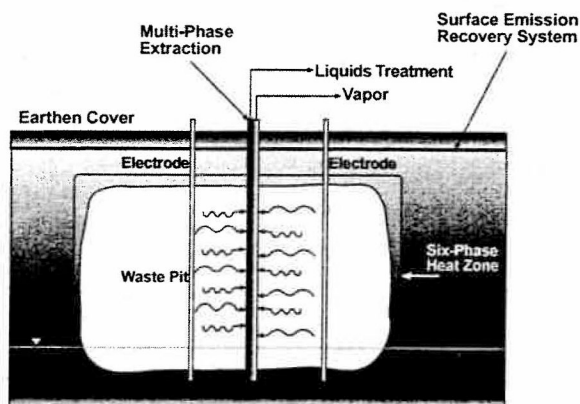


Figure 4
Conceptual Design
North and South FTPA Waste Pits

East/South/West Ground-Water Bentonite Slurry Wall. The Respondents completed building the East/South/West Ground-Water Bentonite

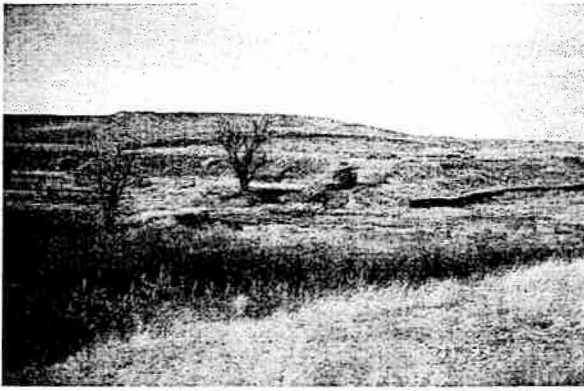


Figure 5
Restored Wetlands

Slurry Wall in spring 1998. This wall's purpose is to minimize the potential for clean water to enter the site and to restrict contaminated ground water from flowing offsite. (Pumping of wells along the East Boundary is described on Page 6.)

North Toe Ground-Water Extraction System. The North Toe Ground-Water Extraction System was constructed in spring 1998 to remove contaminated ground water. The water from the extraction system will be treated at the new onsite treatment plant after it is fully operational.

North Boundary Ground-Water Barrier Wall System. The North Boundary Ground-Water Barrier Wall (NBBW) System was constructed in 1984 and continues to function to remove and treat contaminated ground water flowing north from the Lowry Landfill. Monitoring is being performed on an ongoing basis to evaluate its effectiveness.

Publicly Owned Treatment Works (POTW) Pipeline and Potable Waterline. The potable waterline was constructed in summer 1998 to convey clean water from a municipal water supply line to augment the offsite shallow ground-water system for waters removed from the site. The POTW Pipeline was also built in summer 1998 to convey water from the new onsite Water Treatment Plant to Aurora's sewer system.

North Face Landfill Cover. The Respondents completed the North Face Landfill Cover in late 1999. This cover included the placement of an additional 2 feet of cover on the north face of the landfill mass on an area of about 29 acres. About 100,000 cubic yards of soil were added to increase

the total thickness on the north face cover to 4 feet, equal in thickness to the other surface areas of the landfill.

The New Onsite Water Treatment Plant. The new onsite water treatment plant will pre-treat ground water from the Lowry Landfill Site to remove organic chemicals. The pre-treated water will then be piped offsite for treatment of inorganic and remaining organic chemicals at the Metro Wastewater Reclamation District (the Metro District) facility, a POTW, and the City of Aurora (Aurora) Sand Creek Wastewater Reclamation facility (also a POTW). Following treatment at the POTWs, the treated water will be sent to Sand Creek and the South Platte River. Some of the treated wastewater will be used to irrigate parks and a golf course. The Metro District blends and treats the sewage sludge by-product of its wastewater treatment processes, producing a beneficial product called biosolids. Biosolids are applied as fertilizer and soil amendments on the Metro District's farm lands in eastern Colorado and is also commercially available.

The Metro District and Aurora have developed an industrial wastewater discharge permit (Permit I-118) to require that pre-treated water from the Lowry Landfill Site meets specific standards so that the water can be safely sent through the sewer systems and treated at the POTWs.

The new onsite water treatment plant was built to meet the requirements of the industrial wastewater discharge permit. This new plant is located directly west of the old water treatment facility (Please refer to Figure 1 on Page 2).

Construction of the new onsite water treatment plant began in 1999 and was completed in March 2000 (Figure 6 on Page 5). Since March, the Respondents have been conducting extensive tests to make sure that the new water treatment plant is working properly. These tests include mechanical inspections, electrical inspection and testing, instrumentation inspection and testing, water quality analyses, and hydraulic tests.

Contaminated water coming into the water treatment plant will come from four primary



Figure 6
New Onsite Water Treatment Plant

sources: the North Boundary Barrier Wall, the east boundary pumping wells described on Page 6, the North Toe Ground-Water Extraction System, and the landfill gas condensate. The new water treatment plant is currently treating water from the NBBW, the east boundary wells, and the landfill gas condensate. Treated waters from the new water treatment plant are being temporarily discharged into the injection trench downgradient of the NBBW, just as it was for the old treatment plant, until final tests are completed and the water is approved for discharge to the POTWs.

