

THIRD FIVE-YEAR REVIEW REPORT
for
19th AVENUE LANDFILL SUPEFUND SITE
PHOENIX, ARIZONA

September 2010

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REPORT APPROVALS

**Report Title: Third Five-Year Review Report
19th Avenue Landfill Site
Phoenix, Arizona**

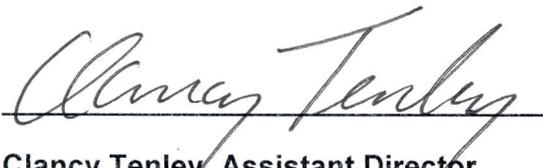
Report Date: September 2010

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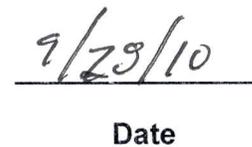

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LIST OF ACRONYMS

AAAQGs	Arizona Ambient Air Quality Guidelines
AAC	Arizona Administrative Code
ACLs	Alternative Concentration Limits
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
ASRAC	Arizona Superfund Response Action Contract
AWQSS	Aquifer Water Quality Standards
ARARs	Applicable or Relevant and Appropriate Requirements
BAS	Bryan A. Stirrat & Associates
BGS	Below Ground Surface
CAA	Clean Air Act
CERCLA	Comprehensive Emergency Response Cleanup and Liability Act
CFR	Code of Federal Regulations
CFS	Cubic Feet Per Second
COP	City of Phoenix
CWA	Clean Water Act
DEUR	Declaration of Environmental Use Restriction
EEC	Engineering and Environmental Consultants, Inc.
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
GPLs	Groundwater Protection Levels
GPM	Gallons Per Minute
HASP	Health and Safety Plan
LEL	Lower Explosive Limit
LOD	Letter of Determination
MCAP	Maricopa County Air Pollution
MCESD	Maricopa County Environmental Services Department
MCLs	Maximum Contaminant Levels
MSL	Mean Sea Level
MSWLF	Municipal Solid Waste Landfill
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NMOC	Non-methane Organic Compounds
NOI	Notice of Intent
NPL	National Priorities List
O&M	Operation and Maintenance
OUs	Operable Units

PRGs	Preliminary Remediation Goals
PM ₁₀	Particulates < 10 Microns
RA	Risk Assessment
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SLERA	Screening Level Risk Assessment
SRLs	Soil Remediation Levels
SWPPP	Storm Water Pollution Prevent Plan
TASOW	Task Assignment Statement of Work
TBC	To Be Considered
TSP	Total Suspended Particulates
USACE	U.S. Army Corps of Engineers
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

This is the third Five-Year Review of the 19th Avenue Landfill Superfund Site located in the City of Phoenix, Maricopa County, Arizona. The purpose of this 2010 Five-Year Review is to review information from the previous five years to determine if the remedy is and will continue to be protective of human health and the environment. Section 121(C) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires a five-year review whenever hazardous substances remain on-site as part of a remedy. This Five-Year Review has been prepared by the Arizona Department of Environmental Quality (ADEQ), as the lead agency for oversight of the long-term operation and maintenance of the landfill and in coordination with the U.S. Environmental Protection Agency, Region 9.

The 19th Avenue Landfill Superfund Site is a closed landfill that occupies approximately 213 acres in an industrial area of Phoenix, Arizona. The landfill is owned by the City of Phoenix (COP). The Site is comprised of two disposal cells (Cells A and A-1) divided by the Salt River. Waste disposed of at the Site was predominately municipal refuse, with some solid and liquid industrial wastes. In February 1979, the Arizona Department of Health Services (ADHS) issued a cease and desist order to the COP to close the landfill. EPA placed the Site on the Superfund National Priorities Lists (NPL) in September 1983.

In 1993, ADEQ and EPA selected the following remedy for the landfill to protect long-term human health and the environment.

- Widening of the river channel between the two cells of the landfill;
- Levees along the river for refuse-washout control and bank protection;
- A soil cap over the landfill to prevent rainfall penetration into the buried waste;
- A secure fence around the landfill perimeter;
- A methane gas collection and treatment system;
- Monitoring of ambient air quality, methane gas, and groundwater; and
- A Groundwater Contingency Plan if water quality standards are exceeded.

Since the 2005 Five-Year Review Report, the following items have occurred:

- In March 2006, EPA completed a Screening Level Ecological Risk Assessment (SLERA).
- In July 2006, the COP and ADEQ negotiated a Declaration of Environmental Use Restriction (DEUR) application for the landfill Site and attached the DEUR to the property deed.
- During the period of October 2005 through June 2010, various minor landfill maintenance problems were identified and corrected by the COP.

In addition during the period of this five-year review, the following other actions were completed:

- In June 2006, an Explanation of Significant Difference (ESD) #3 was signed by ADEQ and approved by EPA that identified the institutional controls (ICs) needed to assure long-term protectiveness of the Site.
- In July 2006, the Final Close-Out Report (FCOR) was completed by ADEQ and signed by EPA documenting the completion of implementation of all necessary remedial actions and ICs.
- In September 2006, the Site was deleted from the EPA National Priorities List (NPL).

This 2010 Five-Year Review concludes that the landfill cap is sound and in good condition, the groundwater monitoring has been conducted as planned, and the methane control system is operating effectively. With the exception of some minor landfill maintenance deficiencies that need attention, no corrective actions are needed.

The review of the groundwater monitoring data identified intermittent exceedances of groundwater standards for a few contaminants (arsenic, nitrate, 1,1-dichloroethene, and some metals) that exceeded MCLs. These exceedances occur during periods when elevated groundwater levels could be remobilizing landfill contaminants, and/or be naturally-occurring or from another off-site, upgradient source. However, these exceedance detections are localized at the boundary of the landfill, and are rarely, if ever observed in downgradient wells.

No issues were identified during the review that would impact a protectiveness determination, although there were some recommendations for follow-up actions. These include: submitting an Annual Monitoring Report that includes summary tables and recommendations for changes to the monitoring network and sampling frequency; updating the Groundwater Contingency Plan; and updating the Operations and Maintenance Manual, the Quality Assurance Project Plan, the Sampling and Analysis Plan, and the Well Inventory for the Site to be consistent with current procedures and practices and Site facts.

Based on current data, the remedy at the Nineteenth Avenue Landfill Superfund Site is protective of human health and the environment. Currently, there are no environmental exposure pathways that result in unacceptable risks, and none are expected as long as the engineered and institutional controls selected in the decision documents continue to be properly operated, monitored, and maintained, and the land use at the Site allows for the integrity of the remedy to continue.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): 19 th Avenue Landfill		
EPA ID (from WasteLAN): AZ D980496780		
Region: IX	State: AZ	City/County: Phoenix / Maricopa County
SITE STATUS		
NPL status: Final <input type="checkbox"/> Deleted <input checked="" type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete <input checked="" type="checkbox"/>		
Multiple OUs?* YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	Construction completion date: February 25, 1997	
Has site been put into reuse? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
REVIEW STATUS		
Lead agency: EPA <input type="checkbox"/> fl State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author names: Delfina Olivarez & Don Atkinson, with contributions from Andria Benner		
Author titles: Project Managers and Site Hydrogeologist	Author affiliations: ADEQ and USEPA	
Review period: 12/01/2009 to 09/25/2010		
Date(s) of site inspection: 03/09/2010 and 03/25/10		
Type of review: <div style="display: flex; justify-content: space-around;"> Post-SARA Pre-SARA NPL-Removal only </div> <div style="display: flex; justify-content: space-around;"> Non-NPL Remedial Action Site <input checked="" type="checkbox"/> NPL State/Tribe-lead </div> <div style="display: flex; justify-content: space-around;"> Regional Discretion </div>		
Review number: 1 (first) 2 (second) <input checked="" type="checkbox"/> 3 (third) Other (specify) _____		
Triggering action: Actual RA Onsite Construction at OU # _____ Actual RA Start at OU# _____ Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report Other (specify) Change in land use plans. Consideration of updated toxicity information.		
Triggering action date (from WasteLAN): September 30, 2005		
Due date (five years after triggering action date): September 30, 2010		

Five-Year Review Summary Form, cont'd.

Issues:

There are no issues that affect protectiveness. All required Land Use Restrictions and other ICs are now fully in place.

Recommendations and Follow-up Actions:

There are no formal recommendations; however, several areas of improvement were identified during the Five Year Review Process. During the document and data review, it was determined that several Plans and the Reporting Program have not been updated in nearly 20 years. Specific suggestions included completing: a combined fourth quarter and annual Summary Report for both groundwater and landfill gas monitoring results; an updated Sampling and Analysis Plan and Quality Assurance Project Plan; an updated Operations and Maintenance Plan; an updated Well Inventory; and a Gas Condensate Monitoring Data Report, as part of the quarterly monitoring program.

Minor, recurring O&M landfill cap erosion, landscaping and equipment maintenance issues at the Site require continual, on-going O&M. The City of Phoenix plans to address these issues in 2010-2011. These O&M actions do not affect the short-term or long-term protectiveness of the existing Site remedy.

Protectiveness Statement(s):

The remedy at the Nineteenth Avenue Landfill Superfund Site is protective of human health and the environment. Currently, there are no environmental exposure pathways that result in unacceptable risks, and none are expected as long as the engineered and institutional controls selected in the decision documents continue to be properly operated, monitored, and maintained, and the land use at the Site allows for the integrity of the remedy to continue. A Declaration of Environmental Use Restriction (DEUR) to restrict use of property was recorded for the site in 2006, and it is effective in preventing incompatible land use.

I. INTRODUCTION

The purpose of a Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The agency interpreted this requirement further in the NCP. 40 CFR §300.430(f)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The Arizona Department of Environmental Quality (ADEQ) in coordination with EPA Region 9 has conducted a Five-Year Review of the remedial actions implemented at the 19th Avenue Landfill Superfund Site. The entire Site comprises one Operable Unit (OU). This review was conducted from January through September 2010. This report documents the results of the review.

