



CITY OF
TUCSON

ENVIRONMENTAL
SERVICES

March 31, 2014



VIA U.S. CERTIFIED MAIL

Ms. Gretchen Wagenseller
Arizona Department of Environmental Quality
400 West Congress St, Suite 433
Tucson, AZ 85701

**Re: Prudence Landfill, Tucson, AZ
Annual Monitoring Report 2013**

Dear Ms. Wagenseller:

The City of Tucson, Environmental Services (COT-ES) prepared the attached report on CD to document groundwater and soil vapor monitoring conducted at Prudence Landfill for 2013.

If you have any questions concerning this report, please contact Molly Collins at (520) 791-3175.

Sincerely,

Nancy Petersen
Deputy Director

NP/LE/nr

cc:

Wally Wilson, COT, Tucson Water (email Link)
Jeff Langejans, COT, Fire Department (entire report on CD)
Molly Collins, COT, ES (email Link)

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**2013 ANNUAL MONITORING REPORT
PRUDENCE LANDFILL
TUCSON, AZ**

MARCH 27, 2014

**Prepared by:
City of Tucson
Environmental Services
P.O. Box 27210
Tucson, Arizona 85726-7210**



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List of Acronyms

1,1-dichloroethane	(1,1 DCA)
Aquifer Water Quality Standards	(AWQS)
Arizona Department of Environmental Quality	(ADEQ)
Below Ground Surface	(bgs)
Carbon Dioxide	(CO ₂)
Cis-1,2 dichloroethene	(cis-1,2 DCE)
City of Tucson Environmental Services	(COT-ES)
Dichlorodifluoromethane	(DCFA)
Feet	(ft)
Feet above mean sea level	(ft amsl)
Non-detect	(ND)
Methane	(CH ₄)
Micrograms per liter	(μg/L)
Milligrams per liter	(mg/L)
Oxygen	(O ₂)
Quality Control/Quality Assurance	(QA/QC)
Tetrachloroethene	(PCE)
Trichloroethene	(TCE)
Volatile Organic Compounds	(VOCs)
Water Quality Assurance Revolving Fund	(WQARF)
Water Table Elevation	(WTE)

1.0 INTRODUCTION

The City of Tucson Environmental Services (COT-ES) has prepared this report to document groundwater and soil vapor monitoring conducted during 2013 near the Prudence Landfill (Figure 1). COT-ES conducts this monitoring as part of a discretionary monitoring program at closed landfills within the COT.

The Prudence Landfill is approximately 8.5 acres generally located along the western bank of the Pantano Wash between 22nd Street and Broadway Blvd in Tucson, AZ. The city operated the landfill between 1974 and 1977¹, and accepted mainly household waste². The landfill meets the definition of closed solid waste facility under A.R.S. 49-701 and is exempt from the state rules covering solid waste facilities. However, methane monitoring for the landfill was directed by Mayor and Council in August 1995 as part of a directive to the Solid Waste Management Department to manage and control methane gas from landfills within the City. Mayor and Council placed evaluation of methane hazards as the highest priority and also directed staff to subsequently evaluate and establish protocols for other environmental concerns, specifically the groundwater conditions at City landfills^{3,4}. To be protective of nearby residences and other developments, COT-ES voluntarily monitors methane quarterly and operates a gas extraction system (built in 1995) to prevent methane from leaving the landfill property. COT-ES also voluntarily collects groundwater and soil vapor samples to assess the level of environmental risk, if any, posed by the landfill.

2.0 MONITORING

In November 2013, COT-ES conducted a biennial (every two years) groundwater monitoring event at wells R-124A, R-125A, and WR-435A, and soil vapor monitoring from nested probes at R-124A, R-125A, and WR-434A (Figure 2). COT-ES also conducts quarterly monitoring of perimeter landfill gas (LFG) probes (PRUD-1 thru PRUD-20). The Arizona Department of Environmental Quality (ADEQ) with the assistance of their contractor, Clear Creek Associates, conducted a groundwater elevation survey in February 2013 using a network of over fifty monitoring wells for the nearby Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site. The WQARF site investigations include the Broadway North and South Landfills, but the water level measurements and contour map from the WQARF site also encompasses the Prudence Landfill. When feasible, COT-ES references the ADEQ data and

¹ URS, Historical Summary Report: Prudence Landfill/Gollob Park Area Tucson, Arizona, March 5, 2004

² Dames & Moore, Landfill Environmental Studies Program Phase I (LESPI), 1989

³ Solid Waste Management Department: Memorandum to Mayor and Council, Closed Landfill Investigation Summary, February 18, 1998

⁴ Mayor and Council Memorandum, Update on Landfill Methane Monitoring and Compliance, March 15, 1999

interpretations (i.e. contours) for a more comprehensive overview of the area and to also increase efficiency of reporting for the Prudence Landfill.

2.1 Groundwater Water Level Monitoring

In November 2013, COT-ES collected water levels from three monitoring wells for Prudence Landfill during the biennial monitoring event. Groundwater elevations have been on a rising trend and have increased an average of 18 feet since 2005 (Figure 3). ADEQ performed a gauging event in February 2013 for the Broadway-Pantano WQARF area which included wells in the direct vicinity of Prudence Landfill. The ADEQ potentiometric groundwater contour map for February 2013 (provided in Appendix G)⁵ indicates groundwater flow towards the northwest from the Prudence Landfill area with an approximate gradient of 0.007 feet/foot. The groundwater flow direction is consistent with historic data.

2.2 Groundwater Sampling Procedures and Results

COT-ES conducted the biennial sampling event from November 25 to 26, 2013 from groundwater wells R-124A, R-125A, and WR-435A. The wells were sampled in order of increasing PCE concentration (non-detect to highest concentrations) based on previous concentrations. Before sample collection, each well was purged a minimum of three well volumes using either a dedicated submersible pump or a decontaminated temporary pump.

A multi-parameter YSI meter equipped with a flow-through cell was utilized to continuously monitor water quality parameters, including: temperature, pH, specific conductance, dissolved oxygen, and oxidation-reduction potential (ORP). Turbidity was collected by a Hanna Instrument.

Groundwater samples were collected once a minimum of three well volumes were purged from the well and field water quality parameters had stabilized (see field sheets in Appendix A for stabilization parameters).

Purge water was directed through a granular-activated carbon (GAC) vessel, unless the well had a history of non-detect for VOCs. Purge water from on-site wells with a history of non-detect levels was discharged to the ground. Purge water (regardless of treatment with GAC or direct discharge) was not allowed to enter any jurisdictional waterways. All non-dedicated sampling equipment was decontaminated prior to each use.

Immediately following purging, groundwater samples were collected from the spigot provided on the sampling equipment. The flow was reduced to minimize volatilization of VOCs during

⁵ Jones, Alison (Clear Creek), Broadway-Pantano Groundwater Elevation Survey, March 27, 2013

sampling. Groundwater samples were collected and analyzed for VOCs, and inorganic compounds as listed in analyte lists provided in Appendix A. Samples were labeled and placed in laboratory-supplied containers with an internal temperature of 4 ± 2 degrees Celsius, and taken to Tucson Water Quality Laboratory to be analyzed.

Field QA protocol during the COT-ES sampling event consisted of:

- One trip blank was collected one a day or per each cooler.
- Collection of one duplicate sample.
- Collection of one equipment blank for each day of use of a non-dedicated pump.

2.2.1 VOC Analytical Groundwater Results

No VOC or inorganic compounds exceeded their respective AWQS in the three groundwater wells sampled by COT-ES near the Prudence Landfill (R-124A, R-125A, and WR-435A). The field forms and laboratory data analytical reports are provided in Appendix A.

Groundwater monitoring well R-124A located downgradient of waste at Prudence Landfill has detections of VOC's including bromodichloromethane at 1.3 $\mu\text{g/L}$, chloroform at 4.1 $\mu\text{g/L}$, dichlorodifluoromethane (DCFA) at 2.0 $\mu\text{g/L}$, PCE at 1.5 $\mu\text{g/L}$ and total trihalomethanes at 5.4 $\mu\text{g/L}$ (Table 3). VOCs were not detected at monitoring well R-125A, which is located upgradient of the majority of the waste at Prudence Landfill. Monitor well WR-435A, which is located downgradient of the Broadway South Landfill (Figure 2) had a detection of PCE at 1.7 $\mu\text{g/L}$. PCE concentrations appear to be generally stable at the site since 2009 (Figure 4).

2.2.2 Inorganic Analytical Groundwater Results

No inorganic compounds exceeded their respective AWQS values (Table 4). In R-125A, concentrations of alkalinity, total dissolved solids, sodium, magnesium, calcium, and barium appear to be on an increasing trend (see graphs in Appendix B). Concentrations of calcium also appear to be increasing in R-124A. The remaining parameters are stable or decreasing (Appendix B).

2.2.3 QA/QC Groundwater Results

Quality assurance/quality control (QA/QC) analyses for the 2013 sampling events included 1 duplicate sample analyses, 1 equipment blank, and 2 trip blanks. Analytical results for QA/QC samples are presented in the laboratory reports in Appendix A, and duplicate comparisons are summarized in a table provided in Appendix C.

