

19th Avenue Landfill Superfund Site 2010 Five Year Review

Appendix C - Declaration of Environmental Use Restriction (DEUR), July 2006

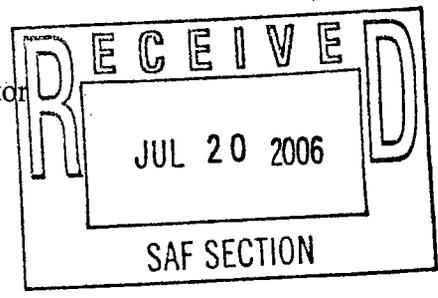


OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
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When recorded, return to:

Bruce E. Henning, PE
Deputy Public Works Director
City of Phoenix
101 South Central Avenue
Phoenix, AZ 85004



**DECLARATION OF ENVIRONMENTAL USE RESTRICTION
FOR PROPERTY WITH ENGINEERING AND INSTITUTIONAL CONTROLS**

This Declaration of Environmental Use Restriction ("Declaration"), when recorded, is a covenant that runs with and burdens the Property, binds all owners and owners' heirs, successors and assigns, and inures to the benefit of the Arizona Department of Environmental Quality ("ADEQ") and the State of Arizona.

This Declaration is executed and recorded by the City of Phoenix, a political subdivision of the State of Arizona (the "City").

DECLARATION

Owner covenants and agrees as follows:

A. Presence of Contamination. As described further below, environmental contaminants are located on and beneath property located at the northeast corner of 19th Avenue and the Salt River (Cell A) and a small parcel of land located southwest of Cell A on the other side of the Salt River (Cell A-1) in Phoenix, Arizona ("Property"). This Property was the site of a municipal landfill operated by the City of Phoenix from approximately 1957-79, and during that time received both household and industrial wastes. Some of the wastes received, for instance spent solvents, were materials that would later be defined as hazardous substances under the federal Superfund law, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"). The Property was subsequently listed on the federal Superfund list and was the subject of investigation and cleanup under CERCLA. Although the property has been remediated in accordance with U.S. Environmental Protection Agency ("EPA") and ADEQ requirements and with the agencies' approval, the selected remedial action involved leaving waste materials, including certain hazardous substances, in place and eliminating exposure to such residual wastes. Accordingly, capped environmental contaminants are present on the Property. Any future development of the property would need to take into account the presence of these residual materials, and the need to maintain the integrity of the remedy components.

B. Warranty of Title. The City is the only owner of, and holds equitable and legal title to, the Property and has authority to execute and record this Declaration.

C. Legal Description. The City's deed, setting forth the legal description of the Property at which the contamination is located, is attached and marked "Exhibit 1."

D. Maps. The location of the Property identified in "Exhibit 1" is depicted on a map attached and marked as "Exhibit 2."

E. Completion of Remediation. After completing a remedial investigation and feasibility study and remedial action plan that were reviewed and approved by EPA and ADEQ, the City proposed a series of remedial measures, which were approved by ADEQ in a Letter of Determination dated September 21, 1989 and by EPA in a Record of Decision dated September 29, 1989. The components of the remedial action included: constructing levees along both banks of the adjacent Salt River, in order to remove the Property from the 100-year flood plain; widening of the river channel; construction of a low permeability soil cap to prevent infiltration of surface water into the residual waste materials; site fencing; monitoring, collection, and treatment of methane and other landfill gases; groundwater and ambient air monitoring; and a groundwater contingency plan calling for additional remedial evaluation and/or remediation if the landfill caused groundwater quality to exceed drinking water standards at the Property boundary. On June 30, 1997, ADEQ certified completion of the remedial action. In 2002 an enhanced methane collection system was constructed and a Maricopa County air quality permit issued for the system. In 2003 EPA and ADEQ issued an Explanation of Significant Differences (ESD) which modified the 1989 remedy by updating the Maximum Contaminant Levels for specific constituents and adding Arizona Ambient Air Quality guidelines as performance standards for ambient air quality monitoring at the Property.

F. Environmental Contaminant Information.

During the environmental investigation, soil, refuse, and groundwater sampling at the site detected a number of environmental contaminants, including, but not limited to, volatile organic compounds ("VOCs"), pesticides, metals, and polychlorinated biphenyls ("PCBs") The most frequently detected VOCs were ethylbenzene, 1,4-dichlorobenzene, xylenes, and toluene. The contents of the 19th Avenue Landfill were generally similar to those of other municipal landfills of its era, that is to say other landfills before hazardous waste disposal regulations and other environmental laws were enacted, and that those contents included some hazardous substances, pollutants, and contaminants. The groundwater quality downgradient of the landfill showed little impact of the landfill and generally met drinking water standards. The ambient air quality in the vicinity of the landfill was not identifiably impacted. Concentrations of methane did require control, which was implemented. The results of the environmental investigation are more fully described in the final Draft Remedial Action Plan, dated June 12, 1989.

G. Engineering/Institutional Control Statements. Because the City/Property Owner has elected to use engineering and institutional controls to satisfy the requirements of A.R.S. §§ 49-152 and 49-158, the City/Property Owner agrees to the provisions below.

H. Engineering Controls.

1. The City/Property Owner agrees to maintain the following engineering controls, as more fully set forth in the Remedial Action Plan, Letter of Determination, and Consent Decree and Agreement between the State of Arizona and the City of Phoenix, in *State of Arizona v. City of Phoenix*, United States District Court No. CIV 91-0237:

- Drainage and Levee System
- Capping System
- Erosion and Drainage System
- Landfill Gas Extraction System
- Perimeter Site fencing to restrict public access
- The City/Property Owner shall not conduct or permit any excavation or construction activities on the Property, nor create or permit surface impoundments, infiltration units, or any other soil disturbance or other activity on or adjacent to the Property that may impair the integrity of any engineering control without the express written approval of ADEQ obtained in advance of any such activity.

2. The maintenance requirements of the engineering control are provided in Section 3 of the Engineering Control Plan dated May 10, 2005, attached hereto and incorporated by reference.