The September 29, 1989 Record of Decision (ROD) selected a remedy that allowed hazardous substances, pollutants, or contaminants to be left on-site at levels that would prohibit unlimited use and unrestricted exposure. This Five-Year Review is therefore required by statute because the remedy allows buried and capped landfill wastes to remain on the site indefinitely. This is the third Five-Year Review for the site. The triggering action for this statutory review is the signature date September 30, 2005, of the previous Five-Year Review Report, as shown in EPA's CERCLIS database.

The Review evaluates the following requirements of the Five-Year Review process:

- Achievement of remedial objectives,
- Appropriateness of cleanup levels and remedial objectives, given any changes in ARARs or site characteristics,
- Whether the remedy is effective and functioning as designed,
- The adequacy of Operation and Maintenance (O&M), and
- Early indicators of potential failure of one or more components of the remedy.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Discovery of problem or contamination (refuse washed into river)	May 1978
Pre-NPL responses	February 1979
Landfill closed by a cease and desist order issued by ADHS	February 1979
Consent Order agreed to by COP & ADHS	June 1979
Site listed on National Priorities List (NPL) by EPA	September 1983
Remedial Investigation/Feasibility Study (RI/FS) completed by COP	June 1988
Lead oversight responsibility assigned to ADEQ by EPA	1988
Remedial Action Plan (RAP) completed by COP	June 1989
Letter of Determination (LOD) signed by ADEQ approved RAP	September 1989
Record of Decision (ROD) signed by EPA approved ADEQ's LOD	September 1989
Remedial Design (RD) started by City of Phoenix (COP)	October 1990
Consent Decree (CD) signed by ADEQ & COP	June 1992
Explanation of Significant Difference (ESD) #1 signed by Agencies	December 1995
RD completed by COP	May 1995
Remedy construction completed by COP	December 1996
Preliminary Close-Out Report (PCOR) signed by ADEQ & EPA	February 1998
Remedial Action (RA) Report completed by COP	September 1998
First Five-Year Review (FYR) Report approved by ADEQ & EPA	September 2000
Supplemental First FYR Report completed by ADEQ	July 2001
ESD #2 signed by ADEQ & EPA	September 2003

Table 1: Chronology of Site Events

Event	Date
Second FYR Report approved by ADEQ & EPA	September 2005
Screening Level Ecological Risk Assessment (SLERA) completed by EPA	March 2006
ESD #3 signed by ADEQ & EPA	June 2006
Declaration of Environmental Use Restriction recorded by COP	July 2006
Final Close-out Report (FCOR) signed by ADEQ & EPA	July 2006

III. Background

Physical Characteristics

The 19th Avenue Landfill Superfund Site occupies approximately 213 acres in an industrial area of Phoenix, in Maricopa County, Arizona (Figure 1). The Site is geographically situated just southeast of the intersection of Lower Buckeye Road and 19th Avenue, and is divided into two areas by the Salt River. The landfill is composed of two disposal areas (Cell A and Cell A-1). Cell A occupies approximately 200 acres north of the Salt River channel. It 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. Cell A-1 occupies about 13 acres south of the Salt River channel and is bounded on the north by the river channel, on the east by an active sand and gravel pit, on the south by industrial property, and on the west by an inactive sand and gravel pit (Figure 2).

The population within six miles of the Site is approximately 16,000 people. The nearest residence is 1/3 of a mile from the Site. The area's primary drinking water is provided by the COP water distribution system. The municipal system draws water from groundwater and surface water sources over thirty miles away. The nearest drinking water supply well is over three miles away. An industrial well and a downgradient agricultural well are located 200 feet and 800 feet, respectively, from the Site. However, there is no known contamination of these wells at this time.

The landfill is underlain by alluvial materials deposited within the West Basin of the Salt River Valley. These materials can be divided into five different units which extend 350 feet below ground surface (bgs). There is a 15 foot surface layer composed of silty sand. Beneath this layer is approximately 100 feet of cobbles and coarse gravels. These next three units below this layer are divisions within the Upper Alluvial Unit. The alluvial materials beneath the site can transmit a relatively large amount of water because they are generally coarse grained.

Before the channelization of the Salt River was completed in March 1996, as a part of the final remedy, portions of the landfill were within the estimated 100-year flood plain of the Salt River. Flows in the Salt River channel result from controlled releases when dam storage capacity is exceeded at dams located more than thirty miles upstream, from rainfall and from local sources of discharge into the riverbed. The direction of groundwater flow is predominantly from the southeast to the northwest at the rate of one to eight feet per day. Measured water levels have varied between 20 and 80 feet bgs, with an average depth to groundwater of 50 to 60 feet. During periods of flow in the adjacent Salt River, the groundwater table rises and may be in contact with the landfill refuse.

Land and Resource Use

Historical Use

The 19th Avenue Landfill Superfund Site is owned by the City of Phoenix (COP). In 1955, the site area was relatively undisturbed except for a shallow 20-acre excavation in the northwestern portion of the Site (an area later identified as Cell A). In 1957, the COP extended an existing lease to operate a municipal landfill. The COP brought in another party to start a sand and gravel mining operation at the Site to create the space needed for the landfill. The mining and landfill operations began shortly thereafter. The landfill eventually developed into two separate cells (Cells A and A-1). (Figure 2)

Beginning in the late 1950s, the Cell A gravel pits were excavated to an approximate depth of 30 to 35 feet below ground surface (bgs), although some pits were excavated as deep as 50 feet bgs. The pits were then backfilled predominately with municipal refuse from the Phoenix area. Subsequently, solid and liquid industrial wastes were disposed or poured into unlined pits dug into areas of Cell A previously filled with refuse. Some medical wastes and materials containing low levels of radioactivity were also deposited. The refuse was generally covered on a daily basis. A final soil cap was placed over the area once it was full of waste.

Cell A is estimated to contain approximately nine million cubic yards of refuse. Most of the liquid disposal pits were in the north-central part of Cell A and along the eastern boundary. Few restrictions were imposed on the type of material that could be deposited. Furthermore, there was no formal record keeping system for the type of material that was deposited. However, a map that was developed through interviews with landfill operators shows where some industries disposed of their wastes. (Dames & Moore, 1989).

Sometime before 1971, Cell A-1 was mined for sand and gravel and then completely filled with refuse by late 1972. The pit was excavated to a depth of 30 to 34 feet bgs in most of the southern two-thirds of the cell and to 10 to 20 feet bgs in the northern third. The filling of Cell A-1 may

have occurred because flows in the Salt River prevented access to much of the available space in Cell A. The same general type of municipal refuse was disposed of in both Cells A and A-1. During the 1987-1988 remedial investigation (RI) of the Site, no evidence or mention of the disposal of liquid or solid, special or hazardous materials in Cell A-1 was discovered (Dames & Moore, 1989). It is estimated that Cell A-1 contains approximately one half million cubic yards of refuse. Again, the refuse in Cell A-1 was generally covered on a daily basis and a temporary soil cap was placed over each area once it had been filled with waste. The soil cover over Cell A-1 is estimated to be approximately four feet in thickness (ESE, 2000).

Current and Future Use

Operation of the 19th Avenue Landfill ceased in 1979, and was subsequently covered and capped. The site is currently unused. However, recently in spring and summer 2010, the COP received some unsolicited proposals from developers interested in developing the landfill property.

The COP has begun investigating the potential possibilities for future land use with local, State and federal agencies. In August 2010, the Phoenix City Council authorized the issuance of a Request for Proposals (RFP) for development of the Site that would consider the following criteria:

- cultural and entertainment use,
- compatibility with the “Beyond the Banks Area Plan”, and
- optional sustainability/renewable energy component.

Impact of Flooding and Rainfall at the Site

During one flood event in 1965 and intermittently during the 1970s, parts of the landfill have been covered with water. In May 1978, flows in the Salt River washed refuse from the southwestern portion of Cell A and the northern third of Cell A-1 into the river bed. These washed out areas were subsequently refilled. Flooding of the site has not been an issue since the remedy was completed in 1996. The impact of prior flooding on the Site is discussed further in the *Analysis of Current Groundwater Conditions* (Appendix A).

History of Contamination

As has been previously described under Section 3.2 (Land and Resource Use), the COP operated the landfill until 1979. After the gravel pits were excavated at the site to a depth ranging from 30 to 50 feet below ground surface (bgs), the pits were then backfilled with waste materials. The same general type of municipal refuse was disposed of in both Cells A and A-1. However, areas of Cell A received liquid wastes, including industrial wastes that were poured into unlined pits dug previously filled with refuse. In addition to the municipal and industrial wastes, some medical wastes and materials containing low levels of radioactivity were also deposited. Most of

the liquid disposal pits were in the north-central part of Cell A and along the eastern boundary. Few restrictions were imposed on the type of material that could be deposited. There was no formal record keeping system for the type of material that was deposited. However, in regards to Cell A-1, no evidence or mention of the disposal of liquid or solid, special or hazardous materials was discovered during the 1988 RI (Dames & Moore, 1989).

In February 1979, the Arizona Department of Health Services (ADHS) (the Arizona Agency responsible for the oversight of the landfill prior to the Arizona Department of Environmental Quality (ADEQ)), issued a Cease and Desist Order to the COP requiring closure of the landfill. In June 1979, the COP and ADHS entered into a consent agreement. The Consent Order was amended in December 1979. To comply with the amended Consent Order, the COP covered the site with fill material, stockpiled soil for final capping, installed groundwater monitoring wells, built berms around the boundary of the landfill, installed a methane gas collection system, and provided a 24-hour security guard until November 30, 1996. The guard was no longer required once the site was secured by a permanent fence with secured access points.

In September 1983, the Site was placed on the EPA's National Priorities Lists (NPL).

In 1987-1988, a Remedial Investigation/Feasibility Study (RI/FS) was conducted by the COP. On June 8, 1988, the COP submitted the RI/FS Report to ADEQ. In 1988, EPA assigned the lead oversight responsibility for the Site to the ADEQ. The ADEQ required the City to prepare a Remedial Action Plan (RAP) under the State of Arizona Water Quality Assurance Revolving Fund (WQARF) rules. The RAP was reviewed by ADEQ, EPA and the Arizona Department of Water Resources (ADWR).