No analytes were detected in any of the trip or equipment blanks.

The laboratory percent recoveries were within laboratory quality assurance objectives for accuracy, except for the data qualifiers listed in the case narratives presented in Appendix A. There were no significant data qualifiers or issues presented in the case narratives. All were within acceptable quality and would not affect data results.

The sample duplicate for R-124A was compared with the original sample analyses to evaluate the degree of laboratory and field precision. The relative percent differences (RPD) between the sample and its duplicate for all detected analytes were less than 30%, except for compounds bromide with an RPD of 46.2% and iron with an RPD of 137.8%. In reviewing the field sampling sheet in Appendix A, there was no indication of a cause for the large variability for these compounds (i.e. colored purge water, high turbidity, surging pump, and/or unstable parameters). There was also nothing of significance noted in the laboratory report and/or chain of custody. COT-ES is unable to identify a reason for this variability, but neither of these compounds has respective AWQs and are not site constituents of concern, therefore, COT-ES does not consider this to be a significant quality control issue. The remaining parameters are below the 30% RPD, with the highest RPD at 8.2%.

2.3 Soil Vapor Monitoring Protocol and Results

COT-ES monitors VOCs in soil-vapor to assess vadose zone conditions at the Prudence Landfill site. There are no regulatory standards for this data. Deep nested soil vapor probes were installed to measure possible impacts to groundwater from vapor phase VOCs migrating from the waste. The nested soil-vapor wells at R-124A, R-125A, and WR-434A were monitored for VOCs on December 2, 2013.

Prior to sampling, each probe was purged by a vacuum pump. The purge volume for each well was equivalent of three casing volumes of air. Landfill gas concentrations measured using the Landtec GEM 2000 Gas Analyzer and Extraction Monitor for the initial and final readings of methane, carbon dioxide, and oxygen. Appendix D contains field sampling forms, and Table 5 provides field parameter summary of final measurements for each probe. Soil vapor samples were collected in canisters, and submitted to Airtech Environmental Laboratories for VOCs analysis by EPA method TO-15. Appendix D contains the laboratory reports, and Table 4 provides a summary of select VOCs.

2.3.1 Soil Vapor Results

During 2013, the highest soil vapor PCE concentration was observed in WR-434A 350 ft bgs at 11.11 µg/L, and the highest TCE concentration was observed in the same probe at 1.144 µg/L. Tabulated summaries of soil vapor monitoring results are provided on Tables 4 and 5, and Figure 5 depicts soil vapor PCE concentrations versus time for probes at R-124A, R-125A, and WR-434A. TCE is not plotted since the trends closely follow those of PCE.

The maximum concentrations observed are low compared to the estimated Groundwater Protection Levels (GPLs) for the Prudence Landfill as established in 2008 by Hargis & Associates⁶. The table below compares maximum detected values in 2013 to the Prudence Landfill GPLs. The current PCE and TCE soil vapor concentrations are below the estimated GPLs, therefore, there is a low probability of soil vapor VOC impacts to groundwater above AWQSSs.

Compound	2011 Maximum Detected Concentrations (µg/L)	Prudence Landfill GPLs (µg/L)
PCE	11.1	70
TCE	1.144	27
Vinyl chloride	0.008	851
Cis-1,2 DCE	2.938	322

ND = not detected

During the sampling event, samplers noted significant ground settlement at R-124A but the groundwater well casing and nested soil vapor probes appeared to be undamaged. The ground settlement was likely due to refuse which R-124A is constructed through. The well's concrete pad was cracked into three large separate pieces (pictures provided in Appendix E). In January 2014, COT-ES initially tried using a sounder to verify total depth on soil vapor probes, but the sounder stopped at approximately 6 feet below ground surface at all probes. COT-ES staff attempt to push past the 6 foot blockage using a rebar was successful for 2 probes (57 ft and 355 ft), but re-tagging with a sounder found another blockage at approximately 21 ft for both. The rebar returned bentonite on the 250 foot probe after it stopped at 6.8 ft. COT-ES was concerned there was significant damage in the sub-surface to the well and moved forward with removing the dedicated submersible pump from the main 5 inch diameter well casing for video logging. The video log on January 21, 2014 completed by Well Scan showed the main 5 inch well casing of R-124A in satisfactory condition with no evidence of cracks or breaks (video log summary provided in Appendix E). In February 2014, the nested soil vapor probes were filled with concrete grout, and a new concrete pad was poured around the groundwater well casing. A new nested soil vapor probe set is proposed to be drilled near the former nested probe set (through trash) in 2014. VOC soil vapor data collected from the well in December 2013 is invalid due to atmospheric contamination.

2.3.2 Shallow Perimeter Landfill Gas Monitoring

In 2012-2013, shallow landfill gas probes PRUD-1 thru PRUD-20 were monitored quarterly in months January, April, July, and October. Methane was not detected during these events

⁶ EEC and Hargis + Associates, Inc. Soil Vapor Assessment at Los Reales, Prudence, Vincent Mullins, Irvington, Cottonwood, and Ryan Landfills, April 10, 2008

(Appendix F). The on-site gas extraction system operates daily except during the evening hours (3 pm to 9 pm) to prevent migration of methane to the neighboring properties. The probes will continue to be monitored quarterly.

3.0 CONCLUSIONS AND RECOMMENDATIONS

The following summarize the 2013 report:

- Since 2004, the city has monitored groundwater monitor wells R-124A and R-125A at Prudence Landfill. There have been no VOCs detected above regulatory standards during that time.
- Monitor well WR-435A, which is downgradient from both Prudence and Broadway South Landfills, has also been below AWQS for all constituents including PCE since 2001.
- A trend analysis of VOCs and inorganic data collected to date indicates that there are no impacts above regulatory standards to the groundwater from the Prudence Landfill.
- Groundwater flow direction towards the northwest in the Prudence Landfill area is consistent with historical. Groundwater elevations have been on a rising trend and have increased an average of 18 feet since 2005.
- Soil vapor concentrations are significantly below the estimated site specific GPLs.
- COT-ES will continue to monitor groundwater and deep soil vapor biennially at this site. The next event will be in 2015.
- No methane was detected in shallow probes and quarterly landfill gas perimeter monitoring will continue. COT ES will adjust the landfill gas extraction system as needed based on the results.
- COT-ES inspects and maintains this and other city owned landfills to correct problems such as wildcat dumping, erosion of soil cover, and vandalism of the wells. All groundwater and deep vapor monitoring wells at the landfill will be inspected and repaired as needed to ensure they are secure and in proper working order.
- Significant surface subsidence was found at monitor well R-124A. The main groundwater well casing was intact, but the deep nested soil vapor probes were damaged at 6 to 21 ft bgs. The deep nested probes were filled with concrete grout, the concrete well pad was reconstructed, and a new set of deep nested probes are proposed to be drilled in 2014.