3. In order to protect the public health and the environment, the engineering control must remain in place because contaminant levels exceed residential soil standards.

4. If the City/Property Owner desires to cancel or modify any engineering or institutional control in the future, the City/Property Owner shall obtain the prior written approval of ADEQ. Any modification of the engineering control without ADEQ's prior written approval is void and a violation of this Declaration.

I. Institutional Controls.

The City/Property Owner agrees to implement and maintain the following institutional controls, as is more fully described in the Remedial Action Plan, Record of Decision, the Consent Decree and ESD for the Property:

- Groundwater quality monitoring
- Groundwater contingency plan

• The City/Property Owner shall restrict the Property to non-residential use, provided, however, that the public shall be allowed access across a Rio Salado Walking Trail, designed and constructed as follows. The U.S. Army Corps of Engineers and City of Phoenix have developed a riparian habitat restoration project at the Salt River between 19th Avenue and 16th Street, called the Rio Salado Habitat Restoration Project. As part of the project, a corridor across Cell A 30 feet wide along the northern bank of the river until reaching 19th Avenue, then extending north from the river for approximately 250 feet, has been constructed for public access. Project improvements included a soft surface pedestrian trail; a paved maintenance road along 19th Avenue that connects with the existing maintenance road along the southern boundary of cell A; and a chain link fence preventing access from the corridor to the remainder of the landfill. This feature allows pedestrian access from 19th Avenue to the Rio Salado Habitat Restoration Project and provides access for maintenance vehicles or emergency response equipment.

J. Nothing in this Declaration shall be deemed to negate or reduce in any manner the obligations of the City as set forth in that Consent Decree and Agreement between the State of Arizona and the City of Phoenix in *State of Arizona v. City of Phoenix*, United States District Court No. CIV 91-0237 (CD). Any delegation by the City of any such obligations to any successor owner of the Property or any other person shall not relieve the City of any such obligation, unless and until such obligation(s) is/are terminated by order of the District Court.

K. Pursuant to A.R.S. § 49-152.01 (B) (1) (2), ADEQ finds that the City is financially capable of meeting the requirements of A.R.S. §49-152.01. The City shall reimburse ADEQ for the costs of ADEQ activities conducted pursuant to A.R.S. § 49-152 through 49-152.02 as "oversight" costs pursuant to Par. XXVII of the above-referenced Consent Decree and Agreement. In the event of a sale or transfer of the Property or any portion thereof subject to a engineering or institutional control, the City's obligation to reimburse ADEQ for its activities under this paragraph shall not be relieved unless the Consent Decree is terminated by order of the United States District Court.

L. The City/Property Owner hereby grants to ADEQ and its representatives, authorized agents, attorneys, investigators, consultants, advisors, and contractors the right of access to the Property at all reasonable times to verify that the engineering and institutional controls are being maintained. This right of access is continuing and runs with the land. If access to the Property is restricted, the City/Property Owner shall have any barrier to entry promptly opened or removed at the request of ADEQ.

M. The City/Property Owner shall incorporate the terms of this Declaration into any agreement for sale, lease, license or other agreement that is signed by the City/Property Owner and that grants a right with respect to the Property. The incorporation may be in full or by reference.

N. Periodic Inspections and Reports. Because the City/Property Owner has elected to use engineering and institutional controls to satisfy the requirements of A.R.S. §§ 49-152 or 49-158, the City/Property Owner shall maintain the controls to ensure that such controls-continue to protect public health and the environment. The first report shall be due on January 31, 2007 for calendar year 2006. The City/Property Owner shall inspect the engineering controls at least once each calendar year. Within thirty days after each inspection, the City/Property Owner shall submit to the Department a written report that:

1. Describes the condition of the controls;
2. States the nature and cost of all restorations made to the controls during the calendar year; and
3. Includes current photographs of the controls.

The City of Phoenix will report information required by the DEUR and the Consent Decree and Agreement in a single report on no less than an annual basis.

O. Additional Information. More detailed information on the remediation is maintained and available at the Department of Environmental Quality, located at 1110 W. Washington Street, Phoenix, Arizona 85007.

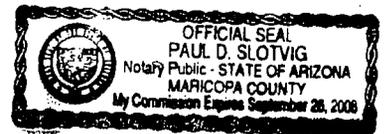
Bruce E. Henning
Designated Representative of Owner

Bruce E. Henning
Signature

101 South Central Avenue, Phoenix, AZ 85004
Current Address of Designated Representative of Owner

This Declaration of Environmental Use Restriction was subscribed and sworn before me this 19th day of July, 2006, by:

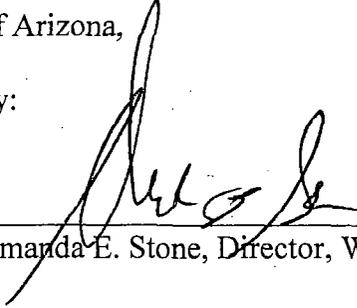
Paul D. Slotvig
Notary Public



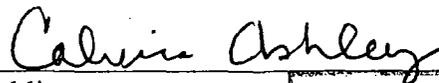
My commission expires: Sept. 26, 2008
This Declaration of Environmental Use Restriction is approved this _____ day of _____, 20____, by the Arizona Department of Environmental Quality.