About 400,000 gallons of water are treated at the new treatment plant each month. All standards in the Lowry Landfill Site's discharge permit must be met before water from the treatment plant may be discharged to the POTWs.

On April 14, 2000, several parties filed a lawsuit in Denver District Court against Metro, Denver, and Aurora to prevent discharging water from the Lowry Landfill Site water treatment plant to the POTWs. On June 9, 2000, a Denver District Court judge dismissed the case.

The Respondents are performing batch tests on the effluent water from the treatment plant (excluding the North Toe Ground-Water Extraction System water). If the test results show that the standards in the discharge permit are being met, then it is planned to discharge water from the treatment plant to the POTWs in August.

During batch testing of waters from the North Toe Ground-Water Extraction System, the Respondents found that of 1,4-dioxane was not being effectively removed. The Respondents are

performing additional tests to evaluate treatment options to meet the standards. In the meantime, North Toe Ground-Water Extraction System waters already collected are being stored onsite in frac tanks and will be excluded from startup and operation of the new water treatment plant.

Ongoing Site Activities

Ongoing Site Monitoring Program

There is an ongoing comprehensive monitoring program at the Lowry Landfill Site to check compliance with the performance standards in the ROD. Substances included are: volatile organic compounds (VOCs), semi-volatile organic compounds, pesticides, polychlorinated bi-phenols (PCBs), herbicides, dioxins, metals, and radionuclides. The monitoring program includes the following:

- **Quarterly samples** are collected from about 60 monitoring wells along the perimeter of the site and are analyzed for organic and inorganic contaminants.
- **Surface water samples** are collected annually to evaluate if contaminant migration is occurring from to the surface water from other media.
- **The effluent of the water treatment plant is monitored** at varying frequencies (continuous, daily, monthly, semi-monthly, quarterly, semi-quarterly, and annually) to verify that the water treatment plant is compliant with the approved flow and discharge standards.
- **Subsurface landfill gas** is monitored from 20 gas probes on the east, south, and west boundaries of the landfill mass. Methane monitoring is performed quarterly along the perimeter of the site and if methane exceeds standards, monthly VOC monitoring is performed (Please refer to Figure 7 on Page 6).
- **Quarterly water-level measurements** are performed to evaluate the ground-water flow patterns at the site.
- **Landfill Gas Flare inlet and exhaust monitoring** is performed to evaluate the

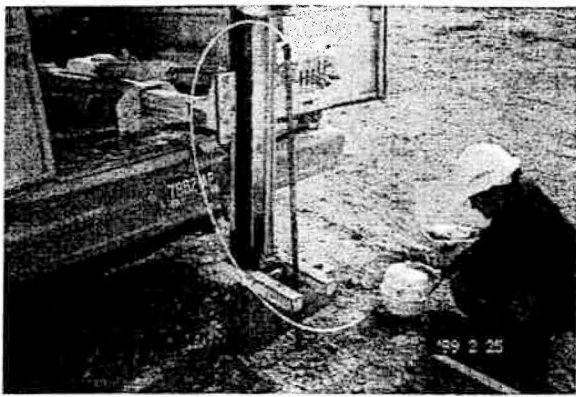


Figure 7
Landfill Gas Sampling

destruction efficiency of the flare and to verify that the exhaust is compliant with the approved discharge standards.

- **Early Warning Monitoring System** monitoring is performed to identify contaminants that may impact the water treatment plant operations. There are six early warning monitoring wells: one well at the North Boundary Barrier Wall, two at the east boundary, and three at the North Toe Extraction System. The early warning monitoring wells are located upgradient of the new treatment plant. This allows the ground-water quality to be checked before treatment to evaluate whether any modifications to operations or equipment will be needed to achieve the discharge standards in the permit.

South Boundary Soil Vapor Extraction System

During monitoring of gas probes, the Respondents found higher than acceptable levels of VOCs (levels exceeding the performance standards for subsurface gas) along the southern boundary of the Lowry Landfill Site. A soil vapor extraction (SVE) system was installed in fall 1999 to extract VOCs from the subsurface (Figure 1). The system works by pulling contaminated soil vapors to an extraction point using a vacuum, and then treating those vapors with granular activated carbon. As contaminated soil vapors are removed, the soil gas quality should improve in the monitoring probes. The SVE system will continue to operate until soil vapors are below performance standards in all of the subsurface gas monitoring points.

Pumping Along the East Boundary

As part of the ongoing monitoring program along the East/South/West Ground-Water Barrier Wall, VOCs above performance levels were detected at two well pairs (PM-11 and PM-15) along the east boundary of the barrier wall. In addition, water level measurements displayed higher water levels in the interior wells as compared to the exterior wells, suggesting that there may be a potential for contamination to move offsite.