FIGURES

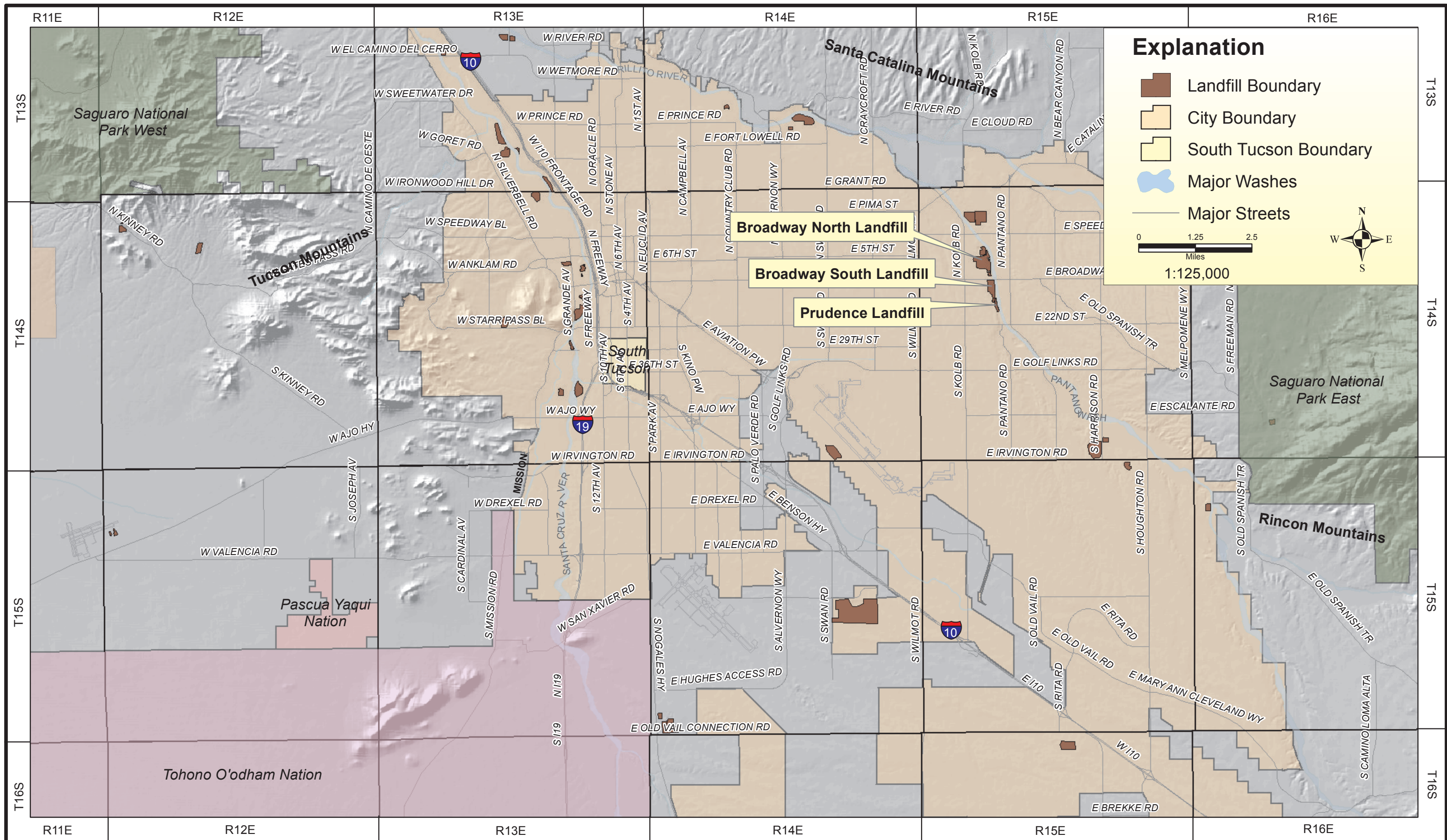


Figure 1
Prudence Landfill Location Map
Tucson, Arizona



Explanation

- Nested Deep Soil Vapor Well
- LFG Monitoring Probes
- Groundwater & Nested Vapor Probe Well
- LFG Extraction Wells
- Groundwater Monitor
- Inactive Production Well
- Production Well
- LFG Extraction Line
- Major Wash
- Landfill Boundary

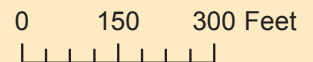
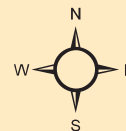


Figure 2
Site Map
Prudence Landfill

Drawn By:	LE
Checked:	MC
Approved:	NP
Date:	3/5/2014
File:	See Below

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Figure 3
Groundwater Elevation Trends
Prudence Landfill, Tucson Az

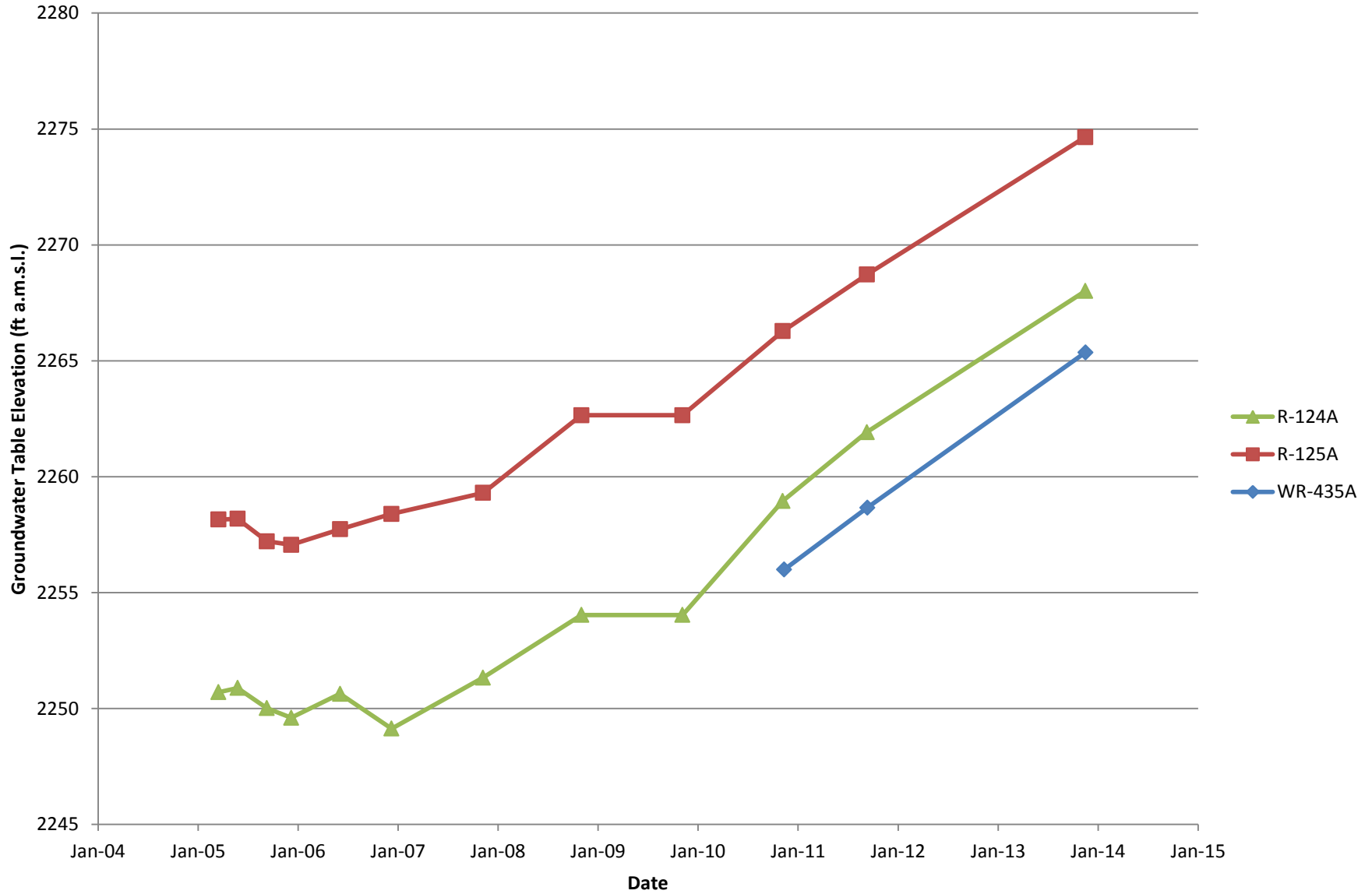
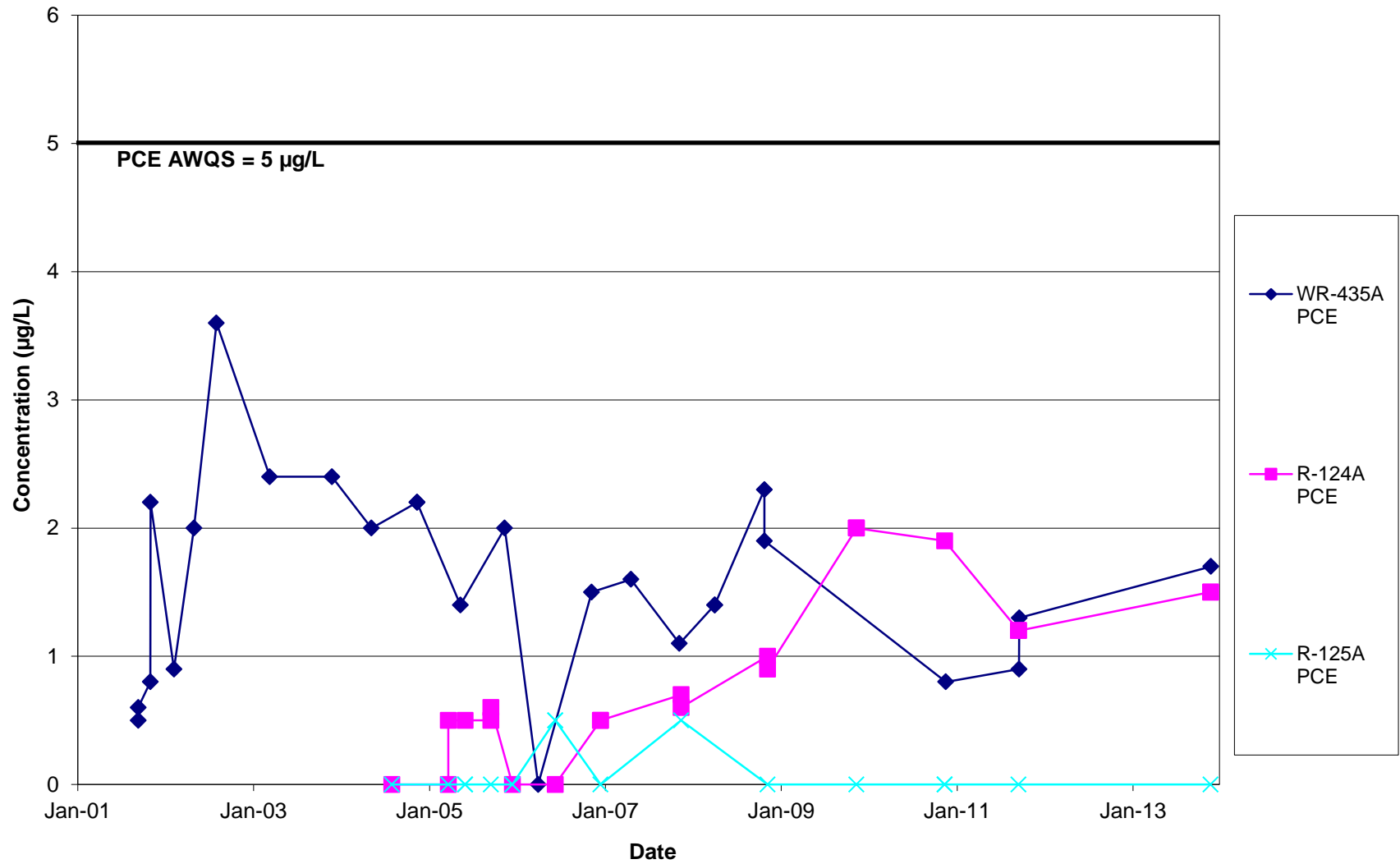
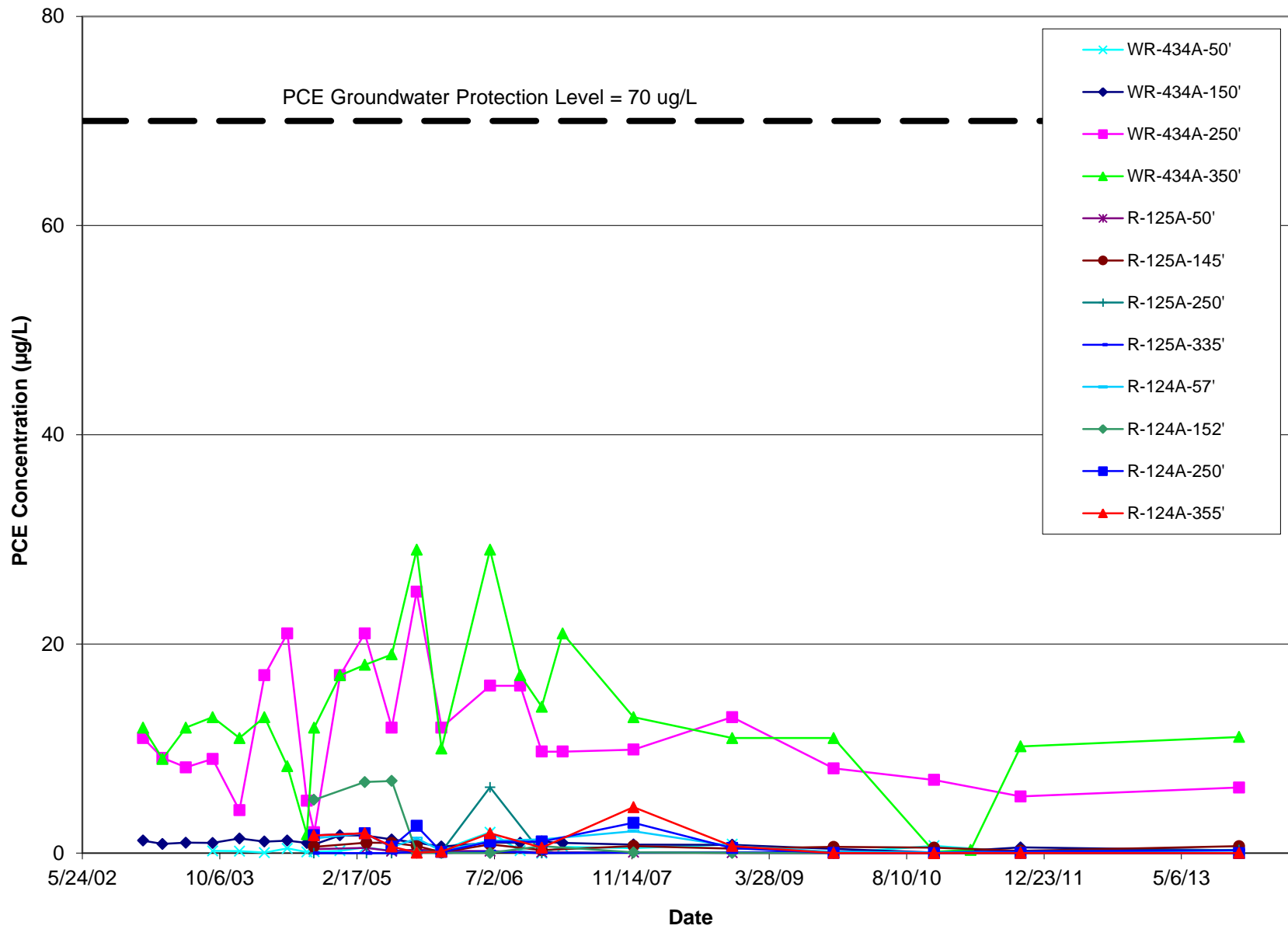