Basis for Taking Action

Numerous hazardous substances were known or suspected to have been disposed of at the 19th Avenue Landfill. Flooding inundated portions of the landfill in 1965 and intermittently during the 1970s, and surface water flows washed out refuse in May 1978 and during winter and spring of 1979-1980. Arsenic, Barium, Carbon Tetrachloride, Gross Alpha, Gross Beta, Mercury, Nitrate, and Vinyl Chloride were detected in groundwater in excess of their respective MCLs.

The results of the COP's RI/FS including the risk assessment, as documented in the 1989 RAP, indicated that public health risks resulting from releases from the landfill are limited to the possible accumulation of methane in enclosed areas at explosive levels, if the existing gas collection system is not operating properly. In addition, although there is no current use of local ground water for drinking and other domestic purposes, this pathway could result in a risk to public health if domestic groundwater wells are developed in the future. (p 3-12, RAP).

IV. Remedial Actions

Remedy Selection and Remedial Action Objectives

The 1989 RAP, prepared by the COP, included a Feasibility Study (FS) that identified remedial action alternatives ranging from no action to excavation of the entire landfill. The alternatives were to address four areas of concern identified in the RI:

- Refuse-Washout
- Surface-Water Quality
- Ground-Water Quality
- Landfill-Gas Accumulation.

Site conditions, health risks and ARARs were also considered when developing specific objectives and options.

On September 21, 1989, ADEQ signed a Letter of Determination (LOD) for the final remedy at the Site. The selected remedy was Alternative “A”, as described in the LOD. It consisted of the following components:

- Levees along both the north and south banks of the Salt River at the landfill site for refuse-washout control and bank protection;
- A widened river channel;
- A single layer soil cap over the landfill to prevent rainwater from seeping into the landfill wastes;
- A secure fence around the landfill perimeter;
- Monitoring of ambient air quality, methane gas, and groundwater;
- A Groundwater Contingency Plan to be implemented if water quality standards are exceeded in the groundwater at the landfill perimeter; and,
- A system for the collecting and treating the methane gas in a manner that eliminates risk of explosion.

The September 1989 ADEQ LOD did not specify the operating life of the gas extraction and control system or the duration of groundwater and methane monitoring.

On September 29, 1989, EPA concurred with the remedy selected in the LOD and signed a Record of Decision (ROD). The EPA ROD selected the remedy described in the ADEQ LOD.

On December 14, 1995, ADEQ and EPA signed an Explanation of Significant Differences (ESD #1) to modify the Site remedy to allow the use of a flexible lining system (Armorflex) for the perimeter drainage collection channel side slopes, channel bottom and sedimentation pond.

On October 16, 2003, ADEQ and EPA signed ESD #2 to update the cleanup standards for the Site. The ESD incorporated into the remedy the current Maximum Contaminant Levels (MCLs) for specific constituents in groundwater, and added the Arizona Ambient Air Quality Guidelines

(AAAQG) for volatile organic compounds (VOCs) as performance standards for ambient air quality monitoring at the Site, should ambient air monitoring be necessary in the future.

On June 29, 2006, ADEQ and EPA signed ESD #3 requiring a Declaration of Environmental Use Restriction (DEUR) on the property to ensure long-term operation and maintenance of the remedy and the compatibility of future land uses. On July 19, 2006, the COP recorded a DEUR with Engineering and Institutional Controls for the property. The DEUR describes the contamination known to be present at the Site, the engineering controls that must be maintained, and the institutional controls required of the City of Phoenix and any and all future owners of the Site.

Remedy Implementation

In October 1990, the COP began planning and contracting for implementing the remedy. The COP hired Simon, Li and Associates, Inc. (SLA) to perform the engineering investigations and prepare the construction plans and specifications. In May 1995, ADEQ approved the 100% Final Design Plans. The COP hired Bentson Contracting Company (BCC) for the remedy construction in May 1995, and the Notice to Proceed was issued in August of that year.

In March 1996, the channelization tasks were completed and work on the gas collection system was started. In May 1996, the site landscaping started along with installation of the ArmorflexTM channel and sedimentation pond lining system. By the end of August 1996, both the capping system and the erosion and drainage system were completed. In October 1996, the gas collection system was operational. Flare station emissions tests were performed October 16-18, 1996.

On December 4-5, 1996, a pre-final inspection was performed by ADEQ of the gas collection system and flare stations. On December 6 and 12, 1996, inspections for the other features of the project were conducted. Based on the results of the inspections, the project was determined to be substantially complete on December 6, 1996. On February 28, 1997, ADEQ provided final project acceptance, based on the results of two additional punch list inspections conducted on January 7 and February 13, 1997.

On June 30, 1997, ADEQ issued approval of "Completion of Remedial Action." This approval triggered the following four actions, in accordance with the 1992 CD:

- (1) preparation of a Remedial Action (RA) Report to document the end of construction activities to be prepared by COP ;
- (2) initiation of Five Year Reviews to evaluate the effectiveness of the remedial action under §300.340 (f)(4)(ii) of the National Oil & Hazardous Substances Contingency Plan, §121 (e) of CERCLA (as amended);
- (3) implementation of a Groundwater Contingency Plan; and
- (4) preparation of the methane and ambient air monitoring programs.

In February 1998, ADEQ and EPA signed a Preliminary Close-Out Report (PCOR) documenting “Construction Complete.”

In September 1998, the COP completed a RA Report documenting that the remedy was operational and functional.

In June 2006, an Explanation of Significant Difference (ESD) #3 was signed by ADEQ and approved by EPA that identified the institutional controls (ICs) needed to assure long-term protectiveness of the Site (Appendix B). The specific IC mechanisms selected were a Declaration of Environmental use Restriction (DEUR) (Appendix C) and the Arizona Department of Water Resources (ADWR) statutes related to groundwater withdrawal permits, and well spacing and notification.

On July 21, 2006, ADEQ signed the Final Close-Out Report (FCOR) documenting that the 19th Avenue Landfill Superfund Site has completed all the response actions at the National Priorities List (NPL) site successfully and is eligible for Site Completion (Appendix D). Site Completion means that no further Superfund response is required to protect human health and the environment. The Site Completion criteria are as follows:

- Clean-up goals specified in the ROD are met;
- Institutional Controls are in place;
- RA Report has been completed;
- All Explanations of Significant Differences (ESDs) have been completed;
- Site is protective of human health and the environment; and
- Only remaining activities at the site are operation and maintenance activities to be performed by the State or responsible party.

On August 14, 2006, EPA issued a “Notice of Intent to Delete” the 19th Avenue Landfill Superfund Site from the NPL, with a 30-day comment period (Appendix E). The comment period closed on September 13, 2006. After completing a responsiveness summary to comments, on September 25, 2006, EPA issued a Final Notice of Deletion for the landfill in the Federal Register (Appendix E). EPA and ADEQ determined that “the Site poses no significant threat to public health or the environment and, therefore, no further remedial measures pursuant to CERCLA are appropriate.”

Operation and Maintenance (O&M)

The COP has been performing all O&M activities at the landfill in accordance with the approved O&M Manual, dated September 15, 1998, and the Operations, Maintenance & Monitoring Program Manual for the Landfill Gas Extraction System, dated March 1999. On January 23, 2003, the March 1999 O&M Manual was revised to reflect the landfill gas system expansion/enhancements completed in 2002 for landfill Cells A and A1 at the Site.

O&M requirements for the landfill include:

- Quarterly inspections of the landfill during the first year of operations;
- Annual and after storm inspections of the landfill during subsequent years of operations;
- Recording and maintaining inspection results in appropriate logs at each flare station area;
- Performing appropriate maintenance of the cap, perimeter drainage system, access roads, security fencing and landscaping;
- Performing appropriate maintenance of the Salt River levee system;
- Performing appropriate maintenance of groundwater monitoring wells;
- Performing O&M of the landfill gas extraction, control, and monitoring system in accordance with the March 1999 manual, which addresses all requirements to inspect, operate, maintain the gas extraction/control system as well as address monitoring requirements for the probes, and management of condensate;
- Maintaining appropriate maintenance logs at each flare station location;
- Submittal of annual inspection/maintenance reports;
- Conducting quarterly groundwater monitoring of designated wells at the site;
- Conducting monthly methane monitoring of gas probes; and
- Conducting biannual sampling of gas extraction wells.

The original 1998 O&M Manual also required that the COP perform ambient air monitoring during two separate seasonal events: once in the summer and again in the winter. These monitoring events were conducted in December 1998 and June 1999. The results of these sampling events indicated that the landfill contribution to ambient volatile organic compound (VOC) concentrations was very small. EPA requested more in depth analysis; therefore, a follow-up Phase II ambient air monitoring event was conducted in September 2000. The Phase II sampling results also showed that the landfill VOC concentrations did not exceed Arizona Ambient Air Quality Goals (AAAQGs) and were below background levels. These findings supported the decision that no further ambient air monitoring was needed at the Site.

The first Five-Year Review Report, completed in September 2000, identified that the methane gas collection system was not operating optimally and methane had been migrating past the landfill boundary. In response, the COP expanded the system to better control methane along the southern and northeastern portions of the landfill (where probes were out of compliance) and expanded the system. Additional methane monitoring probes were installed at the perimeter of the landfill, and methane collection was improved along the middle and southern portions of the landfill. A final engineering design of a system to enhance gas collection was approved by ADEQ in 2001, and construction was completed in May 2002. Since this expansion, the system operates more effectively and the methane monitoring probes have been in compliance.

During the second Five-Year Review in September 2005, a number of more routine O&M deficiencies related to site maintenance (erosion control, replacement of broken equipment, vegetation control, signage on fences, keeping records at the Site, etc.). The Review also

recommended that a Declaration of Environmental Use Restriction (DEUR) be placed on the Site and recommended conducting a formal ecological risk screening assessment and evaluating the exposure scenarios in the baseline 1988 Risk Assessment.

During this third Five-Year Review period (2005 to 2010), the COP continued to conduct the O&M of the landfill. The COP monitored the groundwater and methane, and conducted routine Site maintenance. Maintenance activities included repair of eroded areas, repair of irrigation systems, fence repair, rodent control, and minor repair of wells, probes, and the gas control system. The COP also completed weekly flare station emission result summary reports. The emissions for the flares are calculated from flow data and the run time of each flare, using emission factors developed from the five year performance tests required by Maricopa County as part of the Site's Air Quality Permits. These emission data results are compiled into a Monthly O&M Report. Annual emission inventories for the Site are also conducted by Maricopa County, Air Quality Department. An Ambient Air Monitoring Plan and a Dust Control/Demolition Permit are also both kept on-site at each flare station. The logs at the flare stations located at landfill Cells A and A-1 are both updated regularly by Maricopa County staff.