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY, an agency of the State of Arizona,

by:


Amanda E. Stone, Director, Waste Programs Division

This Declaration of Environmental Use Restriction was subscribed and sworn before me this 18 day of July, 2006, by:


Notary Public

My commission expires: _____

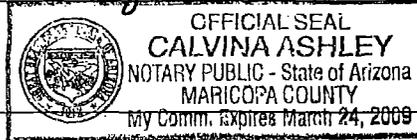


EXHIBIT 1

LEGAL DESCRIPTION OF THE 19TH AVENUE LANDFILL PROPERTY

The part of the Southwest quarter of Section 19, Township 1 North, Range 3 East, G & SRB&M, described as follows:

COMMENCING at the South quarter corner of said Section 19; thence North 00 degrees 49 minutes 15 seconds West, along the North-South mid-section line of said Section 19, a distance of 1156.40 feet;

thence North 99 degrees 51 minutes 22 seconds West to the West line of the East 40 feet of said Southwest quarter and the POINT OF BEGINNING of this parcel description;

thence North 00 degrees 49 minutes 15 seconds West, along said West line, a distance of 1143.20 feet;

thence South 57 degrees 45 minutes 05 seconds West, a distance of 1094.11 feet;

thence South 81 degrees 35 minutes 36 seconds East, a distance of 380.58 feet;

thence South 00 degrees 51 minutes 22 seconds East, a distance of 492.55 feet;

thence South 88 degrees 51 minutes 22 seconds East, a distance of 558.00 feet to the POINT OF BEGINNING:

TOGETHER WITH that part of the West half of said Section 19 described as follows:

COMMENCING at the POINT OF BEGINNING of the parcel of land described herein above;

thence North 00 degrees 49 minutes 15 seconds West, along the West line of the East 40 feet of said West half of Section 19, a distance of 1896.31 feet to the TRUE POINT OF BEGINNING of this parcel description;

thence North 00 degrees 49 minutes 15 seconds West, along the West line, a distance of 2094.65 feet;

thence North 86 degrees 35 minutes 45 seconds West, a distance of 510 feet;

thence North 00 degrees 49 minutes 15 seconds West, a distance of 460 feet;

thence North 88 degrees 50 minutes 45 seconds West, a distance of 2101.70 feet;

thence southerly, along said East line, a distance of 3943.49 feet;

thence North 89 degrees 12 minutes 27 seconds East, a distance of 562.00 feet;

thence North 68 degrees 26 minutes 16 seconds East, a distance of 588.80 feet;

thence North 58 degrees 06 minutes 18 seconds East, a distance of 1080.75 feet;

thence North 55 degrees 19 minutes 20 seconds East, a distance of 436.20 feet;

thence North 40 degrees 06 minutes 21 seconds East, a distance of 357.39 feet to the
TRUE POINT OF BEGINNING.

EXHIBIT 2

MAP OF SITE SUBJECT TO DEUR.

CAN BE FOUND AT:

CITY OF PHOENIX

SOLID WASTE DISPOSAL MANAGEMENT

101 S CENTRAL AVE

PHOENIX AZ

85004

**ENGINEERING CONTROL
PLAN FOR THE
19TH AVENUE MUNICIPAL
SOLID WASTE LANDFILL**

Submitted by:
**CITY OF PHOENIX
Public Works Department
COP Project No. PW16520005**

January 2006

Prepared by:
**URS CORPORATION
7720 N. 16th Street
Phoenix, Arizona 85020
URS Job No. 23442359**

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1.0 INTRODUCTION

This Engineering Control Plan (ECP), which is complementary to existing reports provided to the Arizona Department of Environmental Quality (ADEQ) by the City of Phoenix and the Consent Decree, was prepared as a supplement to the Declaration of Environmental Use Restriction (DEUR) for the City of Phoenix 19th Avenue Landfill. A DEUR is a restrictive covenant that requires maintenance of any institutional or engineering controls that are utilized to address environmental contamination on a specific parcel of land. The City of Phoenix uses five engineering controls to ensure that possible human exposure to contaminants on the property is minimized. These include (1) a drainage and levee system, (2) a capping system, (3) an erosion and drainage system, (4) a landfill gas extraction system, and (5) fencing. Each of the engineering controls are evaluated in this plan as follows:

- A detailed description of the engineering control is included in the plan describing how the control will prevent or minimize exposure to contaminants, the control's specifications, and operating life.
- Maintenance activities for the control are addressed in a maintenance plan.
- A contingency plan outlines the alternative methods of control if the engineering control fails and must be restored, or if it does not achieve the intended level of protection or mitigation.
- A cost analysis that includes the costs associated with maintaining the engineering controls and implementing the contingency plan (if such a need arises) is provided.

For the engineering controls, the City agrees to the following restrictions, which will not be changed without prior approval of the ADEQ:

- The soil cap will not be disturbed.
- There will be no surface impoundments or infiltration units on the landfilled areas.
- The drainage and runoff control system will not be changed.
- No heavy structures will be founded or placed on the cap without an appropriate geotechnical engineering evaluation.
- The City of Phoenix will seek pre-approval from the ADEQ for any other activities that could affect the cap.



In addition to the engineering controls, the City of Phoenix (City) shall also utilize the following institutional controls, which will not be changed without prior approval of the ADEQ:

- The City shall restrict use of the property to non-residential use.
- The City shall continue conducting groundwater monitoring of the wells in accordance with the Consent Decree and Agreement.
- The City shall implement the groundwater contingency plan (as described in the Consent Decree and Agreement) if necessary.

Finally, a financial assurance demonstration shows how the City of Phoenix will ensure the controls will be maintained and establishes that there are sufficient funds to support maintenance activities and any costs associated with restoration, as is already provided in accordance with the Consent Decree.



2.0 FACILITY DESCRIPTION

The City of Phoenix began operating a sanitary landfill at the 19th Avenue site adjacent to the Salt River in 1957. Currently, the surrounding land use is primarily for industrial activities. Land use in the area includes auto wrecking and salvage operations, warehouses, sand and gravel mining operations, heavy equipment maintenance, transport of chemicals and plastics business, waste management and recycling operations, and various fabrication/tooling/welding operations. A detailed site history of the property is presented in the Draft Remedial Investigation Study, 19th Avenue Landfill Report (June 10, 1988) and in the Remedial Action Plan for 19th Avenue Landfill Report (June 12, 1989), both of which were prepared by Dames & Moore. The following is a brief summary from those reports.

The 19th Avenue Landfill ("Landfill") occupies approximately 213 acres in an industrial area of Maricopa County within the municipal boundaries of Phoenix, Arizona (refer to Figure 1-1). The major part of the Landfill, Cell A, occupies approximately 200 acres north of the Salt River channel. Cell A is bounded on the north by Lower Buckeye Road, on the east by the 15th Avenue storm drain outfall channel, on the west by 19th Avenue, and on the south by the river channel. The remainder of the Landfill, Cell A-1, occupies about 13 acres south of the river channel. Cell A-1 is bounded on the north by the Salt River channel, on the east by an active sand and gravel pit, on the south by industrial property, and on the west by a former sand and gravel pit.