The *Final Performance and Compliance Monitoring Plan for Shallow Groundwater Containment, Collection, and Diversion System East/South/West Site Boundaries* (November 1998) requires corrective measures to be implemented when there are detections above performance standards and there are outward gradients in the monitoring well pairs. The Respondents conducted additional field investigations and implemented pumping at these wells in January 2000. The water pumped from the east boundary is treated in the new onsite water treatment plant. Additional boundary monitoring wells were installed to provide more information about the extent of the contamination (Figure 8). Pumping will continue until the gradient is reversed so that water is flowing onto the site or concentrations in the wells no longer exceed performance standards. The Respondents are currently conducting additional investigations to see if additional cleanup actions are necessary.

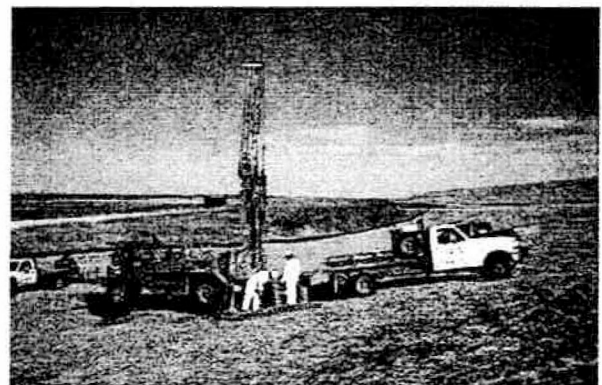


Figure 8
Monitoring Well Installation

FTP Treatment Cell

As part of the FTPA waste pits remedy, the Respondents excavated material from the Middle Waste Pit and placed it in a treatment cell. The

treatment cell is lined and has a cover over it so that air can be pulled from the pile and treated in a catalytic oxidation system. This system was designed to meet air emission standards and a specified destruction efficiency. The catalytic oxidation system was not able to meet the destruction efficiencies. Therefore, the catalytic oxidation system has been removed from the site and the Respondents plan to install a Flameless Thermal Oxidation unit later this summer.

FTP A North and South Waste Pit Field Work

The Respondents and their contractor have installed more than 30 geoprobes around the perimeter of the north and south waste pits to confirm the extent of the waste pits. The geoprobes were installed in early June 2000. In addition, an earthen cover is being constructed over the two waste pits to reduce the potential for release of contaminants to the atmosphere during in-situ remediation. After the cover is completed, the next step in the drilling program is to install test electrodes (12 per waste pit) and multi-phase vapor and liquid extraction wells.

USGS Radionuclide Evaluation

EPA has contracted with the United States Geological Survey (USGS) to conduct studies to measure the levels of plutonium contamination at the Lowry Landfill Site.

This investigation is being conducted in response to concerns expressed by citizens' groups that there may be plutonium in the water at the Lowry Landfill Site, above the levels reported by the Respondents. Based on over a decade of sampling results, the Respondents have measured only very low or background levels of plutonium at the Site. The USGS will also sample the effluent from the new onsite water treatment plant.

Site Tours

EPA, the State, and the Respondents have recently conducted several site tours for interested parties. These tours provide an opportunity to see the water treatment plant, Superfund field work, and the Metro POTW. Anyone interested in a site tour should contact any of the EPA or CDPHE contacts listed on Page 8.

Five-Year Review

This summer, EPA will begin a five-year review of the effectiveness of the Lowry Landfill Site remedy. The review will be completed in summer 2001 (five years after the start of construction). The five-year review's primary purpose is to evaluate the implementation and performance of the selected remedy. It will show whether the Lowry Landfill Site remedy is protective of human health and the environment, or whether the remedy has to be reevaluated.

The review will be conducted by a review team which consists of EPA's Lowry Remedial Project Manager, Gwen Hooten; the EPA Community Involvement Coordinator, Diana Hammer; the State Project Officer, Lee Pivonka; the State Community Relations Manager, Marion Galant; and other technical experts. EPA will notify the public at the beginning of the five-year review process by announcing the review, explaining how the community can contribute, and telling where the five-year review report will be located.

EPA will distribute a separate fact sheet and announcement to notify the community about the start of the five-year review.

LET US HEAR FROM YOU!

Did Update No. 15 adequately discuss the progress being made at the Lowry Landfill Site?

Yes

No

If not, describe what part of the process you would like to see described in more detail in the next update and send this coupon to the address noted below.

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Where to get more information about the Lowry Landfill Site

Availability of the Lowry Landfill Site Documents for Review

The engineering designs, fact sheets, ROD, ESDs, and other site specific documents are available for review at the following locations:

EPA Superfund Records Center
999 18th Street
Denver, CO 80202
303/312-6473



Aurora Public Library
14949 East Alameda Drive
Aurora, CO 80012
303/739-6600

Many Site documents can also be seen at the Deer Trail Public Library, the Bennet Public Library, and the Byers Public Library.

Additional information about the Lowry Site can be obtained on the Internet at:

<http://www.epa.gov/region8/superfund/sites/co/lowry.html>

Key Contacts

If you have questions or would like to added to (or removed from) the mailing list, please contact any of the following individuals:

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