The annual costs for conducting these activities are summarized in Table 2 below.

Table 2: Annual O&M Costs for 19TH Avenue Landfill

DATES		TOTAL COST ROUNDED TO NEAREST \$100
FROM	TO	
July 2004	June 2005	\$114,100.00
July 2005	June 2006	\$702,600.00
July 2006	June 2007	\$57,900.00
July 2007	June 2008	\$912,700.00
July 2008	June 2009	\$21,200.00

The O&M costs for FY 2009 are incomplete because the COP is still compiling the 2009 annual costs at the time of this 2010 Review. Also note that O&M costs for FY 2004 were not compiled at the time of the 2005 Second Five Year Review. The final 2004 costs are included in Table 2 for this 2005-2010 review period.

The average annual O&M costs for the period of 2004 through 2007 for the remedy monitoring and maintenance were approximately \$450,000 per year. This amount is more than 50% less

than the original annual O&M cost estimate developed in June 1989 of an estimated \$1,010,000 per year for O&M costs.

V. Progress Since the Last Five-Year Review

The 2005 Five Year Review (Section 9.0) reached the following conclusion regarding protectiveness of the remedy:

“The remedy at the Site currently protects human health and the environment. A cap, groundwater monitoring and methane control system remain in place and appear to be in good condition. However, several deficiencies were noted during this five-year review. These are listed in Section 7.0. In order for the remedy to be protective in the long-term these items should be addressed by COP within six months of this report as per the recommendations in Section 8.0. In addition, it will be necessary once deficiencies have been addressed to produce a follow-up report. This report will document the adequate implementation of all recommendations.”

Section 8.0 (Follow-up Actions and Deficiencies) of the 2005 Five-Year Review included a summary of actions and recommendations that needed to be taken. These deficiencies and the actions taken by the COP and EPA to address these deficiencies are summarized in Table 3 below.

Table 3: Actions Taken Since the Last Five-Year Review

Issues from Previous 2005 Five Year Review	Recommendations/Follow-up Actions	Action Taken and Outcome
1. Routine maintenance and repair records for the landfill cap, perimeter drainage, sediment ponds, and groundwater monitoring wells, and Site access records, a site-specific incident log, and records of storm water discharge events were not available on-site.	Records showing routine maintenance and repairs performed on the landfill cap, perimeter drainage, sediment ponds, and groundwater monitoring wells must be maintained at the Site. Site access records, a site-specific incident log, and records of storm water discharge events must also be present at the Site.	On May 5, 2006 COP responded that the only records maintained at the site are flare maintenance and operations records for the current calendar year. All other records listed are maintained approximately one mile west of the site at the 27 th Avenue Transfer Facility offices (30602 S. 27 th Avenue).
2. & 3. Surficial erosion, holes and cracks evident at both cells in the earth cap, and along the top of the bank of the perimeter channels.	All cracks and holes extending 0.5 feet or greater must be filled in as soon as possible and prior to the next heavy rainfall event. All areas of erosion along the top of the bank of the perimeter drainage channels should be repaired as soon as possible and prior to the next heavy rainfall event.	By March 22, 2006 COP had repaired all identified erosion holes and cracks at both cells, A & A-1.

Issues from Previous 2005 Five Year Review	Recommendations/Follow-up Actions	Action Taken and Outcome
4. Excessive weed growth was observed storm drain inlet and outlets.	Sedimentation in all drainage channels and sedimentation basins must be cleared. Excessive vegetation growth must be cleared wherever appropriate from drainage channels, including both inlets and outlets. Any other natural or manmade debris must also be removed.	As of March 21, 2006 the weed growth in the storm drain inlets and outlets was removed.
5. The capsulhelic gauge on the knockout tank at Cell A was inoperable. In addition, some of the capsulhelic gauges at the flare station at Cell A-1 appeared to be inoperable.	The capsulhelic gauge on the knockout tank at Cell A should be repaired/replaced or removed. Any inoperable capsulhelic gauges at the flare station at Cell A-1 should be repaired/replaced or removed.	By June 1, 2006 COP replaced the capsulhelic gauges on the knockout tanks at located the flare stations for both landfill Cells A and A-1.
6. There was no chart paper at one of the two flare stations.	An adequate quantity of chart paper for system controls should be stocked at both flare stations.	As of November 2005 chart paper was in place at each flare station, with additional rolls stored at each flare station.
7. There was some minor erosion beneath the pad of well I-3. Three 2" diameter observation wells DM-3P, DM-3I, and DM-3D were not locked.	Repair erosion beneath the pad of well I-3. Either lock the three 2" diameter observation wells DM-3P, DM-3I, and DM-3D or (better) abandon these wells, since they are no longer used.	As of March 20, 2006 erosion beneath the pad at well I-3 had been repaired and wells DM-3P, DM-3I, and DM-3D were locked by April 25, 2006.
8. The casing of the probes SR-1 through SR-8 appears to have been silted up after winter storm water flow in the Salt River.	Clean the silt out of methane monitoring probes SR-1 through SR-8. If appropriate, provide a hood, shield or box that will keep silt out of these probes in the future.	By December 2005 all probe casings were cleaned out and repaired.
9. The Site's perimeter fence has no signage.	Provide signage for the Site's perimeter fence.	As of January 2006 signs were posted every 200 feet and at each Site entrance.
10. There is currently no deed restriction (DEUR) in place at the Site.	Place a deed restriction (DEUR) on the Site in accordance with the provisions of the upcoming ESD. The DEUR will ensure the performance of O&M activities in the future and limit incompatible land use.	July 2006 the COP submitted the deed restriction (DEUR) to ADEQ and placed a copy at each flare station. [See Attachment 7.]
11. After completion of the redevelopment plans for the Salt River (i.e., Rio Salado Project), there may be	After completion of future redevelopment plans for the Salt River (i.e., Rio Salado Project, recommend conducting a formal	On March 22, 2006 Ned Black, EPA Region 9 CERCLA Ecologist, conducted a Screening Level Ecological Risk

Issues from Previous 2005 Five Year Review	Recommendations/Follow-up Actions	Action Taken and Outcome
potential impacts related to the landfill.	ecological risk screening assessment and evaluate whether the exposure scenarios in the 1988 baseline risk assessment needs revision.	Assessment (SLERA) and determined that there were no complete exposure pathways from the landfill to any ecological receptors in the area, contingent upon continued maintenance of the integrity of the landfill cap. A re-evaluation of the 1988 baseline risk assessment was not completed; however, EPA has advised ADEQ that the risk assessment would not be re-evaluated until a specific redevelopment plan is proposed for the Site that could change exposure risks.

VI. Five-Year Review Process

Administrative Components

The 2010 Third Five-Year Review was led by Delfina Olivarez, ADEQ Project Manager. The following ADEQ team members assisted in the review:

- Don Atkinson, Hydrologist;
- Wayne Miller, P.E.
- Linda Mariner, Community Involvement Coordinator (CIC)

Also, the following EPA personnel provided background information, written material and/or technical support on this 2010 Five-Year Review:

- Andria Benner, Remedial Project Manager (RPM) (since March 2010)
- Cynthia Wetmore, Engineer/Region 9 Five-Year Reviewer
- Rachel Loftin, RPM (until March 2010)
- Ned Black, Regional CERCLA Ecologist
- Jackie Lane, CIC

As part of the initial planning process for the Review, during the period of December 1-15, 2009, the ADEQ Review team established a schedule for the following activities:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

The 2010 Five-Year Review process was conducted during the period of December 2009 through September 2010.

Community Notification and Involvement

In December 2009, ADEQ initiated activities to involve the community in the five-year review beginning with a planning meeting between ADEQ and EPA. Plans were proposed to develop a Five-Year Review Fact Sheet announcing the start of the review process, to organize some community open house events, as needed, to conduct community interviews and to prepare a final Fact Sheet summarizing the review's findings and conclusions.

In January 2010, ADEQ prepared a Fact Sheet announcing the beginning of the Five-Year Review process. The Fact Sheet was distributed on January 15, 2010 to community members on ADEQ's site mailing, including nearby neighbors, State and local Agencies, City of Phoenix departments, and EPA. It explained the review process, provided an overview of the history of contamination at the Site and the selected remedy, and discussed how the community could be involved in the process with contact information. (See Appendix F).

The Fact Sheet announced a series of meetings open to the public for providing information or relaying any concerns about the Site. These events were held at the following Phoenix locations on the dates listed below:

- February 8-9, 2010 – C.J. Jorgensen Elementary School, 1701 W. Roeser Road
- February 18 & 25 – ADEQ Office Building, 1110 W. Washington Street

The meetings were lightly attended by a few nearby neighbors to the landfill who asked a few questions regarding potential future use of the landfill.

In February 2010, ADEQ also began conducting a series of formal community interviews with local community members, elected officials, and city, state and federal employees who were involved with the 19th Avenue Landfill during the Five-Year Review period. A total of 10 interviews were conducted using the same set of questions for each interviewee. The interviews were completed in April 2010. The interview results are summarized in Section VI (Five Year Review Process, Interviews) and the detailed records for each interview are included in Appendix G.

A final Five-Year Review Fact Sheet summarizing the conclusions of the evaluation, including a discussion of the protectiveness of the remedy, will be prepared and distributed to the ADEQ mailing list once the Report is signed in September 2010.

The completed 2010 Five-Year Review Report will be available to the public at the following locations:

- City of Phoenix Public Library
1221 N. Central Avenue, Phoenix, AZ 85004
(602) 262-6801
- Arizona Department of Environmental Quality (ADEQ)
1110 W. Washington Street, Phoenix, AZ 85007
(602) 771-4380
- U.S. EPA, Region 9
Superfund Records Center,
95 Hawthorne Street, Room 403
Mail Stop SFD-7C
San Francisco, CA 94105
(415) 536-2000

Document and ARARs Review

The document review included a review of ADEQ's project files and COP records for the Site, including O&M records and monitoring data. (Appendix H) This work was completed in accordance with Appendix B (Document Review) of the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (EPA, June 2001).