Landfill operations were confined to portions of the Cell A property through most of the 1960s. Refuse sent to the Landfill, primarily consisting of material collected from households and businesses in the Phoenix area, was placed where sand and gravel had been excavated. Liquid disposal also occurred in Cell A and appears to have been confined to the eastern edge of Cell A along the 15th Avenue storm drain and in several liquid disposal pits. Cell A-1 was mined for sand and gravel, and this cell was completely filled with refuse by late 1972. No liquid disposal occurred at this cell. In 1975, a new liquid disposal pit was excavated in the east-central portion of Cell A, and in 1976, an additional liquid disposal pit was dug in the central portion of the Landfill. Flooding in May 1978 and winter-spring 1979 washed out portions of the refuse in the southwestern part of Cell A and the northern part of Cell A-1. An additional liquid disposal pit was opened in 1979 in the central portion of Cell A.

The 19th Avenue Landfill was closed by a cease and desist order issued by the Arizona Department of Health Services (ADHS) in late 1979. The City of Phoenix and ADHS entered into a Consent Order agreement on June 21, 1979 (and amended on December 27, 1979) that



outlined specific actions to be taken at the 19th Avenue Landfill. This order was later vacated and superseded by a Consent Decree dated June 18, 1992.

The Consent Decree required the City to design and construct:

- A washout control system with a levee and bank protection system and erosion control in the river
- A surface water and sediment quality protection system consisting of a soil cap and surface drainage structures
- Groundwater quality protection including a groundwater monitoring program, quality assurance/quality control plan, well maintenance, and implementation of a contingency plan
- A methane gas control system and ambient air quality protection including a gas collection and flare system and monitoring
- Site fencing and landscaping

In addition to state regulatory actions, the 19th Avenue Landfill site was placed on the federal Environmental Protection Agency's (EPA) initial National Priority List (NPL) in November 1981. This identified the Landfill as a possible hazardous waste site that the EPA could investigate and clean up under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1989, if these activities were not done by the responsible party.

The Remedial Investigation Study (RI/FS) work was developed and implemented during the late 1980s. A Remedial Action Plan was developed in 1989 containing recommendations including ambient air impact modeling. Remedial work was completed during the 1990s, and completion approved by the ADEQ on June 30, 1997.



3.0 ENGINEERING CONTROL DESCRIPTION

The various engineering controls outlined within this document are excerpted from reports issued by Simons, Li & Associates, Inc. entitled "19th Avenue Landfill Environmental Cleanup Project Remedial Action Report: Construction Complete" (September 1998) and "19th Avenue Landfill Operation & Maintenance Manual" (September 1998).

3.1 DRAINAGE AND LEVEE SYSTEM

A drainage and levee system for the Salt River was incorporated through the vicinity of the 19th Avenue Landfill through a channel improvement that provides containment for the refuse and protects the Landfill from inundation by the 100-year flood. The drainage and levee system also includes a uniform channel that extends through the project reach (refer to Figure 3-1) with collection structures at the upstream end, a grade control structure at the downstream end, and an earthen berm along the 15th Avenue monument line on Cell A. It extends from approximately 450 feet downstream of the 19th Avenue bridge to the 15th Avenue extension, a distance of approximately 3,900 feet.

The channel has an unlined invert with a bottom width of approximately 600 feet. The bank protection structures, which extend 10 to 15 feet below the channel invert elevation, were constructed with soil cement. These structures will allow for bed form development, low flow incisement, local scour, and long-term degradation that may occur along the river throughout the project reach. The bank protection extends 3 feet above the height of the computed 100-year water surface to allow for super-elevation, wave development, local deposition, and freeboard, which meet the Federal Emergency Management Agency's (FEMA) requirements for a levee system. Banks extend higher than the existing ground and grading adjacent to the channel. The soil cement banks were constructed at a side slope of 1½ horizontal to 1 vertical with a horizontal width of 8 feet. Figure 3-2 shows a typical section of the constructed channel.

The grade control structure located near the downstream end of the project stabilizes the channel slope and acts to check upstream travel of head cut from current and future mining operations located downstream of the project. It was constructed with soil cement that extends 42 feet below river grade.

Construction of the various items associated with the drainage and levee system commenced in August 1995 and was completed in March 1996.



3.1.1 Maintenance Plan

The following inspection and maintenance procedures are in place to ensure the drainage and levee system (Figure 3-3) is maintained and kept clear of objects that could impede storm water runoff and to ensure compliance with the criteria set by FEMA.

- The City visually inspects each drainage facility annually.
- The City schedules cleaning as needed, but not at a frequency that exceeds the established service levels specified in Table 3-1, unless it follows a severe storm event and it was determined that there could be an obstruction to storm water drainage. Storm inspections are conducted within 24 hours of a severe storm event, which is defined as a minimum of ½ inch of rainfall in a 24-hour period.
- Inspections are recorded in an inspection log, and any maintenance performed as a result of inspections is recorded in a maintenance log. Copies of both logs are maintained at each respective flare station, or at another designated area.

**Table 3-1
Drainage and Levee System Service Levels**

Facility	Service Level and Frequency	Responsible Party
Storm Drainage Inlets	Inspect annually and clean as needed	Off-Site – SMDF ¹ On-Site – SWDMD ²
Storm Drainage Outlets	Inspect annually and clean as needed	SMDF
Flap Gate Valves	Inspect annually and repair/ service as needed	SMDF
Dedicated Natural Washes	Inspect annually and clean off debris as needed	SMDF
Man-Made Drainage Channels	Inspect annually and clean as needed	On-Site – SWDMD
Man-Made Detention Basins	Inspect annually and clean as needed	On-Site – SWDMD
Oversight of Maintenance on the Complete Levee System	Inspect and document observations annually	SWDMD*
Oversight of Stability and Integrity on the Levee and its Associated Structures	Inspect and document observations annually	SWDMD**

¹SMDF = Street Maintenance Drainage Foreman

²SWDMD = Solid Waste Disposal Management Division

* Includes those components maintained by the SMDF.

