

**ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION  
REPORT**

**ASH LANDFILL GROUNDWATER MONITORING WELLS  
SPRINGERVILLE GENERATING STATION  
SPRINGERVILLE, ARIZONA**

Prepared for

TUCSON ELECTRIC POWER COMPANY

January 30, 2019

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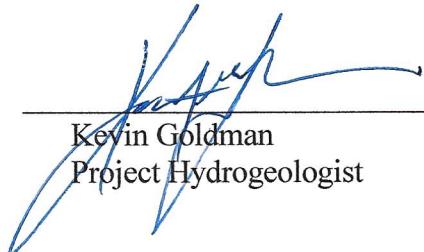
Project No. 1062.07



**Annual Groundwater Monitoring and Corrective Action Report  
Ash Landfill Groundwater Monitoring Wells  
Springerville Generating Station  
Tucson Electric Power Company  
Springerville, Arizona**

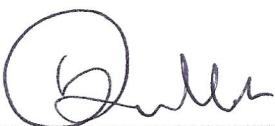
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# **1 INTRODUCTION**

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## **1.1 Purpose and Content**

AMTECH Associates L.L.C. (AMTECH) has prepared this 2018 Annual Groundwater Monitoring and Corrective Action Report (2018 Annual Groundwater Report) on behalf of Tucson Electric Power Company (TEP) to comply with the Coal Combustion Residuals (CCR) Rule. The CCR Rules are codified under Title 40 of the US Code of Federal Regulations (40 CFR), Parts 257 and 261. The Springerville Generating Station (SGS, or Facility) is an electric generating facility with an existing ash disposal landfill that is defined as an “Existing CCR landfill,” under 40 CFR §257.53.

### **1.1.1 Annual Report Requirements (§257.90(e))**

To comply with 40 CFR §257.90(e), the owner or operator of an existing CCR landfill must prepare an annual report for the preceding calendar year to document the status of groundwater monitoring and summarize key actions completed. This Report also describes problem(s) encountered in relation to the groundwater monitoring program, actions taken to resolve the problems, and project key activities for the upcoming year.

To comply with these requirements, at a minimum, this Report contains the following information for the 2018 calendar year, to the extent available:

- CCR unit and CCR monitoring wells map;
- Identification of installed CCR monitoring wells;
- Summary of groundwater monitoring data;
- A narrative discussion of any transition between monitoring programs; and
- Other information specified in 40 CFR §257.90 through 40 CFR §257.98.

## **1.2 Facility Description**

The TEP SGS is located approximately 15 miles northeast of Springerville, in Apache County, Arizona and has been in operation since 1985. The SGS is a four-unit, pulverized coal-fired, steam electric generating facility that has a combined net generating output of approximately 1,600 megawatts.

The SGS site occupies 15,777 acres, which includes the power plant area, ash landfill area and the east and west well fields. The power plant area of SGS is located in Sections 27, 28, 33, and 34, of Township 11 North, Range 30 East of the Salt and Gila River Baseline and Meridian, northeast of the Ash Landfill.

The Ash Landfill is primarily used for the disposal of fly and bottom ash, products of the coal-fired units at the plant. A delineated portion of the Ash Landfill is also used for the disposal of other items in lesser quantities (e.g., various process wastes and other inert and non-hazardous materials).

### **1.3 Project Background**

Initial groundwater quality conditions were determined following the minimum required eight (8) groundwater samples from each well in the monitoring network, in accordance with 40 CFR §257.94(b). These results were used to calculate numeric (prediction) limits for the Detection Monitoring Program constituents at each CCR well (i.e., well-constituent pairs), pursuant to 40 CFR §257.93(f), using the US Environmental Protection Agency (USEPA) Unified Guidance Document.

Historically, prediction limits have been used in the state of Arizona for the statistical analysis of groundwater monitoring results in relation to solid waste facilities. The initial prediction limits established for this Facility in 2017 were revised in early 2018 (Addendum No. 1 to the 2017 Annual Groundwater Report) following the recognition and correction of an error in the calculations.

TEP may revise the statistical method(s) employed (i.e., prediction limits) to any of those identified in 40 CFR §257.93(f) or any other that can meet the performance standards in 40 CFR §257.93(g). If the statistical analysis method(s) are revised or replaced, the Statistical Method Certification, which is required by 40 CFR §257.93(f)(6), will also be revised.

## **2 SGS CCR MONITORING WELL NETWORK**

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### **2.1 CCR Unit and Monitoring Wells Map (§257.90(e)(1))**

An aerial image of the SGS Ash Landfill with the background (i.e., upgradient) wells, compliance (i.e., downgradient) wells, and well identification numbers, are shown on the Monitoring Well Locations and Groundwater Contour Map (**Figure 1**).