Figure 4
PCE Concentrations for Selected Groundwater Monitor Wells*
Prudence Landfill, Tucson Az



*All other wells are non-detect for PCE.

Figure 5
PCE Concentrations in Soil Vapor Monitoring Wells
Prudence Landfill, Tucson Az



TABLES

**Table 1
Well Information
Prudence Landfill**

Well Name	Vapor Probe Information			Groundwater Well Information			
	Vapor Probe Depth (ft bgs)	Probes Diameter (inches)	Probe Material	Well Depth (ft bgs)	Well Diameter (inches)	Screened Interval (ft bgs)	Casing Material
D-039A	<i>No vapor probes installed.</i>			435	12	193-435	Steel
D-040A	<i>No vapor probes installed.</i>			556	12	222-402	Steel
D-041A	<i>No vapor probes installed.</i>			702	10	410-556	Steel
	<i>No vapor probes installed.</i>				12	249-457	Steel
R-124A	50	0.5	SCH 40 PVC	410	5	370-410	SCH 80 PVC
	145	0.5	SCH 40 PVC				
	246	0.5	SCH 40 PVC				
	354.55	0.5	SCH 40 PVC				
R-125A	50	0.5	SCH 40 PVC	395	5	355-395	SCH 80 PVC
	140	0.5	SCH 40 PVC				
	250	0.5	SCH 40 PVC				
	335	0.5	SCH 40 PVC				
WR-434A	50	0.5	SCH 40 PVC	<i>No groundwater well installed.</i>			
	150	0.5	SCH 40 PVC	<i>No groundwater well installed.</i>			
	250	0.5	SCH 40 PVC	<i>No groundwater well installed.</i>			
	350	0.5	SCH 40 PVC	<i>No groundwater well installed.</i>			
WR-435A	<i>No vapor probes installed.</i>			420	5	330-420	SCH 80 PVC

ft bgs = feet below ground surface.

TABLE 2
GROUNDWATER MONITOR WELLS
CONCENTRATION OF SELECTED VOCs (ug/L)
PRUDENCE LANDFILL

Well Name	Notes	Date	<i>cis</i> -1,2-DCE	DCFA	MC	PCE	TCE	VC
D-039A	A	10/30/08	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
D-039A	A	11/12/07	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
D-039A	A	04/23/07	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0
D-039A	A	11/13/06	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0
D-039A		07/25/00	<0.5	0.7	<0.5	<0.5	<0.5	<0.5
D-039A	*	07/25/00	<0.5	0.8	<0.5	<0.5	<0.5	<0.5
D-039A		06/24/99	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5
D-039A	*	06/24/99	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5
D-040A	A	10/30/08	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
D-040A	A	11/12/07	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
D-040A	A	04/23/07	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0
D-040A	A	11/13/06	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0
D-040A		06/23/99	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5
D-041A		05/25/06	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
D-041A	*	05/25/06	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
D-041A		10/15/01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
D-041A		06/22/99	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5
R-124A		11/25/13	<0.5	2	<0.5	1.5	<0.5	<0.5
R-124A	*	11/25/13	<0.5	2	<0.5	1.5	<0.5	<0.5
R-124A		09/20/11	<0.5	2.1	<0.5	1.2	<0.5	<0.5
R-124A		09/20/11	<0.5	2	<0.5	1.2	<0.5	<0.5
R-124A		11/17/10	<0.5	2.6	<0.5	1.9	<0.5	<0.5
R-124A		11/16/09	<0.5	1.7	<0.5	2	<0.5	<0.5
R-124A	*	11/16/09	<0.5	2	<0.5	2	<0.5	<0.5
R-124A		11/12/08	<0.5	1.1	<0.5	0.9	<0.5	<0.5
R-124A	*	11/12/08	<0.5	1.1	<0.5	1	<0.5	<0.5
R-124A		11/19/07	<0.5	0.7	<0.5	0.6	<0.5	<0.5
R-124A		11/19/07	<0.5	0.8	<0.5	0.7	<0.5	<0.5
R-124A		12/20/06	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
R-124A		12/20/06	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
R-124A		06/15/06	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-124A		12/19/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-124A		09/21/05	<0.5	0.6	<0.5	0.6	<0.5	<0.5
R-124A	*	09/21/05	<0.5	0.5	<0.5	0.5	<0.5	<0.5
R-124A		06/06/05	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
R-124A		03/28/05	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
R-124A	*	03/28/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-124A	D	08/06/04	<0.5	<2.0	<3.0	<0.5	<0.5	<0.5