** Oversight of the structures associated with the levee system includes: (1) the stability of the embankments from deterioration of the supporting earthen berms; (2) the stability of the embankments and grade control structure from deterioration of the soil cement requiring an engineering evaluation; (3) the integrity of the levee structures from degradation or aggradation of the river bed to provide the required freeboard; and (4) the integrity of the embankments from change in height from landfill settlement.



3.1.2 Contingency Plan

There is not an alternative control methodology that would be used in place of the drainage and levee system. If the existing drainage and levee system does not achieve the intended level of protection or mitigation, then this system will be re-designed and restored. This restoration would be accomplished in the same manner as the initial design in that the City of Phoenix will provide its re-design plan to the ADEQ for review and comment prior to beginning the actual restoration process.

3.1.3 Cost Analysis

Costs associated with the construction of the drainage and levee system have already been incurred. Those costs associated with maintaining the drainage and levee system have been estimated assuming a typical maintenance schedule, and are summarized in Table 4-1 of this document.

3.2 CAPPING SYSTEM

With regular inspection and maintenance, a capping system provides long-term protection to human health and the environment by preventing contact between surface water and refuse. This capping system, together with the drainage and levee system, effectively prevents surface water from contacting the refuse, minimizes surface water infiltration into refuse, and minimizes transport of leachate into the ground water.

The landfill cap system consists of a 1-foot thick sub-base layer, 3-feet thick infiltration layer (IBL), and 1-foot thick vegetation topsoil layer. The Consent Decree requires that the IBL have a soil permeability of less than 10^{-4} centimeters per second (cm/sec) with a minimum 2 percent grade to direct surface water toward the site perimeter, away from the landfill. The soil permeability of the in-place final compacted IBL was tested 45 times, and the average permeability was determined to be near 10^{-7} cm/sec.

Construction of the capping system commenced in October 1995 and was completed in August 1996.

3.2.1 Maintenance Plan

The capping system is inspected annually, or more frequently as necessary, to determine if there has been any erosion or damage. Specifically, the soil cover is inspected to identify areas of soil cover settlement, surface cracking, and other surface failures or intrusions. This inspection is



recorded on inspection logs that are maintained at each respective flare station, or at another designated area.

If repairs are necessary, extreme care must be taken during any cap repair activity to avoid the possibility of damage to the gas extraction system (i.e., gas well, probe and sump heads, gas collection header, and air/condensate lines located above and below grade). If additional IBL material is required for backfill, it must be contaminant-free off-site borrow material with a permeability less than 10^{-4} cm/sec. The IBL should be benched in the existing material to minimize the potential for cracks or voids. It also should be placed in lifts such that it will allow for adequate compaction, but should not exceed one foot in thickness. The IBL should be compacted to a uniform density of not less than 95 percent standard proctor density with a moisture content of ± 2 percent of optimum. Each 1-foot layer should be compacted and tested for moisture and density prior to placement of subsequent layers.

A contaminant-free material that is classified as a Sandy Loam and/or a Loamy Sand should be used for topsoil backfill. The topsoil cover should be placed loosely without compaction in one 12-inch thick layer over the IBL.

3.2.2 Contingency Plan

There is not an alternative control methodology that would be used in place of the capping system. If the existing capping system does not achieve the intended level of protection or mitigation, then this system will be re-designed and restored. This restoration would be accomplished in the same manner as the initial design in that the City of Phoenix will provide its re-design plan to the ADEQ for review and comment prior to beginning the actual restoration process.

Excessive infiltration of water in the cap may result in ground water contamination. If ground water sampling shows that a specific constituent exceeds its threshold level in one or more wells (refer to Figure 3-4), the City will implement its Ground Water Contingency Plan, which is outlined under Section XII of the Consent Decree.

3.2.3 Cost Analysis

Costs associated with the construction of the capping system have already been incurred. Those costs associated with maintaining the capping system have been estimated assuming a typical maintenance schedule, and are summarized in Table 4-1 of this document.



3.3 EROSION AND DRAINAGE SYSTEM

The landfill erosion and drainage system consists of the following:

- A street storm drain extension along 15th Avenue that mitigates potential erosion on the east side of the landfill
- A minimum 2 percent grade on the landfill capping system for surface water runoff to the perimeter drainage channels as required in the Consent Decree
- Perimeter drainage channels, which were lined with a geo-textile filter fabric, drain into the three large sedimentation ponds, with the exception of the 15th Avenue channel on Cell A
- Nine small sedimentation ponds (along 15th Avenue) consist of a series of small contoured depressions (sub-base and IBL only) with elevated catch basins that function as sedimentation ponds
- Three large sedimentation ponds, which were lined with 20 millimeter HDPE to prevent water infiltration into the landfill, allow sedimentation to drop out before the water discharges to the Salt River
- Three interior mounds, two on Cell A and one on Cell A-1, provide the required grade, while seeding on these mounds provides erosion protection

The channels and sedimentation ponds also are protected with a concrete block mat system (ArmorflexTM). ArmorflexTM was placed over the HDPE liner in the three large sedimentation ponds and over the geo-textile filter fabric in the channels. The ArmorflexTM mats can flex with settlement in the landfill and still provide the required erosion protection.

Construction of the erosion and drainage system commenced in September 1995 and was completed in August 1996.

3.3.1 Maintenance Plan

The erosion and drainage system is inspected during the annual inspections and following severe rainfall events to ensure that it is properly maintained. This inspection is recorded on inspection logs that are maintained at each respective flare station, or at another designated area. Potential problems that could be identified during these inspections and the appropriate maintenance actions that should be taken to correct these problems are outlined in Table 3-2.