ARARs Review

During the review, one ARAR issue was identified, the requirement for Institutional Controls, which has been addressed during this review period, as discussed below.

There have been no changes to the Chemical-Specific ARARs for groundwater or air since the standards were updated in the 2003 ESD #2 signed by ADEQ and EPA.

There have been no changes in the last five years to the EPA standard for methane at landfill boundaries of the Lower Explosive Limit (LEL), or the AAAQS or to the NAAQS. The EPA standard for methane is five percent by volume. To better understand and manage the U.S. Green House Gas (GHG) footprint, EPA is currently developing a voluntary GHG emissions inventory and quarterly reporting system. Thus, the COP began recording quarterly GHG emissions in December 2009. No federal GHG mandates have been issued yet.

No new Location-Specific ARARs were identified that need to be incorporated as ARARs for the Site. However, depending on what proposals are considered for future redevelopment of the Site and any corresponding potential land use changes, a land use planning evaluation and re-evaluation of ARARs may be necessary at that time.

DEUR Review

Regarding the Institutional Controls (ICs), the September 2005 Five-Year Review recommended as a follow-up action that institutional controls (ICs), in the form of a DEUR, be placed on the Site. ADEQ and EPA's ESD #3, signed on June 29, 2006, made this requirement part of the Superfund Administrative Record for the Site. On July 20, 2006, the City of Phoenix recorded a DEUR for the landfill Site with the Maricopa County Records Office. The 2006 DEUR established both engineering controls and ICs, and it is effective in preventing incompatible land use.

The COP uses five engineering controls at the Site to protect human health and the environment. 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) perimeter fencing to restrict public access.

The DEUR states that "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."

The DEUR states that "If the COP desires to cancel or modify any engineering or institutional control in the future, the COP 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 the DEUR."

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; and
- Groundwater Contingency Plan."

The DEUR further states that "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."

Data Review

Groundwater Monitoring Data

During the period leading up to the 2010 Five-Year Review, the COP continued to conduct quarterly groundwater sampling and depth to groundwater measurements at the nineteen monitor wells that comprise the monitoring network. The samples were submitted for analysis to an Arizona Department of Health Services (ADHS) certified laboratory that used State-approved analytical methods. The COP continued to prepare and submit quarterly reports to the Agencies, although some reports may summarize data collected over more than one quarter.

A separate, detailed Groundwater Analysis for the Site was completed to summarize the current groundwater monitoring data results and to evaluate the data in a historical context. (Appendix A) This analysis also includes hydrogeological and other data relevant to understanding the regional groundwater dynamics. This step was taken because there have been intermittent exceedances of the drinking water standards (MCLs) for certain chemicals since the time of the RI (late 1980s). While the 2000 and 2005 Five-Year Reviews and the 2006 FCOR concluded that these exceedances pose no threat to public health and welfare, to confirm these conclusions, the data collected during the five-year review period (2005 through 2010) was evaluated, with a historical perspective, by comparing it to the entire monitoring history of the Site.

As shown on the following series of tables (Table 4 (pages 1 thru 3), Summary of Groundwater Exceedances by Well, Chemical and Quarter During 2010 Five-Year Review Period), the groundwater data during this most recent review period displayed similar characteristics as observed previously over the last twenty years. There were irregular and intermittent exceedances of certain compounds. Arsenic, nitrate and 1,1-DCE were the primary contaminants identified that exceeded the groundwater standards established in the 1989 LOD/ROD, and the updated standards established in the 2003 ESD #2. There were a few exceedances of nickel and thallium (in 2005 only), and just one exceedance each of chromium, tetrachlorethene (PCE) and gross alpha during the review period. The intermittent or irregular detections of certain compounds continue to appear to be a result of potential leakage from the landfill during periods when elevated groundwater levels re-mobilize site contaminants. And, other chemicals are believed to originate from upgradient, off-site sources.

Well #	1 st Qtr 2005	2nd Qtr 2005	3rd Qtr 2005	4th Qtr 2005	1st Qtr 2006	2nd Qtr 2006	3rd Qtr 2006	4th Qtr 2006
DM-3D								
DM-3I	1,1-Dichloro-ethene (DCE) 7.4 ug/l 1/5/05.	1,1-DCE 8.3 ug/l 4/4/05.						
DM-3P								

DM-4								
DM-5D	Nitrate 12 mg/l, 1/6/05.	Nitrate 11 mg/l, 4/5/05.			Nitrate 11 mg/l, 1/9/06.			
DM-5S	1,1-DCE 7.1 ug/l, 1/6/05.	1,1-DCE 7.4 ug/l. 4/5/05.		1,1-DCE 7.1 ug/l, 10/4/05.				
DM-6								
DM-7D								
DM-7S								
DM-8S				Arsenic 0.011 mg/l 10/4/05.				Arsenic 0.010 mg/l 11/8/06.
DM-8D	1,1-DCE 7.9 ug/l 1/6/05.	Arsenic 0.010 mg/l 4/05.	1,1-DCE 7.1 ug/l 10/5/05.	1,1-DCE 7.1 ug/l	Arsenic 0.010 mg/l 1/9/06.	Arsenic 0.010 mg/l 4/27/06.		Arsenic 0.011 mg/l 11/17/06.
River North-R								
I-1				Chromium 0.054 mg/l 10/10/05.				
I-2R								
I-3	Arsenic 0.033 mg/l, 1/18/05; 0.028 mg/l, 2/05; 0.021 mg/l, 3/05.	Arsenic 0.014 mg/l, 4/7/05; 0.013 mg/l, 5/05; 0.033 mg/l, 6/05. Nitrate 85 mg/l, 4/7/05. Nickel 0.34 mg/l, 4/7/05.	Arsenic 0.029 mg/l 7/11/05.	Arsenic 0.041 mg/l 10/5/05; 0.033 mg/l 11/05; 0.033 mg/l 12/05.	Arsenic 0.030 mg/l 1/11/06; 0.028 mg/l 2/06; 0.034 mg/l 3/06. Nitrate 14 mg/l, 1/11/06.	Arsenic 0.036 mg/l 4/13/06; 0.041 mg/l 5/06; 0.038 mg/l 6/06.	Arsenic 0.073 mg/l 7/31/06; 0.062 mg/l 8/30/06; 0.040 9/06; 0.047 mg/l 9/11/06. Nitrate 12 mg/l, 9/11/06.	Arsenic 0.048 mg/l 10/23/06; 0.048 mg/l 11/1/06; 0.055 mg/l 12/14/06.
I-4	Arsenic 0.051/ 0.052 mg/l 1/18/05; 0.048 mg/l 2/05; 0.036 mg/l 3/05.	Arsenic 0.026 mg/l 4/7/05; 0.025 mg/l 5/05; 0.018 mg/l 6/05. Thallium 0.015 mg/l 4/7/05. Nickel 0.11 mg/l 4/7/05.	Arsenic 0.048 mg/l 7/26/05.	Arsenic 0.062 mg/l 10/6/05; 0.057 mg/l 11/05; 0.065 mg/l 12/05.	Arsenic 0.062 mg/l, 1/18/06; 0.051 mg/l, 2/06; 0.063 mg/l 3/06.	Arsenic 0.056/ 0.057 mg/l 4/13/06; 0.065 mg/l 5/06; 0.050 mg/l 6/06	Arsenic 0.065 mg/l 7/31/06; 0.073 mg/l 8/06; 0.053/ 0.057 mg/l 9/11/06.	Arsenic 0.064 mg/l 10/23/06; 0.064/ 0.057 mg/l 11/1/06; 0.048 mg/l 12/14/06.
I-5R								
I-6								
I-8R		Nickel 0.11 mg/l 4/11/05. Thallium 0.0069 mg/l, 4/11/05.						

Well #	1 st Qtr 2007	2nd Qtr 2005	3rd Qtr 2007	4 th Qtr 2007	1st Qtr 2008	2nd Qtr 2008	3 rd Qtr 2008	4 th Qtr 2008
DM-3D								
DM-3I								1,1-DCE 9 ug/l 10/27/08.
DM-3P								
DM-4								
DM-5D	Nitrate 10 mg/L 1/23/07.				Nitrate 11 mg/l 1/31/08.			

DM-5S								
DM-6								
DM-7D								
DM-7S						Tetrachloro-Ethane (PCE) 7.4 ug/l 4/7/08		
DM-8S	Arsenic 0.011 mg/L 3/29/07.							
DM-8D	Arsenic 0.011 mg/L 3/29/07							
River North-R								
I-1								
I-2R								
I-3	Arsenic 0.052 mg/L 1/23/07; 0.052 mg/L 2/7/07; 0.042 mg/L 3/7/07.	Arsenic 0.039 mg/l 4/19/07; 0.036 mg/l 5/1/07; 0.050 mg/l 6/5/07. Nitrate 14 mg/l 4/19/07.	Arsenic 100 mg/l 7/9/07; 0.083 mg/l 8/07.	Arsenic 0.047 mg/l 11/07; 0.048 mg/l 12/07.	Arsenic 0.031 mg/l 1/28/08. Nitrate 38 mg/l 1/28/08.	Arsenic 0.018 mg/l 4/8/08. Nitrate 17 mg/l 5/1/08.	Arsenic 0.028 mg/l 7/15/08. Nitrate 23/25 mg/l 7/31/08; 10 mg/l 9/10/08.	Arsenic 0.021 mg/l 10/27/08. Nitrate 0.011 mg/l 10/27/08; 14 mg/l 11/3/08; 25/26/mg/l 26/27 mg/l 12/8/08; 20/21 mg/l 21/22 mg/l 12/17/08.
I-4	Arsenic 0.051 mg/l 1/22/07; 0.050 mg/l 2/7/07; 0.047 mg/l 3/7/07.	Arsenic 0.041 mg/l 4/16/07; 0.053 mg/l 5/1/07; 0.054 mg/l 6/5/07.	Arsenic 0.052 mg/l 7/10/07; 0.055 mg/l 8/07.	Arsenic 0.052 mg/l 10/6/07; 0.045 mg/l 11/07; 0.045 mg/l 12/07.	Arsenic 0.049 mg/l 1/29/08.	Arsenic 0.025 mg/l 4/8/08. Nitrate 14/15 mg/l 4/8/08.	Arsenic 0.055 mg/l 7/15/08.	Arsenic 0.053/ 0.055 mg/l 10/27/08.
I-5R								
I-6								
I-8R								

Except for two detections of 1,1-DCE and one detection of gross alpha above their respective MCLs in 2009 and early 2010, only arsenic and nitrate have been detected above the groundwater standards; and again, at much lower frequency than in earlier years.