TABLE 2
GROUNDWATER MONITOR WELLS
CONCENTRATION OF SELECTED VOCs (ug/L)
PRUDENCE LANDFILL

Well Name	Notes	Date	<i>cis</i> -1,2-DCE	DCFA	MC	PCE	TCE	VC
R-125A		11/25/13	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		09/20/11	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		11/17/10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		11/17/10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		11/16/09	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		11/12/08	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		11/19/07	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
R-125A		12/20/06	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		06/15/06	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
R-125A	*	06/15/06	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
R-125A		12/19/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A	*	12/19/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		09/21/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		06/06/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A	*	06/06/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A		03/28/05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
R-125A	D	08/06/04	<0.5	<2.0	<3.0	<0.5	<0.5	<0.5
WR-435A		11/26/13	<0.5	0.5	<0.5	1.7	<0.5	<0.5
WR-435A	A	9/23/2011	<1.0	<4.0	<4.0	1.3	<1.0	<1.0
WR-435A		9/22/2011	<0.5	<0.5	<0.5	0.9	<0.5	<0.5
WR-435A		11/22/10	<0.5	<0.5	<0.5	0.8	<0.5	<0.5
WR-435A	A	10/30/08	<1.0	<5.0	<5.0	1.9	<1.0	<1.0
WR-435A	A*	10/30/08	<1.0	<5.0	<5.0	2.3	<1.0	<1.0
WR-435A	A	04/07/08	<1.0	<5.0	<5.0	1.4	<1.0	<1.0
WR-435A	A*	04/07/08	<1.0	<5.0	<5.0	1.4	<1.0	<1.0
WR-435A	A	11/12/07	<1.0	<5.0	<5.0	1.1	<1.0	<1.0
WR-435A	A	04/25/07	<1.0	2.4	<5.0	1.6	<1.0	<1.0
WR-435A	A	11/13/06	<1.0	2.5	<1.0	1.5	<1.0	<1.0
WR-435A	A	04/05/06	<1.0	1.5	<5.0	<1.0	<1.0	<1.0
WR-435A	A	11/17/05	<0.5	3	<3.0	2	<0.5	<0.5
WR-435A	A	05/17/05	<0.5	<2.0	<3.0	1.4	<0.5	<0.5
WR-435A	A	11/18/04	<0.5	2.3	<3.0	2.2	<0.5	<0.5
WR-435A	*	11/18/04	<0.5	2.4	<3.0	2.2	<0.5	<0.5
WR-435A	A	05/13/04	<0.5	3.7	<3.0	2.0	<0.5	<0.5
WR-435A	A	12/01/03	<0.5	3.3	<3.0	2.4	<0.5	<0.5
WR-435A		03/18/03	<0.5	1.7	<1.0	2.4	<0.5	<0.5
WR-435A		08/08/02	<0.5	1.9	<1.0	3.6	<0.5	<0.5

TABLE 2
GROUNDWATER MONITOR WELLS
CONCENTRATION OF SELECTED VOCs (ug/L)
PRUDENCE LANDFILL

Well Name	Notes	Date	<i>cis</i> -1,2-DCE	DCFA	MC	PCE	TCE	VC
WR-435A		05/07/02	<0.5	1.5	<1.0	2	<0.5	<0.5
WR-435A		02/13/02	<0.5	1	<1.0	0.9	<0.5	<0.5
WR-435A		11/07/01	<0.5	1.5	<1.0	2.2	<0.5	<0.5
WR-435A	*	11/07/01	<0.5	0.8	<1.0	0.8	<0.5	<0.5
WR-435A		09/18/01	<0.5	0.8	<0.5	0.6	<0.5	<0.5
WR-435A	*	09/18/01	<0.5	0.8	<0.5	0.5	<0.5	<0.5

* = Duplicate Sample

^D = Sample taken during well development

^A = Sample taken by ADEQ for Broadway-Pantano WQARF site

^B = Sample taken by grab method, bailer.

All Analysis performed by the Tucson Water Quality Laboratory

Parameters:

cis-1,2-DCE = cis-1,2-dichloroethene

DCFA = dichlorodifluoromethane

MC = methylene chloride

PCE = tetrachloroethene

TCE = trichloroethene

VC = vinyl chloride

TABLE 4
Vapor Probe Results - Selected VOCs
Prudence Landfill

Well	Date	Depth	PCE	TCE	cis-1,2-DCE	VC	TCFM	DCFM
WR-434A-50'	12/31/2002	50'	0.08	0.0034	ND	ND	0.0019	NA
WR-434A-50'	3/12/2003	50'	0.067	0.0022	ND	0.0022	ND	NA
WR-434A-50'	6/5/2003	50'	0.073	0.0025	ND	ND	ND	NA
WR-434A-50'	9/10/2003	50'	0.21	ND	ND	ND	ND	0.086
WR-434A-50'	12/17/2003	50'	0.19	0.010	ND	ND	ND	0.08
WR-434A-50'	3/17/2004	50'	0.051	0.0072	ND	ND	ND	0.036
WR-434A-50'	6/8/2004	50'	0.45	0.034	ND	ND	ND	0.3
WR-434A-50'	8/18/2004	50'	0.11	ND	ND	ND	ND	0.096
WR-434A-50'	9/14/2004	50'	0.13	ND	ND	0.025	ND	0.23
WR-434A-50'	12/17/2004	50'	0.23	0.0083	ND	ND	ND	0.1
WR-434A-50'	3/17/2005	50'	0.55	0.039	ND	ND	ND	0.042
WR-434A-50'	6/23/2005	50'	0.21	0.0066	ND	ND	ND	0.024
WR-434A-50'	9/22/2005	50'	0.23	0.0094	0.0072	ND	ND	0.048
WR-434A-50'	12/21/2005	50'	0.3	0.11	ND	ND	0.0074	0.15
WR-434A-50'	6/16/2006	50'	2	0.28	0.0072	ND	ND	0.16
WR-434A-50'	10/4/2006	50'	0.22	0.015	ND	ND	0.0032	ND
WR-434A-50'	12/21/2006	50'	0.0035	ND	ND	ND	ND	0.0033
WR-434A-50'	3/7/2007	50'	0.61	0.048	ND	ND	0.008	ND
WR-434A-50'	11/20/2007	50'	0.47	0.021	ND	ND	0.0063	0.14
WR-434A-50'	11/13/2008	50'	0.84	0.034	ND	ND	0.01	0.23
WR-434A-50'	11/17/2009	50'	0.012	ND	ND	ND	ND	0.017
WR-434A-50'	11/18/2010	50'	0.7	0.025	ND	ND	0.0079	0.18
WR-434A-50'	9/29/2011	50'	0.108	ND	ND	ND	ND	0.0218
WR-434A-50'	12/2/2013	50'	0.235	0.009	ND	ND	ND	0.064
WR-434A-150'	12/31/2002	150'	1.2	0.38	2.9	ND	ND	NA
WR-434A-150'	3/12/2003	150'	0.88	0.28	2.2	0.066	ND	NA
WR-434A-150'	6/5/2003	150'	1.0	0.33	2.3	0.041	ND	NA
WR-434A-150'	9/10/2003	150'	0.97	0.24	2.0	0.029	ND	0.19
WR-434A-150'	12/17/2003	150'	1.4	0.37	3.9	ND	ND	0.31
WR-434A-150'	3/17/2004	150'	1.1	0.26	2.4	0.047	ND	0.3
WR-434A-150'	6/8/2004	150'	1.2	0.38	3.5	ND	ND	0.33
WR-434A-150'	8/18/2004	150'	0.97	0.24	2.0	0.081	ND	0.25
WR-434A-150'	9/14/2004	150'	0.83	0.22	1.8	0.065	ND	0.25
WR-434A-150'	12/17/2004	150'	1.7	0.39	3.6	ND	ND	0.4
WR-434A-150'	3/17/2005	150'	1.7	0.38	3.2	ND	ND	0.46
WR-434A-150'	6/23/2005	150'	1.3	0.26	2.4	ND	ND	0.28
WR-434A-150'	9/22/2005	150'	1.0	0.21	1.5	ND	ND	0.26
WR-434A-150'	12/21/2005	150'	0.6	0.12	0.76	ND	ND	0.18
WR-434A-150'	6/16/2006	150'	1.0	0.66	0.72	ND	ND	0.19
WR-434A-150'	10/4/2006	150'	1.0	0.16	0.64	ND	ND	ND
WR-434A-150'	12/21/2006	150'	1.1	0.1	0.17	ND	ND	0.27
WR-434A-150'	3/7/2007	150'	1.0	0.083	0.1	ND	ND	ND
WR-434A-150'	11/20/2007	150'	0.8	0.057	0.022	ND	ND	0.28
WR-434A-150'	11/13/2008	150'	0.8	0.03	0.01	ND	ND	0.18
WR-434A-150'	11/17/2009	150'	0.4	0.016	0.0044	ND	ND	0.12
WR-434A-150'	11/18/2010	150'	0.047	0.002	0.0019	ND	ND	0.0086
WR-434A-150'	9/29/2011	150'	0.549	0.0188	ND	ND	ND	0.0594
WR-434A-150'	12/2/2013	150'	0.277	0.013	0.006	ND	ND	0.038