**Table 3-2
Maintenance Actions for the Erosion and Drainage System**

Potential Problem	Maintenance Action
Erosion due to washout of vegetated cover, typically on steep slopes	Use recovered washed-out soil to restore eroded areas, backfill the area with additional soil to the original cover design thickness, and then re-seed the area.
Potential for erosion on extensive bare areas	Re-seed and/or place mulch on the area as needed.
Settlement of the ground cover due to standing water	Check the final elevation to ensure there is adequate drainage. If not, the area may need to be re-graded and/or have additional soil added. Once completed, the bare area should be re-seeded and/or covered with mulch.
Smothering and killing of vegetation and interruption of normal surface water flow due to sediment in swale	Remove excess sediment and stockpile it for later use as topsoil or remove it from the site. Once completed, the bare area should be re-seeded and/or covered with mulch.
Erosion or washout of surface cover material or sub-base material	Recover the washout cover material, which can be used to restore the eroded area. Then, the area should be backfilled and compacted to grade.
Obstructions or debris within the sedimentation ponds and drainage ditches	All obstructions and debris that may affect flow should be removed.

If re-seeding is required, the following process will be used:

- Prepare the area (if necessary) by ripping the top 6 inches of soil
- Apply the seed mix as specified in Table 2-4 of the Operation and Maintenance Manual (Simons, Li & Assoc., Inc., 1998)
- Apply starter fertilizer and conditioner
- Apply straw or wood mulch cover over seed mix

3.3.2 Contingency Plan

There is not an alternative control methodology that would be used in place of the erosion and drainage system. If the existing erosion and drainage system does not achieve the intended level of protection or mitigation, then this system will be re-designed and restored. This restoration would be accomplished in the same manner as the initial design in that the City of Phoenix will provide its re-design plan to the ADEQ for review and comment prior to beginning the actual restoration process.



3.3.3 Cost Analysis

Costs associated with the construction of the erosion and drainage system have already been incurred. Those costs associated with maintaining the erosion and drainage system have been estimated assuming a typical maintenance schedule, and are summarized in Table 4-1 of this document.

3.4 LANDFILL GAS EXTRACTION SYSTEM

The landfill gas extraction system consists of gas extraction wells, gas collection headers, air and condensate lines, condensate collection sumps, flare stations, and gas monitoring probes, as identified in Figure 3-5. Two separate gas extraction systems were designed to provide adequate gas extraction efficiency and control thereby mitigating the potential for landfill gas migration off-site.

There are 73 methane gas monitoring probes in the monitoring network that were designed as dual depth points to monitor off-site migration of landfill gas. The shallower probe is 15 feet with a screen interval of 5 to 15 feet, and the deeper probe is 30 feet with a screen interval of 20 to 30 feet. Along the river bottom, 8 probes were designed with a single point that is 15 feet deep with a screen interval of 5 to 15 feet rather than dual depth points. Also, along the south bank, 5 probes were designed with triple points. The shallower probe is 15 feet deep with a screen interval of 5 to 15 feet, the intermediate probe is 30 feet deep with a screen interval of 20 to 30 feet, and the deeper probe is 45 feet deep with a screen interval of 35 to 45 feet.

There are 177 methane gas extraction wells in the network; 141 are located on Cell A and 36 are located on Cell A-1. The depth of the wells varies depending on the depth of the refuse at each location. The extraction wells were designed to extract gas from the landfill by operating under a vacuum generated by a blower at each flare station. The well casings are connected to gas collection header pipelines via lateral pipes with a 2 percent gradient towards the header for condensate collection. The lateral pipes are connected to the wellheads with flexible hoses to allow for landfill settlement and thermal movement.

The landfill gas collection header lines were designed to convey the collected gas to the flare station. Cell A consists of three major lines, Lines "A", "B", and "C". Cell A-1 is surrounded by Line "D". The header pipes were designed to be below grade installations with 1½ to 3 percent slopes for condensate collection. The portion of Line "B" that parallels 15th Avenue was a design change to an above grade installation.



There are 30 condensate collection sumps (25 on Cell A and 5 on Cell A-1), condensate return lines, and compressed air supply lines associated with the collection headers. The sumps were designed to collect the landfill-generated condensate. Pumps were installed at each sump to transfer collected condensate through the return lines to the respective condensate holding tank at each flare station.

The pumps are driven by compressed air delivered through the compressed air supply lines from the flare stations and are cycled on and off as the condensate collects using liquid level switches. The condensate is held in the condensate holding tanks at each flare station pending proper disposal by the City of Phoenix.

The flare stations were designed for continuous automated operation to combust the collected landfill gas. Each flare station is equipped with electronic controls, sensors, alarms, and data monitoring instruments for this operation. The Cell A flare station has a gas processing capacity of 150 to 1,500 standard cubic feet per minute (scfm) with a rating of 4 to 18 million British Thermal Units per hour (MMBtu/hr). The Cell A-1 flare station has a gas processing capacity of 10 to 100 scfm with a rating of 0.5 to 1.5 MMBtu/hr. Centrifugal blowers at each station induce a vacuum that extracts the landfill gas and passes it through a knockout vessel where free liquids and solid particulates are removed before it is sent to the flare for combustion.

Construction of a landfill gas extraction system commenced in March 1996 and was completed in October 1996. In 2002, additional gas extraction wells, probes, and condensate sumps were installed on the southern boundary of Cell A and northern boundary of Cell A-1; construction was completed in August 2002.

Comment [H1]: This is all I can describe with the information I have now. Does the City have any additional info for this section, or is this sufficient?

3.4.1 Maintenance Plan

The various maintenance procedures outlined within this section are excerpted from reports issued by Simons, Li and Associates, Inc. entitled "19th Avenue Landfill Gas Extraction System Operations and Maintenance Manual" (February 13, 1998) and by Bryan A. Stirrat & Associates, Inc. entitled "Operations, Maintenance & Monitoring Program Manual for the Landfill Gas Extraction System" (January 2003).

3.4.1.1 Well Maintenance

Due to the dynamic nature of landfills, periodic inspection and maintenance of landfill gas extraction wells is required. The system in place at the 19th Avenue Landfill incorporates both above- and below-grade wells. Each below-grade well has two vaults that allow access to the well casing, well sample port, header sample port, and well flow adjustment valve. On each of



these, the technician must inspect the integrity of each of the screwed components to ensure an airtight seal. If damage has occurred, repairs must be performed. On both the well and header sample ports, a labcock style sample valve has been installed. Periodically, these valves malfunction and require replacement.