Well #	1 st Qtr 2009	2 nd Qtr 2009	3 rd Qtr 2009	4 th Qtr 2009	1 st Qtr 2010	2nd Qtr 2010	3 rd Qtr 2010	4 th Qtr 2010
DM-3D								
DM-3I				1,1-DCE 8.2/8.4 ug/l 10/6/09.	1,1-DCE 8.2/8.4 ug/l 1/12/10.			
DM-3P								
DM-4								
DM-5D								
DM-5S								
DM-6								
DM-7D								
DM-7S								
DM-8S				Arsenic 0.010 mg/l				

				10/8/09.				
DM-8D				Arsenic 0.010 mg/l 10/8/09.				
River North-R								
I-1								
I-2R								
I-3	Arsenic 0.025 mg/l 1/13/09. Nitrate 32 mg/l 1/13/09.	Arsenic 0.022 mg/l 4/15/09.	Arsenic 0.024 mg/l 7/21/09.	Arsenic 0.040 mg/l 10/5/09.	Arsenic 0.046 mg/l 1/13/10. Nitrate 20 mg/l 1/13/10.			
I-4	Arsenic 0.054 mg/l 1/13/09.	Arsenic 0.036 mg/l 4/14/09.	Arsenic 0.055 mg/l 7/21/09.	Arsenic 0.061 mg/l 10/5/09.	Arsenic 0.050 mg/l 1/11/10.			
I-5R								
I-6								
I-8R	Gross Alpha 16 pCi/l 1/14/09.							

Over the period of 2005 to 2010, the number of exceedances per year declined for all detected chemicals with groundwater standards (Table 5, Total Number Groundwater Exceedances by Chemical and Year During 2010 Five-Year Review Period). Also, with the exception of one exceedance of PCE in downgradient well DM-7S in April 2008, no exceedances of groundwater standards were identified in the three shallow zone monitor wells located downgradient from the landfill boundary (Figure 3). This one detection of PCE is considered anomalous, in that PCE has not been previously identified in the groundwater or associated with the Site.

Table 5. Total Number of Groundwater Exceedances by Chemical and Year for Entire 19 Well Monitor Network During Five Year Review Period (2005 – 2010)								
	EPA Maximum Contaminant Levels (MCLs)	2005	2006	2007	2008	2009	2010 (Jan- Mar)	Total
Arsenic	0.010 mg/l	22	28	23	8	8	2	91
Chromium	0.10 mg/l	1	0	0	0	0	0	1
1,1-DCE	7 ug/l	8	0	0	1	1	1	11
Nickel	0.10 mg/l	3	0	0	0	0	0	3
Nitrate	10 mg/l	3	3	1	10	1	1	19
Tetrachloro- ethene (PCE)	5 ug/l	0	0	0	1	0	0	1
Thallium	0.002 mg/l	4	0	0	0	0	0	6

This 2010 groundwater data review reaches the same conclusions as the earlier Five-Year Reviews and FCOR; however, this Review makes some specific recommendations for updating certain groundwater-related O&M documents and providing better documentation for the Administrative Record on the cause of the groundwater exceedances. See Section IX (Recommendations and Follow-up Actions).

Landfill Gas Monitoring Data

The COP performs landfill gas monitoring on a routine basis. The system includes forty-four dual depth monitoring probes at Cell A, eleven dual depth probes at Cell A-1, eight probes in the Salt River channel and five triple depth probes on the south bank of the Salt River. Monitoring is conducted monthly. During the review period, the eight monitoring probes in the Salt River could not be sampled due to flooding during the following months:

- December 2007
- February, March, August and December 2008
- January, February, March, July and August 2009
- January, February and March 2010

The results of this landfill gas monitoring are included routinely in the Quarterly Groundwater Quality Monitoring Reports. During the five-year review period, all probes were below 5% methane by volume during all quarters with the following few exceptions:

- September 12, 2006 – 8.4% methane at probe LG19B12D
- March 6, 2007 – 24.4% methane by volume at probe LG19B12D (corrected by adjustment)
- April 23, 2007 – 5.3% methane by volume at probe LG19A199D (corrected by adjustment)

The Site also has a condensate management system which consists of 30 condensate sumps integrated into the landfill gas extraction system. In the above and below grade headers, condensate flows to low points where collection sumps are located. Condensate is pumped from the sumps to condensate storage tanks at the flare stations. Condensate monitoring is performed on a monthly basis. The pH of the condensate is adjusted to near 7.0 before it can be discharged to the City of Phoenix sanitary sewer system. Additionally, yearly analyses for metals and organics are conducted on the condensate. The condensate analytical results are reviewed by the COP, and are not routinely reported to ADEQ and EPA.

Surface Water and Sediment Monitoring Data

There are no surface water bodies located within the landfill cells; however, the Salt River channel runs through the Site, as previously discussed. Storm water runoff is directed to

perimeter drainage channels and into retention basins from where it is released to the Salt River. No surface water or sediment monitoring is conducted in the adjacent Salt River because the landfill was properly closed in accordance with the State's storm water runoff requirements.

Site Inspection

COP and ADEQ personnel completed the site inspection over a series of site visits, beginning on March 9 and March 25, 2010. Chuck Hamstra, COP Landfill Compliance Officer, accompanied Delfina Olivarez, ADEQ Project Manager and Don Atkinson, ADEQ Hydrogeologist, for the site inspection. Additionally, staff from COP and Bryan A. Stirrat & Associates (BAS), consultants to the City responsible for servicing the flare stations, also were on-site to assist in the inspection and answer questions. On April 20, 2010, Delfina Olivarez also observed routine quarterly groundwater and landfill gas probe monitoring. A final inspection of the landfill caps (Cells A and A-1) was made on June 23, 2010, by Chuck Hamstra, Delfina Olivarez, Don Atkinson, and Wayne Miller, P.E., of ADEQ.

The inspection included visual observation of overall site conditions and inspection of various components of the remedy. The inspection evaluated the landfill caps, the landfill gas collection system, the two flare stations, as well as the groundwater monitoring wells DM-3P, DM-3I, DM-3D, methane probes SR1 through SR8, and several representative gas extraction wells. A summary of the inspection findings is presented below. A copy of the inspection checklist is included as Appendix I. Photographic documentation of the site inspection is also attached (Appendix J – Photographs of Current Site Conditions).

Conditions during the initial inspections were overcast and wet with cool temperatures, and intermittent precipitation. Heavy to moderate periods of rainfall had been occurring for several weeks prior to the inspection. With the exception of landfill gas probes located in the bed of the Salt River no problems were encountered with access to the features of the Site that were inspected. One landfill gas probe located in the bed of the Salt River was inspected on June 23, 2010.

Inspection Findings

O&M Related Documents

During the site inspections, it was observed that a copy of an O&M Vacuum and Weekly Reports notebook was kept at flare stations A and A-1 (See Appendix J, photo, #1). These notebooks contained flare daily operations, weekly operations log, weekly vacuum readings, and a preventative maintenance checklist. Consultants (BAS) produce monthly reports that contain flare station monitoring data forms, QA/QC equipment forms, flare station summaries, condensate sump monitoring data forms, monthly air emissions tables, deviation & shutdown

logs, inspection weekly logs, weekly preventative check lists, maintenance logs, and weekly operations logs.

Also kept at each flare station was a copy of an Ambient Air Monitoring Plan (issued 8/08/01, renewal date 8/31/11); Dust Control/Demolition Permit (Permit # E041500 issued 5/5/04) which is updated yearly with Maricopa County; and a Health & Safety Plan (HASP). Copies of the 1992 CD, the 2006 DEUR, the O&M procedures, and O&M Cost Records are on file at the COP Records Center for the Site and at the 27th Avenue Transfer Facility offices (30602 S. 27th Avenue), approximately one mile west of the site. As required by the DEUR, the COP performs annual site inspections, copies of which are submitted to ADEQ and kept on file at the COP Records Center. Storm inspections, which are conducted after every storm event, are also kept at the COP Records Center.

Landfill Cell Caps

The landfill caps at both Cells A and A-1 were found to be in relatively good condition with the exception of some minor shallow erosion from the recent rainfall events in spring 2010. The impermeable clay layer of the landfill caps at Cells A and A-1 did not appear to be exposed, with the possible exception of the recent erosion of the topsoil layer and minor, shallow (less than one foot deep) cracks (Appendix J, Photos #2, #3 and #10). The underlying waste materials were not exposed at either cell. Minor shallow depressions were observed, with one significant depression near the northwest corner of Cell A cap showing evidence of ponding. (Appendix J, photo #8). A few shallow animal burrows were noted during the inspections. The vegetative cover, consisting of shallow rooted species and a few small trees, was well established, uniform, and green at both landfill Cells A and A-1.

Perimeter Fence and Signage

The perimeter fence was in good condition with locked gates restricting access. “City of Phoenix No Trespassing” signs are posted on the fencing and entrance gates. There was no evidence of trespassing. (Appendix J, photos #15, #16, and #18)

Access Roads

Access roads were in good condition, although the down-slope edge of sections of the roads at Cell A-1 were observed to be slightly eroded. No obstruction to traffic along access roads was noted. (Appendix J, photo #19)

Perimeter Drainage Channels, Sedimentation Basins and River Banks

Inspection of perimeter drainage channels at both cells verified that surface water is directed toward three sedimentation basins located along the east side, the southeast corner, and southwest corner of Cell A, and to one sedimentation basin that is located at the northwest corner of Cell A-1. The sedimentation basins remove sediments in storm water prior to discharge through flap gates to the Salt River. Erosion had not affected the Armorflex™ that was used to line the channels at both cells. (Appendix J, photo #17)

No significant accumulation of sediment was evident in drainage channels and sedimentation basins. It appears that sufficient capacity remains for unobstructed drainage flows. The north and south bank protection (soil-cement levees) along the Salt River appeared to be in good condition and there was no evidence of erosion along the banks. (Appendix J, photo #12)

Flare Stations

Centrifugal blowers at each flare station induce a vacuum which extracts the landfill gas. The gas then passes through a knockout vessel where free liquids and solid particulates are removed before the landfill gas is discharged into the flare for combustion. All components of both systems appear to be well maintained and working properly.