TABLE 4
Vapor Probe Results - Selected VOCs
Prudence Landfill

Well	Date	Depth	PCE	TCE	cis-1,2-DCE	VC	TCFM	DCFM
WR-434A-250'	12/31/2002	250'	11	1.8	0.78	0.03	0.25	NA
WR-434A-250'	3/12/2003	250'	9.1	1.2	0.56	ND	0.23	NA
WR-434A-250'	6/5/2003	250'	8.2	1.3	0.56	ND	0.1	NA
WR-434A-250'	9/10/2003	250'	9.0	1.9	0.92	0.034	0.14	4.0
WR-434A-250'	12/17/2003	250'	4.1	0.83	0.52	0.031	ND	0.22
WR-434A-250'	3/17/2004	250'	17	2.5	1.4	0.034	0.26	4.4
WR-434A-250'	6/8/2004	250'	21	3.3	1.1	ND	0.55	8.0
WR-434A-250'	8/18/2004	250'	5.0	0.61	0.24	0.029	0.074	1.3
WR-434A-250'	9/14/2004	250'	2	0.33	0.26	ND	ND	0.25
WR-434A-250'	12/17/2004	250'	17	2.7	1.8	ND	ND	4.0
WR-434A-250'	3/17/2005	250'	21	3.5	2.5	ND	0.26	6.0
WR-434A-250'	6/23/2005	250'	12	1.9	1.4	ND	ND	3.1
WR-434A-250'	9/22/2005	250'	25	3.4	2.8	ND	0.24	4.9
WR-434A-250'	12/21/2005	250'	12	1.4	1.2	0.029	0.17	2.5
WR-434A-250'	6/16/2006	250'	16	5.3	3.9	ND	0.35	7
WR-434A-250'	10/4/2006	250'	16	3.3	3.1	ND	0.24	4.4
WR-434A-250'	12/21/2006	250'	9.7	1.6	0.8	ND	ND	1.4
WR-434A-250'	3/7/2007	250'	9.7	3.3	3	ND	0.34	4.2
WR-434A-250'	11/20/2007	250'	9.9	1.9	1.9	ND	ND	2.8
WR-434A-250'	11/13/2008	250'	13	1.6	1.8	ND	0.11	2.6
WR-434A-250'	11/17/2009	250'	8.1	1.4	2.3	ND	0.092	2.2
WR-434A-250'	11/18/2010	250'	7	1.5	2.8	ND	0.11	2.4
WR-434A-250'	9/29/2011	250'	5.42	1.56	3.96	ND	0.0843	2.18
WR-434A-250'	12/2/2013	250'	6.27	1.03	2.938	ND	0.09	1.83
WR-434A-350'	12/31/2002	350'	12	1.2	0.34	0.17	0.93	NA
WR-434A-350'	3/12/2003	350'	9.0	0.42	ND	0.19	1.1	NA
WR-434A-350'	6/5/2003	350'	12	1.2	0.31	0.086	0.73	NA
WR-434A-350'	9/10/2003	350'	13	1.4	0.48	0.10	0.47	10
WR-434A-350'	12/17/2003	350'	11	1.3	0.52	0.17	0.97	18
WR-434A-350'	3/17/2004	350'	13	2.3	1.0	0.073	0.74	10
WR-434A-350'	6/8/2004	350'	8.3	0.42	ND	ND	1.3	20
WR-434A-350'	8/18/2004	350'	1.8	0.16	0.052	ND	0.063	1.2
WR-434A-350'	9/14/2004	350'	12	0.88	0.28	0.12	0.46	8
WR-434A-350'	12/17/2004	350'	17	0.88	0.048	ND	1.1	18
WR-434A-350'	3/17/2005	350'	18	0.83	ND	ND	1.5	35
WR-434A-350'	6/23/2005	350'	19	0.83	ND	ND	1.5	28
WR-434A-350'	9/22/2005	350'	29	0.88	0.044	ND	1.0	20
WR-434A-350'	12/21/2005	350'	10	1.5	1.0	0.055	0.52	7.5
WR-434A-350'	6/16/2006	350'	29	3.5	0.5	ND	1.60	33
WR-434A-350'	10/4/2006	350'	17	1.4	0.1	ND	1.30	19
WR-434A-350'	12/21/2006	350'	14	0.66	ND	ND	0.91	ND
WR-434A-350'	3/7/2007	350'	21	1.1	ND	ND	1.70	28
WR-434A-350'	11/20/2007	350'	13	0.74	ND	ND	1.10	20
WR-434A-350'	11/13/2008	350'	11	0.63	ND	ND	0.90	22
WR-434A-350'	11/17/2009	350'	11	0.74	0.032	ND	0.82	18
WR-434A-350'	11/18/2010	350'	0.12	0.005	ND	ND	0.0024	0.009
WR-434A-350'	3/31/2011	350'	0.302	0.0097	ND	ND	ND	0.0183
WR-434A-350'	9/29/2011	350'	10.2	0.75	ND	ND	0.843	14.9
WR-434A-350'	12/2/2013	350'	11.11	1.144	0.054	ND	1.078	21.11

TABLE 4
Vapor Probe Results - Selected VOCs
Prudence Landfill

Well	Date	Depth	PCE	TCE	cis-1,2-DCE	VC	TCFM	DCFM
R-125A-50'	9/13/2004	50'	0.39	ND	ND	ND	0.13	2.5
R-125A-50'	3/23/2005	50'	0.5	ND	ND	ND	0.16	3.1
R-125A-50'	6/23/2005	50'	0.19	ND	ND	ND	ND	1.3
R-125A-50'	9/22/2005	50'	0.34	ND	ND	ND	0.11	2.2
R-125A-50'	12/21/2005	50'	0.21	ND	0.072	ND	ND	0.86
R-125A-50'	6/16/2006	50'	0.19	ND	ND	ND	ND	1.2
R-125A-50'	12/21/2006	50'	0.083	ND	ND	ND	ND	0.8
R-125A-50'	11/20/2007	50'	0.08	0.0093	ND	0.0062	0.019	1
R-125A-50'	11/13/2008	50'	0.038	ND	ND	ND	ND	0.42
R-125A-50'	11/17/2009	50'	ND	ND	ND	ND	ND	0.16
R-125A-50'	11/18/2010	50'	0.018	ND	ND	0.015	ND	0.16
R-125A-50'	9/29/2011	50'	0.0183	ND	ND	ND	ND	0.119
R-125A-50'	12/2/2013	50'	ND	ND	ND	ND	ND	0.132
R-125A-145'	9/13/2004	145'	0.61	ND	ND	0.029	0.57	4.9
R-125A-145'	3/23/2005	145'	1.0	0.061	ND	ND	0.91	9.1
R-125A-145'	6/23/2005	145'	1.0	ND	ND	ND	0.74	8.0
R-125A-145'	9/22/2005	145'	0.69	0.061	ND	ND	0.63	11
R-125A-145'	12/21/2005	145'	0.069	0.16	0.11	ND	0.51	3.7
R-125A-145'	6/16/2006	145'	0.83	ND	ND	ND	0.68	6
R-125A-145'	12/21/2006	145'	0.28	ND	ND	ND	0.21	2.9
R-125A-145'	11/20/2007	145'	0.67	0.064	0.027	0.014	0.62	5.9
R-125A-145'	11/13/2008	145'	0.44	0.042	0.02	0.0097	0.35	4.7
R-125A-145'	11/17/2009	145'	0.59	0.028	0.016	0.0068	0.39	3.7
R-125A-145'	11/18/2010	145'	0.52	0.029	0.019	0.0064	0.39	4.2
R-125A-145'	9/29/2011	145'	0.224	ND	ND	ND	0.18	2.52
R-125A-145'	12/2/2013	145'	0.66	0.017	0.012	ND	0.369	4.326
R-125A-250'	9/13/2004	250'	ND	ND	ND	0.034	0.41	3.6
R-125A-250'	3/23/2005	250'	ND	ND	ND	0.14	0.50	7.5
R-125A-250'	6/23/2005	250'	ND	ND	ND	ND	0.80	10
R-125A-250'	9/22/2005	250'	0.12	ND	ND	ND	0.97	16
R-125A-250'	12/21/2005	250'	0.14	ND	ND	ND	0.57	13
R-125A-250'	6/16/2006	250'	6.3	3.8	0.6	ND	0.74	9.6
R-125A-250'	12/21/2006	250'	ND	ND	ND	ND	0.34	6
R-125A-250'	11/20/2007	250'	0.048	ND	ND	ND	0.3	3.9
R-125A-250'	11/13/2008	250'	0.057	ND	ND	0.0047	0.45	5.4
R-125A-250'	11/17/2009	250'	0.13	ND	ND	ND	0.51	7.3
R-125A-250'	11/18/2010	250'	0.065	ND	ND	ND	0.28	3.1
R-125A-250'	9/29/2011	250'	0.176	ND	ND	ND	0.899	10.4
R-125A-250'	12/2/2013	250'	0.303	ND	0.005	0.003	1.036	14.29
R-125A-335'	9/13/2004	335'	ND	ND	ND	0.055	0.2	2.8
R-125A-335'	3/23/2005	335'	ND	ND	ND	0.031	0.49	10
R-125A-335'	6/23/2005	335'	ND	ND	ND	ND	0.8	11
R-125A-335'	9/22/2005	335'	0.12	ND	ND	ND	0.91	15
R-125A-335'	12/21/2005	335'	ND	ND	ND	ND	0.5	5
R-125A-335'	6/16/2006	335'	0.17	ND	ND	ND	0.39	3.9
R-125A-335'	12/21/2006	335'	ND	ND	ND	ND	0.097	1.8
R-125A-335'	11/20/2007	335'	0.046	ND	ND	0.0065	0.29	4
R-125A-335'	11/13/2008	335'	0.053	ND	ND	0.0055	0.35	4
R-125A-335'	11/17/2009	335'	0.13	ND	ND	ND	0.47	6.7
R-125A-335'	11/18/2010	335'	0.082	ND	ND	0.0051	0.42	4.7
R-125A-335'	9/29/2011	335'	0.176	ND	ND	ND	0.843	9.9
R-125A-335'	12/2/2013	335'	0.272	ND	ND	0.008	1.121	12.84