The well's flow valve occasionally requires repair or replacement. Should the valve seals become damaged, the valve should be repaired or replaced with a similar type. New landfill gas extraction wells utilize a rising stem and existing landfill gas extraction wells utilize a non-rising stem type of PVC gate valve. Both types of valves allow the unit's internal components to be replaced without having to remove the valve body.

Meter vault maintenance may be required if significant settlement of the landfill occurs or if the vaults become damaged. If the vault's lid or body is damaged, it should be repaired as soon as possible to prevent damage to the well pipe inside. If settlement or erosion allows surface water to enter the meter vaults, re-grading of the vault to direct water flow around them must be performed.

Above-grade wells incorporate the same sample valves and well flow valves as the below-grade wells, and should be inspected and maintained in the same manner. However, above-grade wells feature a few more components requiring inspection. Each well is connected to the header piping by small diameter PVC lateral piping. A flexible hose is installed on this pipe to allow differential movement between the header and well lateral piping. The technician must inspect the hose for ultraviolet (UV) light damage, and if cracked and leaking, the hose must be replaced. This will be evident by cracks or embrittlement of the hose. The connection to the piping should be checked regularly for leaks, and repaired as necessary.

Some of the above-grade extraction wells are located away from the header piping. To maintain proper sloping of the pipe to facilitate drainage of condensate, lateral piping is installed on supports. The technician must inspect the slope of the lateral piping to ensure no low points exist, and verify that the lateral pipe slopes continuously to the header piping. A minimum of 2 percent slope of the pipe must be maintained.

3.4.1.2 Probe Maintenance

Probe maintenance is essentially the same as well maintenance. Any threaded connection of the probe heads must be checked for integrity, and repairs made as necessary. The PVC sample valve should be inspected as performed for well maintenance, and replaced if necessary.



3.4.1.3 Landfill Gas Extraction System Maintenance

Below-Grade Header Piping: A majority of the extraction system is below grade and requires very little maintenance. However, sample ports have been installed at various locations on the below-grade piping. These sample ports are installed in a meter vault and require the same maintenance as the well sample ports.

Above-Grade Header Piping: The only above-grade header piping is Line "B", which is located on the eastern boundary of the landfill. The header is located on pipe supports to maintain the pipe slope, which is necessary to facilitate condensate drainage. These supports require periodic adjustment to maintain proper slope. Along the length of the above-grade piping, flexible hoses have been installed to compensate for thermal expansion and contraction of the pipe. These flex hoses and clamps must be inspected on a regular basis to ensure an airtight seal. Inspection should include examination for cracks or tears in the hose that must be replaced.

Isolation Valves: Butterfly valves located throughout the landfill must be inspected to ensure complete valve travel. If the valve travel is restricted or difficult to operate, the valves seals and seats may have become damaged. Should this occur, the valve must removed from service and repaired.

3.4.1.4 Condensate Management System Inspection and Maintenance

The condensate management system at the 19th Avenue Landfill consists of 30 condensate sumps integrated into the extraction system. In the above- and below-grade headers, condensate flows to designated low points where collection sumps are installed. These integrate a pneumatic pump, level controller, filter regulator lubricator, and other components to control the condensate level within the sump.

Inspection of the sumps is essential to maintain continuous operation. At each sump, the technician is required to perform the following inspection and maintenance activities:

- Inspect the oil level within the lubricator. If required, the lubricator reservoir should be filled with ISO 15-5 weight oil.
- Adjust the lubricator to its lowest lubrication setting.
- Check each pump for abnormal noise or leakage.
- Check the level controller mechanical movements to ensure no binding occurs.



- Inspect all flexible connections for leakage. Seal or replace as necessary.
- Check the operation of the compressed air and condensate valves within the sump assembly. Replace if necessary.
- Surface regrading may be required to redirect surface water flow around each sump.

3.4.2 Contingency Plan

As the existing landfill gas extraction system employs best available technology, there is not an alternative control methodology that would be used in place of the landfill gas extraction system. If the existing landfill gas extraction system does not achieve the intended level of protection or mitigation, then this system will be re-designed and restored. This restoration would be accomplished in the same manner as the initial design in that the City of Phoenix will provide its re-design plan to the ADEQ for review and comment prior to beginning the actual restoration process.

3.4.3 Cost Analysis

Costs associated with the construction of the landfill gas extraction system have already been incurred. Those costs associated with maintaining the landfill gas extraction system have been estimated assuming a typical maintenance schedule, and are summarized in Table 4-1 of this document.

3.5 FENCING

The site is secured with a 6-foot chain link fence around its perimeter, which prevents trespass.

The U.S. Army Corps of Engineers and City of Phoenix have constructed a riparian habitat restoration project at the Salt River between 19th Avenue and 16th Street, called the Rio Salado Habitat Restoration Project. As part of the project, a 30-foot wide corridor across Cell A along the northern bank of the river extends north from the river for approximately 250 feet adjacent to 19th Avenue to provide public access. Project improvements included a soft surface pedestrian trail; a paved maintenance road along 19th Avenue that connects with the existing maintenance road along the southern boundary of Cell A; and a chain link fence preventing access from the corridor to the remainder of the landfill. This feature allows pedestrian access from 19th Avenue to the Rio Salado Habitat Restoration Project and provides access for staff in City maintenance or emergency response vehicles. Access will typically be from dawn to dusk.



3.5.1 Maintenance Plan

The fencing is inspected annually, or more frequently as necessary, to determine if there has been any damage. Specifically, the fencing is inspected to identify areas of breached chain link, bent posts, and other failures. This inspection is recorded on inspection logs that are maintained at each respective flare station, or at another designated area.

If repairs are necessary, care must be taken not to damage the cap.

3.5.2 Contingency Plan

There is not an alternative control methodology that would be used in place of the fencing. If the existing fencing does not achieve the intended level of protection, then it will be re-designed and reconstructed, with ADEQ for review and comment prior to re-construction.