Electronic controls, sensors, and instrumentation at both flare stations appeared to be in good working condition. Operation of shutoff and alarms was observed during the inspection at the Cell A flare station. Each functioned as designed, although the supply of flare re-ignition gas was insufficient to restart the flare. Additional flare re-ignition gas had already been ordered by the operators. (Appendix J, photos #5 and #14)

Pressure gauges and valves at both flare stations appeared to be in good, working condition with no evidence of malfunction. The City representative reported that portable gauges are also used, when needed. A manual of operating procedures and written logs of systems operations were observed inside the control box at both Cells A and A-1, for easy access by operators and inspectors. (Appendix J, photos #14 and #18)

Landfill Gas Collection System

Inspection of representative methane monitoring probes, landfill gas extraction wells, and condensate collection sumps, showed all of these items to be in relatively good condition and secure. Internal piping, valves, and fittings were in good condition and no water, debris or foreign material was present. There was evidence of a leaking pneumatic line (bubbles) in a flooded excavation adjacent to a condensate collection point on the east side of Cell A. The open excavation indicated recent work on the system was not completed at that location. (Appendix J, photos #6 and #7)

Groundwater Monitoring Wells

Representative groundwater monitoring wells were visually inspected. A City representative opened the outside locks on the cover boxes for inspection of internal components. No water, debris or foreign material was present. It appeared that well casings and caps are in good condition. The COP reported that groundwater monitoring wells are regularly inspected and repairs made as needed. All groundwater monitoring wells observed during the FYR inspection were securely locked and appeared to be in good condition. (Appendix J, photo #9)

Deficiencies Noted

However, during the Site inspection, the following deficiencies routine O&M deficiencies were identified that need attention.

1. Some routine records/documents that in many cases would be kept on-site are kept on file at the 27th Avenue Transfer Facility offices (30602 S. 27th Avenue).
2. Surficial erosion and minor cracking was evident on the cap at both cells.
3. Weed growth was observed around storm drain inlets on the east side of Cell A.
4. Debris was observed on some storm drain inlets on the east side of Cell A.
5. There was an insufficient supply of flare re-ignition gas at the Cell A flare station to re-ignite the flare after shutdown (for testing of alarm system).
6. Broken vaults were observed at two landfill gas extraction wells/condensate collection points, and many of the various vaults/boxes had lids displaced (open, up-side down, etc.)
7. Observed evidence of a leaking pneumatic line (bubbles) in a flooded excavation at a condensate collection point on the east side of Cell A. [The open excavation indicated recent work was not completed at the site.]
8. A few isolated, shallow depressions were observed. There was visual evidence of prior shallow ponding of water near the northwest perimeter of Cell A.

Interview Summary

Interviews primarily targeted individuals who are knowledgeable as to the operation of the site remedy. Interviewees included City employees who have responsibility for the operation and maintenance of the landfill, citizens who live in the vicinity of the Site, elected officials, and employees of local, state and federal regulatory agencies.

The purpose of the interviews was to identify issues or problems associated with the remedy and how the community currently views the landfill. The community was asked how they felt about the landfill and what they ideally would like to see the landfill become in the near future. Employees of local, state and federal regulatory agencies were questioned as to procedures for operation of the methane gas collection and flare system, the clay soil cap, the perimeter

drainage system, and any site specific factors that appear to have impacted the effectiveness of the remedy, and its ability to protect human health and the environment. The interviewees were also asked if they were aware of any new regulations or ordinances that would affect the landfill and what effects they felt the landfill had on the community.

The following individuals were interviewed during the period of February through April 2010:

- Louise Henderson, Community Member and retired principle who works on call at Jorgensen Elementary School;
- Selena Gonzalez, Community Member who lives and works in South Phoenix;
- Rachel Loftin, 19th Avenue Landfill Former Remedial Project Manager, EPA Region 9;
- Chuck Hamstra, 19th Avenue Landfill Compliance Officer, COP;
- Hilary R. Hartline, 19th Avenue Landfill Senior Engineering Technician, COP;
- Jackie Lane, Community Involvement Coordinator, EPA Region 9;
- Joe Giudice, Deputy Public Works Director, COP;
- Michael Johnson, Councilman for District 8, COP;
- Julie Riemenschneider, Remedial Projects Section Manager, ADEQ; and
- John Patricki, DEUR Program Coordinator, Site Assessment Unit, ADEQ.

The completed questionnaires for each interview are included in Appendix G. Outlined below is an overall summary of the primary comments and opinions provided during the interview process:

- Some long-time neighbors recalled the odors and smells from the trash prior to the landfill closure and capping and they were pleased to see the landfill closed and the problem remedied.
- Several interviewees indicated they would like to see a future use for the Site now that the remedy is in place, including:
 - A family park for playing and exercising;
 - Evaluation of various alternatives for future development of the Site;
 - Redevelopment that incorporates the Rio Salado Parkway Project;
 - Redevelopment that is protective and compatible with the remedy; and
 - Productive future use.
- Most interviewees remarked that the remedy appears to be functioning effectively as designed, and the Site appears to be well managed.
- In regards to the groundwater monitoring, a City official noted that there have been intermittent exceedances of water quality standards of certain chemicals (arsenic, nitrate, 1,1-dichloroethene (DCE) in monitor wells I-3 and I-4 (wells located on the western boundary of the Site). However, the data results seem to indicate that the contamination is localized and not migrating off-site. The commenter also recommended updating the monitoring, test methods and field procedures in the 1992 Consent Decree, the QA/QC manual and procedures, and the GCP Threshold Levels, in order to increase efficiency and save money.

- It was noted that a Screening Level Ecological Risk Assessment (SLERA) was completed during 2006 and the Site remedy was found protective for potential ecological receptors.
- A City Official noted that air monitoring conducted during the previous five-year review showed that the landfill does not adversely impact ambient air quality.
- A City official commented that potential Green House Gas (GHG) emission reporting requirements, which are uncertain at the time, could impact the long-term O&M of the Site; however, the COP has been recording GHG-related data as of December 2009.
- An ADEQ official commented that the DEUR appears to be an effective method for ensuring the long term maintenance of the various engineering and institutional controls utilized on the property; and since the DEUR was approved and recorded, there have been no changes or issues.

VII Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Plans and Documentation

It appears that the remedy is functioning as intended in the decision documents and that most of the appropriate plans and documentation are present at the Site or at a nearby COP facility at 27th Avenue. To ensure that all requirements of the decision documents are being met, daily flare operations logs and preventive maintenance checklists are kept and used daily at the flare stations at landfill Cells A and A-1.

Institutional Controls

A DEUR with Institutional and Engineering Controls was recorded for the Site on July 19, 2006. The DEUR describes the contamination known to be present at the Site, the engineering controls that must be maintained, and the institutional controls required of the COP and any and all future Site owners. The COP has submitted to ADEQ Annual Inspection Reports every January, as required by the DEUR. The reports were found to meet the requirements pursuant to A.R.S. 49-152(K). Additionally, the COP has provided appropriate site security measures at the Site.

Remedial Action Performance

The landfill cover system has been effective in containing the waste and contaminants, and preventing leaching of contaminants through the vadose zone via percolation. However, shallow erosion of the landfill cell caps from recent rains will require repair.

Examination of the perimeter drainage systems indicated that they are functioning properly. However, near the top of the drainage channels there was evidence of minor erosion. While this has not affected the Armorflex™ or the integrity of drainage channels, it requires constant repair during periods of rainfall. The installation of straw waddles along the edges of drainage channels and other areas prone to erosion had reduced erosion to a minimum. Stockpiles of soil (for filling areas of erosion) and spare waddles are stationed at various locations at the Site. At Cell A minor weed growth or accumulation (due to recent rainfall/flows) was observed in the east channel around the storm drain inlets. Debris was observed partially blocking one of the storm drain inlets.

Some of the components of the remedy (i.e., methane monitoring probes) located in the channel of the Salt River were not accessible for inspection due to the flow of water in the river. Indications are that it will be necessary to clean and inspect these components after the flow of water has ceased to ensure they are functioning properly.

Assessment of the flare system at both cells shows that they are generally in good condition, functioning properly, and protective of human health and the environment.

System O&M

In general, the COP has been performing O&M activities according to the 1992 CD, and the Site's O&M Plan. In addition, the COP has been routinely submitting quarterly monitoring reports to ADEQ. Recent maintenance records are currently present at the Site that show routine maintenance and repairs performed on the landfill cap, perimeter drainage, sediment ponds, and groundwater monitoring wells. All pertinent Site records such as maintenance records, incident logs, and storm water discharge records are maintained on site and/or at the 27th Avenue Transfer Facility offices (30602 S. 27th Avenue). Chart paper is present at all times at flare stations.

Early Indicator of Potential Remedy Failure

The COP performs regular checks, maintaining daily logs for the flare operations and weekly logs for operations and maintenance of the 19th Avenue Landfill and its instruments to ensure compliance with procedures required by the ROD, CD, and DEUR, and to ensure protection of human health and the environment.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

Exposure Assumptions

The exposure assumptions have not significantly changed. Currently there are no known complete routes of exposure to contaminants from the Site. Engineering controls are in place and well maintained. Institutional controls are in effect that prevent/prohibit human incursion onto the site. The long-term monitoring and engineering and institutional controls will need to remain in place and be maintained in perpetuity because contamination has been left in place. Monitoring results for groundwater contamination and landfill gas emissions have been shown to be consistent or decreasing over time. However, since the completion of the Site remedy approximately twenty years ago, there have been changes to some of the procedures and standards prescribed in the 1992 CD that need updating.