TABLE 4
Vapor Probe Results - Selected VOCs
Prudence Landfill

Well	Date	Depth	PCE	TCE	cis-1,2-DCE	VC	TCFM	DCFM
R-124A-57'	9/13/2004	57'	1.4	0.15	0.92	ND	0.057	2.2
R-124A-57'	3/17/2005	57'	1.9	0.31	1.8	0.036	ND	2.0
R-124A-57'	6/23/2005	57'	0.57	0.23	1.5	0.047	ND	0.65
R-124A-57'	9/22/2005	57'	1.4	0.19	1.1	0.036	ND	2.0
R-124A-57'	12/21/2005	57'	0.21	ND	0.048	ND	ND	0.7
R-124A-57'	6/16/2006	57'	1.2	0.2	0.84	0.031	ND	0.2
R-124A-57'	12/21/2006	57'	1.3	0.32	1.3	0.055	ND	1.9
R-124A-57'	11/20/2007	57'	2.1	0.39	0.88	ND	0.095	2.6
R-124A-57'	11/13/2008	57'	0.68	0.43	0.84	ND	ND	1.2
R-124A-57'	11/17/2009	57'	0.12	ND	ND	ND	0.0053	0.1
R-124A-57'	11/18/2010	57'	0.05	ND	0.24	ND	ND	0.18
R-124A-57'	9/29/2011	57'	0.0305	ND	ND	ND	0.124	0.0089
R-124A-57'	12/2/2013	57'	ND	ND	ND	ND	0.177	0.0130
R-124A-152'	9/13/2004	152'	5.1	0.77	1.6	0.055	0.11	2.1
R-124A-152'	3/17/2005	152'	6.8	1.1	2.9	0.049	0.17	3.2
R-124A-152'	6/23/2005	152'	6.9	1.2	4	ND	ND	2.9
R-124A-152'	9/22/2005	152'	0.041	ND	ND	ND	0.043	ND
R-124A-152'	12/21/2005	152'	0.021	ND	ND	ND	0.016	0.012
R-124A-152'	6/16/2006	152'	0.017	ND	ND	ND	0.022	0.022
R-124A-152'	12/21/2006	152'	0.68	0.029	0.013	ND	0.01	0.06
R-124A-152'	11/20/2007	152'	0.066	ND	ND	ND	0.005	0.005
R-124A-152'	11/13/2008	152'	0.021	ND	ND	ND	0.0039	0.012
R-124A-152'	11/17/2009	152'	ND	ND	ND	ND	ND	ND
R-124A-152'	11/18/2010	152'	ND	ND	ND	ND	0.015	0.0027
R-124A-152'	9/29/2011	152'	ND	0.0081	ND	ND	ND	ND
R-124A-152'	12/2/2013	152'	ND	ND	ND	ND	0.168	0.013
R-124A-250'	9/13/2004	250'	1.7	0.19	1.1	ND	0.063	2.8
R-124A-250'	3/17/2005	250'	1.9	0.32	1.8	0.036	ND	2.1
R-124A-250'	6/23/2005	250'	0.61	0.23	1.5	0.049	ND	0.65
R-124A-250'	9/22/2005	250'	2.6	0.27	1.5	0.047	0.12	3.6
R-124A-250'	12/21/2005	250'	0.1	0.94	ND	ND	ND	0.36
R-124A-250'	6/16/2006	250'	1.1	0.18	0.8	ND	ND	1.3
R-124A-250'	12/21/2006	250'	1.1	0.28	0.92	0.036	ND	ND
R-124A-250'	11/20/2007	250'	2.9	0.45	1.1	ND	0.15	3.9
R-124A-250'	11/13/2008	250'	0.48	0.27	0.47	ND	ND	0.71
R-124A-250'	11/17/2009	250'	0.007	ND	ND	ND	0.0072	ND
R-124A-250'	11/18/2010	250'	0.0039	ND	ND	ND	0.037	0.0031
R-124A-250'	9/29/2011	250'	0.0217	ND	ND	ND	0.112	0.0054
R-124A-250'	12/2/2013	250'	ND	ND	ND	ND	0.167	0.013

TABLE 4
Vapor Probe Results - Selected VOCs
Prudence Landfill

Well	Date	Depth	PCE	TCE	cis-1,2-DCE	VC	TCFM	DCFM
R-124A-355'	9/13/2004	355'	1.7	0.17	0.96	ND	0.074	2.3
R-124A-355'	3/17/2005	355'	1.9	0.33	1.8	0.034	ND	2.1
R-124A-355'	6/23/2005	355'	0.63	0.24	1.6	0.052	ND	0.75
R-124A-355'	9/22/2005	355'	0.042	ND	0.019	ND	ND	0.014
R-124A-355'	12/21/2005	355'	0.14	ND	0.015	ND	ND	0.4
R-124A-355'	6/16/2006	355'	1.9	0.29	1.3	0.039	0.047	0.91
R-124A-355'	12/21/2006	355'	0.52	0.13	0.48	0.02	ND	0.7
R-124A-355'	11/20/2007	355'	4.4	0.79	1.9	ND	0.23	5.9
R-124A-355'	11/13/2008	355'	0.67	0.4	0.75	ND	ND	1.1
R-124A-355'	11/17/2009	355'	0.0052	ND	ND	ND	0.0045	0.0023
R-124A-355'	11/18/2010	355'	0.0041	ND	ND	ND	0.041	0.003
R-124A-355'	9/29/2011	355'	0.0163	ND	ND	ND	0.0517	0.005
R-124A-355'	12/2/2013	355'	0.007	ND	ND	ND	0.187	0.014

ND = not detected at laboratory practical quantification level

NA = not analyzed

PCE = tetrachloroethene

TCE = trichloroethene

cis-1,2-DCE = cis-1,2-dichloroethene

TCFM = trichlorofluoromethane

VC = Vinyl Chloride

DCFM = dichlorofluoromethane

All samples analyzed using Method TO-15

All concentrations reported in ug/L

TABLE 5
SOIL-VAPOR MONITOR WELLS
FIELD MEASUREMENTS OF METHANE, CARBON DIOXIDE, AND OXYGEN
PRUDENCE LANDFILL

Well Name	Date	Depth (ft)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)
WR-434A	12/2/2013	50	0.0	3.9	16.4
		150	0.0	8.1	11.6
		250	1.1	5.3	14.8
		350	0.7	0.5	16.1
	9/29/2011	50	0.0	2.2	18.5
		150	0.0	6.2	14.6
		250	0.3	3.4	17.2
		350	0.3	0.5	17.9
	3/31/2011	350	2.0	2.7	0.0
	11/18/2010	50	0.0	17.6	13.3
		150	0.0	0.1	20.2
		250	1.3	13.1	6.9
		350	1.4	1.8	5.9
	11/17/2009	50	0.0	2.7	11.4
		150	0.0	21.3	0.3
		250	2.4	21.2	0.0
		350	2.2	3.5	0.0
	11/13/2008	50	0.0	15.5	5.2
		150	0.0	21.7	0.0
		250	3.1	20.8	0.0
		350	2.2	3.0	0.0
	11/20/2007	50	0.7	11.1	5.8
		150	1.6	22.0	0.0
		250	0.0	19.9	0.0
		350	0.1	2.5	0.0
	3/7/2007	50	0.0	14.4	3.9
		150	0.0	22.5	0.0
		250	3.3	20.6	0.1
		350	2.1	2.7	0.0
	12/21/2006	50	0.0	0.1	21.1
		150	0.0	22.6	0.0
		250	3.0	18.3	2.7
		350	2.3	3.3	0.4
	10/4/2006	50	0.1	13.2	5.0
		150	0.1	22.1	0.3
		250	3.5	20.4	0.3
		350	2.4	2.9	0.4
	6/18/2006	50	0.0	14.2	16.4
		150	0.0	22.5	0.2
		250	3.1	19.6	0.3
		350	2.0	2.2	0.3
	12/31/2005	50	0.0	17.8	3.3
		150	0.9	20.4	0.2
		250	0.1	17.7	2.9
		350	2.5	4.7	0.1