3.5.3 Cost Analysis

Costs associated with the construction of the fencing system have already been incurred. The cost for fencing alterations associated with the Rio Salado Habitat Restoration Project were borne by that project. Those costs associated with maintaining the fencing have been estimated assuming a typical maintenance schedule, and are summarized in Table 4-1 of this document.

4.0 GROUNDWATER MONITORING AND TREATMENT

The Consent Decree requires the City to provide groundwater quality protection through of operation and maintenance of a groundwater monitoring program, and implementation of a contingency plan if necessary, which could include groundwater remediation. The estimated cost for operation and maintenance of the groundwater monitoring program, and groundwater remediation are presented in Table 4-1. The costs of groundwater remediation have been estimated based on general conceptual plans for groundwater removal and treatment.

5.0 FINANCIAL ASSURANCE DEMONSTRATION

As is already in place for the Consent Decree, the City of Phoenix is providing a demonstration of financial assurance (see Attachment A) for the costs associated with maintenance and restoration activities for the 19th Avenue Landfill, which are summarized in Table 4-1. The City of Phoenix is using the Government Financial Test as described in ARS §49-152.01(B)(2).



TABLE 4-1

POST-CLOSURE MAINTENANCE AND CONTINGENCY COST ESTIMATES FOR
THE 19TH AVENUE LANDFILL

Post-Closure Maintenance Description	Quantity	Units	\$/Unit*	Subtotal*
1. Semiannual Inspection	2	LS ¹	15,000	30,000
2. General Maintenance				
Final Cover System	166	AC ²	150.60	25,000
Landscape, Fencing, Berms	1	LS	15,000	15,000
3. Monthly Landfill Gas Monitoring				
(Monitoring, Inspection, Operation, & Maintenance)	1	LS	266,294	266,294
4. Groundwater Monitoring	1	LS	128,800	128,800
Total Post-Closure Maintenance Costs per Year				465,094
Total Post-Closure Maintenance Costs Over 4 Years				1,860,376

Groundwater Remediation	1	LS	4,000,000	4,000,000
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¹LS = Lump Sum

²AC = Acre

* Costs provided in 2006 dollars.



FIGURES

CAN BE FOUND AT:

CITY OF PHOENIX

SOLID WASTE DISPOSAL MANAGEMENT

101 S CENTRAL AVE

PHOENIX AZ

85004

ATTACHMENT A – FINANCIAL ASSURANCE DOCUMENTATION



City of Phoenix

PUBLIC WORKS DEPARTMENT
SOLID WASTE DISPOSAL MANAGEMENT DIVISION

January 20, 2006

Ms. Linda Pollock
Assistant Attorney General
Office of the Attorney General
State of Arizona
1275 West Washington
Phoenix, Arizona 85007

Re: Financial Assurance, City of Phoenix 19th Avenue Landfill Declaration of Environmental Use Restriction

Dear Ms. Pollock:

The City of Phoenix (City) presents this recitation of obligations and commitment to provide funds for those obligations required by the Consent Decree and Agreement between the State of Arizona and the City of Phoenix, in *State of Arizona v. City of Phoenix*, United States District Court No. CIV 91-0237 (Consent Decree) for the City's 19th Avenue Landfill in support of the Declaration of Environmental Use Restriction (DEUR).

Under the Consent Decree, the City is obligated to maintain the following engineering controls, as more fully set forth in the Remedial Action Plan, Letter of Determination, and Consent Decree:

- Drainage and Levee System
- Capping System
- Erosion and Drainage System
- Landfill Gas Extraction System
- Perimeter Site fencing to restrict public access
- The City shall not conduct or permit any excavation or construction activities on the Property, nor create or permit surface impoundments, infiltration units, or any other soil disturbance or other activity on or adjacent to the Property that may impair the integrity of any engineering control without the express written approval of the Arizona Department of Environmental Quality (ADEQ) obtained in advance of any such activity.

The City is also obligated to implement and maintain the following institutional controls, as is more fully described in the Remedial Action Plan, Record of Decision, the Consent Decree and Explanation of Significant Differences (issued by the Environmental Protection Agency and ADEQ in 2003) for the Property:

- Groundwater quality monitoring

101 South Central Avenue, Suite 300
Phoenix, Arizona 85004
(602) 495-5600 FAX: (602) 534-3464

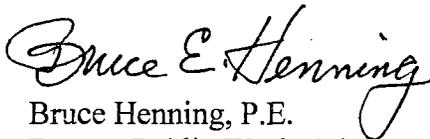
- Groundwater contingency plan
- The City shall restrict the Property to non-residential use, with provisions listed in the DEUR.

The City is financially capable and committed to maintaining the controls listed above, and to restoring the controls and/or to implement the Contingency Plan if the controls fail. The funding requirements are presented in the Engineering Control Plan associated with the DEUR.

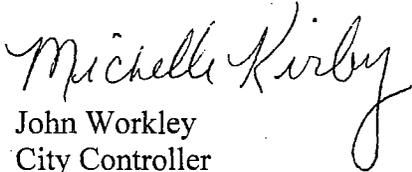
In a letter from the Office of the Attorney General dated January 13, 2006, the ADEQ agrees that the City qualifies under the government financial test of ARS §49-152.01(B)(2). The City is using the government financial test as its financial assurance mechanism for funding maintenance and contingency plan implementation activities.

Sincerely,

City of Phoenix



Bruce Henning, P.E.
Deputy Public Works Director



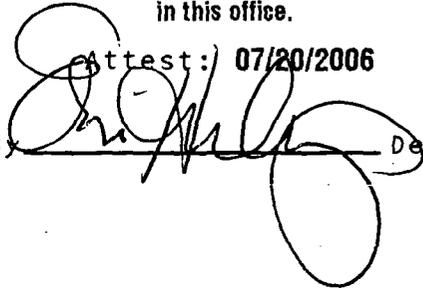
for John Workley
City Controller



**OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL**

The foregoing instrument is a full, true
and correct copy of the original record
in this office.

Attest: 07/20/2006

By  Deputy