Changes In Exposure Pathway

There have been some changes observed in and adjacent to the Salt River, as a result of the Rio Salado Project Parkway, including the presence of a low-flow perennial stream within the bottom of the river channel adjacent to the Site and reestablishment of some native vegetation and wildlife. During the 2005 Five-Year Review, some concerns were raised that the initial exposure pathway assumptions in the Risk Assessment may need to be revisited in the future. However, EPA concluded in March 2006 when completing a SLERA that it is not necessary to revisit the ecological risk assessment for the Site, unless a proposed change for future use should open up the landfill wastes and potentially pose a risk to public health or the environment. As long as the current remedy remains in place, undisturbed, there is no need to revise prior risk assessments.

Toxicity Data and Cleanup Levels

There have been no changes to the Chemical-Specific ARARs for groundwater or air since the standards were updated in the 2003 ESD #2 signed by ADEQ and EPA. However, the ARARs may need to be re-evaluated in the future if the COP proposes a redevelopment plan that could cause potential exposure issues if buried waste is removed or the landfill caps are damaged.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has been identified that would call into question the protectiveness of the remedy.

Technical Assessment Summary

According to the review of relevant documents and data, site inspections, and interviews with the City of Phoenix, EPA, ADEQ and Maricopa County personnel, the remedy is functioning as intended by the ADEQ LOD and the EPA ROD. There have been no changes in the physical

conditions of the Site that would affect the protectiveness of the remedy. There is no other information that calls into questions the protectiveness of the remedy.

VIII. Issues

There are no issues that affect the protectiveness of the remedy.

IX. Recommendations and Follow-Up Actions

There are no formal recommendations; however, several areas of improvement were identified during the Five Year Review process. A list of minor deficiencies was identified during the Site Inspection and are discussed in Section 6 (Five Year Review Process, Site Inspection). In addition, during the document and data review, it was determined that several Plans and the Reporting Program have not been updated in nearly 20 years. Specific suggestions are below:

- Landfill Maintenance Deficiencies: During the site inspections a list of eight maintenance deficiencies were identified (see page 36). The deficiencies ranged from minor surface erosion of the cap, to location of records, to broken vaults or a leaking line in the methane collection system. The necessary repairs should be completed within the next six months and a follow-up report provided to ADEQ and EPA by the COP.
- Annual Monitoring Report: The COP currently submits quarterly monitoring reports that summarize both groundwater and landfill gas monitoring results. Beginning in the fourth quarter 2010, the COP should submit the fourth quarter report as a combined fourth quarter and annual summary report that includes groundwater exceedance summary tables similar to Tables 4 and 5 included in this Five-Year Review Report. Such summary tables will provide an overview of groundwater trends, as well as reduce the effort required to compile data for future Five-Year Reviews. This annual report should also include a recommendation section, with a detailed rationale, for reducing the monitoring frequency for specific wells with a long history of no exceedances. Upon receipt of the annual report, ADEQ and EPA will review any recommended changes to the monitoring network and ADEQ will provide approval or disapproval to the COP on such proposed changes.
- Update Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP): The GCP (Section 12) of the 1992 CD, including the Groundwater Monitoring and Data Collection program (Appendix A) and the Threshold Levels (Appendix B), are not consistent with current data collection and sampling procedures used for the Site. An updated SAP needs to be prepared by the COP and submitted to ADEQ and EPA for review and approval. This updated SAP needs to describe current sampling procedures for all media (groundwater and soil vapor). The SAP and the related QAPP need to include current analytical requirements and appropriate detection limits for contaminants

of concern. The QAPP also need to include updated groundwater MCLs and ambient air standards included in the 2003 ESD #2 signed by ADEQ and EPA.

- Update Operation & Maintenance (O&M) Plan: A complete analysis of current operation and maintenance procedures at the Site should be conducted and recommendations for any changes submitted to ADEQ and EPA, including an updated O&M Plan, as needed.
- Update Well Inventory and Corresponding Map. The most current monitor well inventory available for this Review was Table 10, attached to the 2000 Five-Year Review, which summarizes the construction details for the Site's monitor wells. The 1992 CD included a well inventory (Table 4) for the monitor wells in existence at that time. An updated well inventory and a corresponding map showing all other wells located within a one-mile radius of the Site should also be prepared for the Site. The purpose of this larger well inventory is to document that there are no wells used for drinking water purposes that could potentially be impacted by the intermittent exceedances of drinking water standards observed in the immediate vicinity of the Site.
- Compile and Evaluate Landfill Gas Condensate Monitoring Data on a Regular Basis. Condensate monitoring is performed on a monthly basis by the COP. The pH of the condensate is adjusted to near 7.0 before it can be discharged to the COP sanitary sewer system. Additionally, yearly analyses for metals and organics are conducted on the condensate. The condensate analytical results are part of a COP internal process, but they are not routinely reported to ADEQ and EPA. The COP should provide the historical data to EPA in a Report that summarizes the findings, and for the future, provide the data as part of its quarterly reporting on the soil vapor and groundwater monitoring systems.

X. Protectiveness Statement

The remedy at the Nineteenth Avenue Landfill Superfund Site is protective of human health and the environment. Currently, there are no environmental exposure pathways that result in unacceptable risks, and none are expected as long as the engineered and institutional controls selected in the decision documents continue to be properly operated, monitored, and maintained, and the land use at the Site allows for the integrity of the remedy to continue. A Declaration of Environmental Use Restriction (DEUR) to restrict use of property was recorded for the Site in 2006, and it is effective in preventing incompatible land use.

XI. Next Review

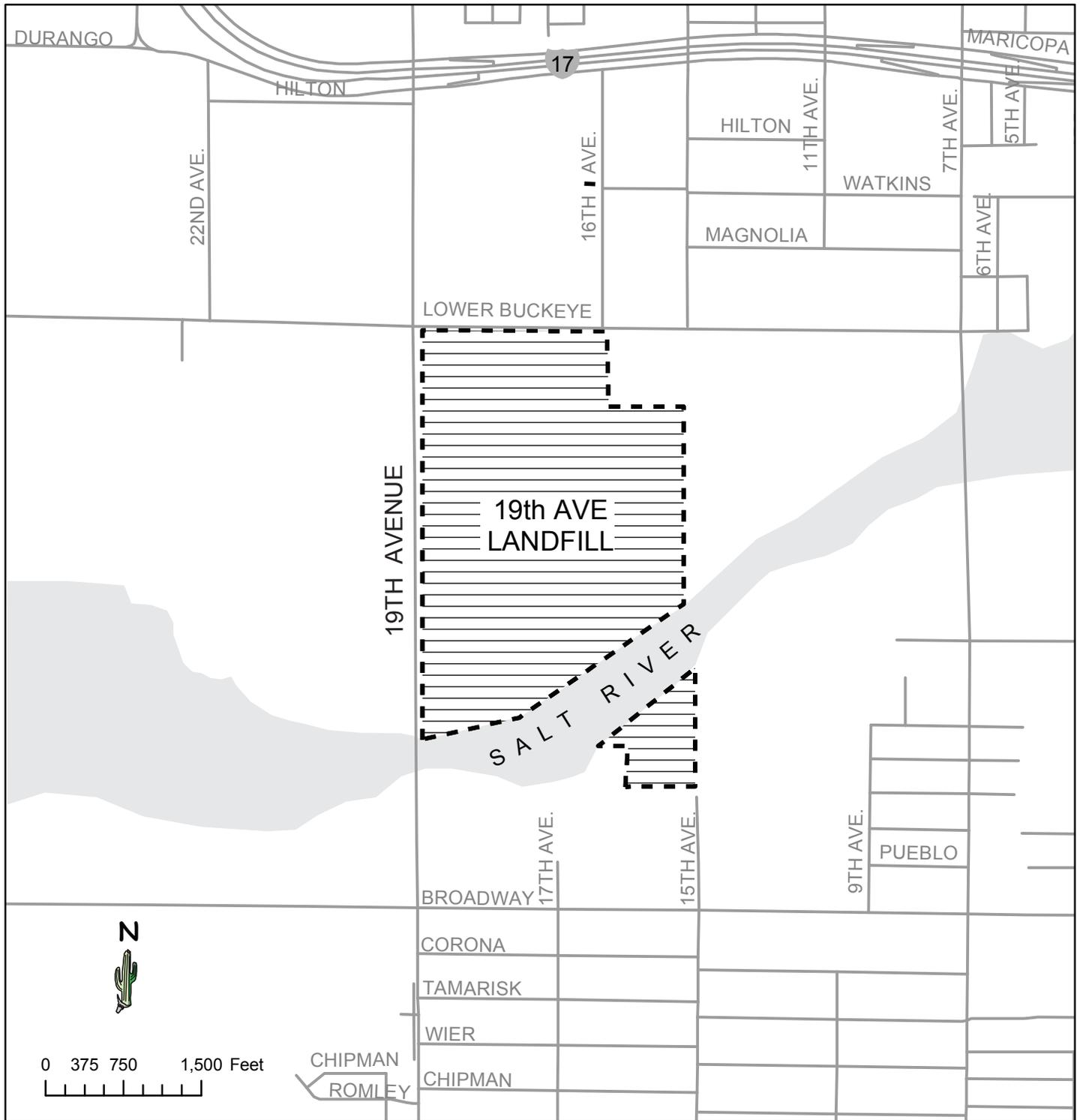
The 19th Avenue Landfill Superfund Site requires ongoing statutory Five-Year Reviews as a matter of statute, because the remedy does not allow for unrestricted use and unrestricted exposure. The next review for the Site will be conducted within five years of the completion date of this Five-Year Review Report. The completion date will be the date of signature shown on the cover of this Report.

19th Avenue Landfill Superfund Site 2010 Five Year Review

FIGURES AND MAPS

19th Avenue Landfill Superfund Site 2010 Five Year Review

Figure 1 - Site Location Map



Legend

 19th Avenue Landfill

 Roads

July 2004, updated January 2005

**19th Ave. Landfill
Superfund Site**
Phoenix, Arizona

19th Avenue Landfill Superfund Site 2010 Five Year Review

Figure 2 - Site Plan (Showing Location of Cell A and Cell A-1)

19th Avenue Landfill Superfund Site 2010 Five Year Review

Figure 3 - Groundwater Monitoring Well Location Map

FIGURE 4-1

Groundwater Monitoring Wells O&M Program Features Map