TABLE 5
SOIL-VAPOR MONITOR WELLS
FIELD MEASUREMENTS OF METHANE, CARBON DIOXIDE, AND OXYGEN
PRUDENCE LANDFILL

Well Name	Date	Depth (ft)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)
WR-434A (con't)	12/21/2005	50	0.0	12.4	9.1
		150	0.0	21.9	0.1
		250	3.3	18.8	1.5
		350	2.9	11.7	0.7
	9/22/2005	50	0.0	14.4	6.3
		150	0.2	22.9	0.4
		250	4.0	20.9	0.3
		350	2.8	3.0	0.4
	6/23/2005	50	0.0	12.4	8.4
		150	0.3	22.0	0.0
		250	3.9	20.0	0.1
		350	2.5	2.9	0.0
	3/17/2005	50	0.0	13.4	8.0
		150	0.4	22.6	0.5
		250	3.8	19.9	0.4
		350	2.0	2.1	0.5
	12/17/2004	50	0.0	13.0	9.2
		150	0.5	22.3	0.0
		250	4.0	20.0	0.0
		350	2.3	3.1	0.0
	9/14/2004	50	0.0	16.0	7.2
		150	0.2	23.0	0.0
		250	0.0	15.0	6.7
		350	2.6	12.0	0.0
	6/8/2004	50	0.0	17.0	4.7
		150	0.8	24.0	0.0
		250	4.1	14.0	0.0
		350	2.1	1.5	0.0
	3/17/2004	50	0.0	17.0	4.1
		150	0.5	23.0	0.0
		250	4.2	20.0	0.0
		350	3.6	14.0	0.0
	12/17/2003	50	0.1	16.1	5.3
		150	0.8	23.1	0.0
		250	0.1	16.8	3.5
		350	1.8	8.9	0.9
	9/10/2003	50	0.0	17.0	3.0
		150	1.4	23.0	0.6
		250	2.1	18.0	1.5
		350	2.5	11.0	0.7

TABLE 5
SOIL-VAPOR MONITOR WELLS
FIELD MEASUREMENTS OF METHANE, CARBON DIOXIDE, AND OXYGEN
PRUDENCE LANDFILL

Well Name	Date	Depth (ft)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)
WR-434A	6/5/2003	50	0.0	16.8	2.0
(con't)		150	0.8	19.9	0.4
		250	0.0	16.5	4.2
		350	2.3	7.2	0.5
	3/12/2003	50	0.0	12.0	2.5
		150	1.2	19.0	0.7
		250	0.9	14.0	4.2
		350	2.7	6.2	0.1
	9/3/2002	50	0.0	17.7	2.4
		150	1.1	20.7	0.3
		250	3.6	15.5	1.4
		350	1.8	3.7	0.2
	6/17/2002	50	0.0	18.5	1.9
		150	1.0	18.5	0.3
		250	3.0	14.8	2.0
		350	1.3	6.3	0.6
	3/5/2002	50	0.0	20.1	1.0
		150	0.9	18.2	0.0
		250	2.3	15.8	0.7
		350	0.3	5.6	3.4
	12/10/2001	50	0.0	19.6	0.1
		150	1.1	23.2	0.0
		250	3.9	14.2	0.0
		350	0.2	1.7	5.2
	11/26/2001	50	0.0	20.1	0.1
		150	1.0	23.3	0.0
		250	4.4	17.7	0.0
		350	0.4	0.9	9.5
	11/19/2001	50	0.0	20.3	0.2
		150	1.2	23.2	0.0
		250	1.3	6.0	13.5
		350	1.0	2.1	12.5
	11/8/2001	50	0.0	20.0	0.2
		150	1.1	23.1	0.1
		250	4.5	18.0	0.0
		350	0.9	0.8	12.9
	11/1/2001	50	0.0	19.5	0.2
		150	1.2	22.8	0.2
		250	4.2	15.9	0.1
		350	0.1	0.0	18.0

TABLE 5
SOIL-VAPOR MONITOR WELLS
FIELD MEASUREMENTS OF METHANE, CARBON DIOXIDE, AND OXYGEN
PRUDENCE LANDFILL

Well Name	Date	Depth (ft)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)
R-124A	12/2/2013	57	0.0	5.5	13.8
		152	0.0	0.7	18.6
		250	0.6	5.1	14.7
		355	1.7	3.7	16.8
	9/29/2011	57	0.0	6.1	14.0
		152	0.0	0.1	19.8
		250	0.0	4.3	15.8
		355	0.0	2.1	18.0
	11/18/2010	57	2.4	11.5	9.6
		152	0.0	0.2	19.5
		250	0.0	1.9	17.1
		355	0.0	2.2	16.6
	11/17/2009	57	0.0	8.2	9.9
		152	0.0	0.1	19.5
		250	0.0	2.0	17.3
		355	0.0	1.2	18.3
	11/13/2008	57	3.7	21.5	0.2
		152	0.0	0.8	19.8
		250	2.5	18.3	4.2
		355	3.5	21.7	0.0
	11/20/2007	57	5.4	20.6	0.0
		152	0.4	0.5	19.1
		250	4.7	21.1	0.0
		355	4.6	21.4	0.1
	12/21/2006	57	7.7	23.6	0.1
		152	0.0	2.1	18.0
		250	7.8	24.1	0.0
		355	7.8	23.6	0.5
	6/16/2006	57	7.9	23.1	0.2
		152	0.0	0.7	19.2
		250	7.8	23.1	0.1
		355	7.6	23.0	0.1
	12/21/2005	57	5.0	20.7	0.6
		152	0.0	0.5	20.3
		250	2.1	11.8	7.7
		355	1.3	8.4	11.1
	9/22/2005	57	8.8	22.8	0.3
		152	0.0	1.5	18.8
		250	3.3	22.1	0.4
		355	0.0	0.3	20.1
	6/23/2005	57	11.9	24.8	0.4
		152	5.9	20.0	0.4
		250	11.7	24.4	0.1
		355	11.7	24.4	0.3

TABLE 5
SOIL-VAPOR MONITOR WELLS
FIELD MEASUREMENTS OF METHANE, CARBON DIOXIDE, AND OXYGEN
PRUDENCE LANDFILL

Well Name	Date	Depth (ft)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)
R-124A	3/17/2005	57	7.8	23.0	0.4
(con't)		152	5.1	20.1	0.4
		250	7.2	22.7	0.4
		355	7.2	22.7	0.4
R-125A	12/2/2013	50	1.4	5.7	13.0
		145	0.6	4.9	10.0
		250	0.0	2.3	11.8
		335	0.0	0.0	18.9
	9/29/2011	50	0.8	7.3	12.6
		145	0.2	6.6	10.9
		250	0.0	1.4	13.8
		335	0.0	0.0	19.1
	11/18/2010	50	2.5	12.2	8.0
		145	0.2	7.8	9.2
		250	0.0	0.1	19.9
		335	0.0	0.1	19.5
	11/17/2009	50	4.8	21.3	0.0
		145	0.3	14.2	0.0
		250	0.0	3.7	2.6
		335	0.0	3.8	1.9
	11/13/2008	50	4.2	19.9	0.0
		145	0.0	13.7	0.0
		250	0.0	1.6	9.6
		335	0.0	1.4	12.3
	11/20/2007	50	4.1	20.1	0.2
		145	0.6	13.9	0.1
		250	0.5	1.1	11.1
		335	0.4	0.8	12.1
	12/21/2006	50	7.9	22.8	0.0
		145	0.3	14.5	0.0
		250	0.0	2.1	4.8
		335	0.0	1.8	5.3
	6/16/2006	50	4.4	19.2	0.0
		145	0.5	7.7	0.0
		250	0.1	1.4	6.9
		335	0.0	0.7	9.4
	12/21/2005	55	3.3	19.8	0.3
		145	0.6	13.2	0.2
		255	0.0	2.8	3.2
		335	0.0	1.3	2.5
	9/22/2005	55	0.7	18.1	0.4
		145	0.7	18.2	0.4
		255	0.0	2.4	3.0
		335	0.0	1.5	4.9

TABLE 5
 SOIL-VAPOR MONITOR WELLS
 FIELD MEASUREMENTS OF METHANE, CARBON DIOXIDE, AND OXYGEN
 PRUDENCE LANDFILL

Well Name	Date	Depth (ft)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)
R-125A	6/23/2005	55	0.9	17.9	0.6
(con't)		145	0.7	12.7	0.5
		255	0.0	2.0	4.0
		335	0.0	1.8	4.1
	3/23/2005	55	0.1	17.8	0.1
		145	0.7	11.3	0.0
		255	0.1	1.1	8.0
		335	0.0	0.7	8.7

All measurements collected by COT-ES with Landtec Gas Analyzer