### **2.2 Identification of Installed Monitoring Wells (§257.90(e)(2))**

The installation of the groundwater monitoring system at the SGS Ash Landfill was completed in 2016. There have been no monitoring wells installed or decommissioned during the present reporting period. The system consists of five (5) groundwater monitoring wells: two (2) upgradient wells and three (3) downgradient wells, each with its own dedicated, low-flow pump manufactured and installed by QED Environmental Systems, Inc. (QED). The CCR monitor wells are identified as follows:

- Well CCR-1U (upgradient);
- Well CCR-2U (upgradient);
- Well CCR-1D (downgradient);
- Well CCR-2D (downgradient); and
- Well CCR-3D (downgradient).

A Groundwater Monitoring System Certification report was completed in October 2017 to certify that the groundwater monitoring system installed at the SGS Ash Landfill meets the CCR groundwater monitoring systems requirements of 40 CFR §257.91.

A summary table of the CCR groundwater monitoring well construction is included in **Appendix A**.

### **2.3 Summary of Groundwater Monitoring Activities (§257.90(e)(3))**

The SGS Ash Landfill is currently subject to the Detection Monitoring program requirements. This program includes semi-annual groundwater monitoring at each CCR

well for all constituents listed in Appendix III of the rule. This frequency is in agreement with the minimum required sampling frequency for the statistical method employed. The data collected are evaluated for statistically significant increases (SSI) above the established numeric limits as discussed in Section 1.3 and shown on Table 2. As such, semi-annual monitoring activities were conducted by Confluence Environmental, Inc. (Confluence) in accordance with the SGS CCR Monitoring Network Sampling and Analysis Plan (SAP, June 2016). These activities are discussed below.

## 2.4 Groundwater Elevations

Confluence measured and documented static groundwater levels prior to well purging. Static groundwater elevations (prior to sampling) are presented in **Table 1**, and are illustrated in the most recent groundwater contour map shown on **Figure 1**. Based on eight (8) rounds of initial sampling and the 2017 semi-annual sampling event, the 2017 Annual Groundwater Report indicated no change in the groundwater flow rate and direction due to minimal fluctuation in groundwater elevations. The 2018 semi-annual sampling events also confirmed minimal fluctuations in groundwater elevations, thereby AMTECH concludes there is little overall change in the groundwater velocity and direction across the Ash Landfill.

In addition, Confluence measured groundwater quality markers (e.g., pH, conductivity, temperature, etc.) prior and during well purging. Field documentation and reports for all the semi-annual monitoring events are filed in the Facility operating record.

## 2.5 Groundwater Quality Results

Groundwater samples were analyzed by TestAmerica Laboratories, Inc. (TestAmerica) for the constituents listed in Appendix III of the rule using EPA-approved methods, in accordance with 40 CFR §136 and as referenced in the SAP. Analytical results were compared against established numeric limits (**Table 2**) to determine if there is a SSI over background levels. Results for the sampling events are summarized in **Table 2** and discussed below. Sampling documentation and laboratory analytical reports for the semi-annual monitoring events are filed in the Facility operating record.

### 2.5.1 First Semi-Annual Monitoring Event

The first semi-annual monitoring event (2018 Semiannual 01) occurred on February 27 and February 28, 2018. With the exception of Sulfate in Wells CCR-2D and CCR-3D, analytical results showed no SSI over background levels for Wells CCR-1D, CCR-2D, and CCR-3D. A comparative review of the results for 2018 Semiannual 01 revealed that two well-constituent pairs (2D-sulfate and 3D-sulfate) had concentrations of 1,930 mg/L and 1,460 mg/L, which are higher than their numeric limits of 1,929 mg/L and 1,402 mg/L, respectively. Verification samples were collected from CCR-2D and CCR-3D on May 30, 2018 (2018 Semiannual Verification 01). The 2D-sulfate and 3D-sulfate well-constituent

pair concentrations in 2018 Semiannual Verification 01 were 1,690 mg/L and 1,370 mg/L, respectively, which are below the numeric limits (**Table 2**). Based on the analysis of this semi-annual monitoring event, the Facility remained in the Detection Monitoring program.

### **2.5.2 Second Semi-Annual Monitoring Event**

The second semi-annual monitoring event (2018 Semiannual 02) occurred on August 20 and August 21, 2018. The analytical results indicated that the constituents were within predictive limits in background well CCR-2U and compliance wells CCR-2D and CCR-3D. Equipment failure in well CCR-1D prevented the collection of enough sample volume for the full constituent list. The chloride and sulfate results for the upgradient well CCR-1U indicated upgradient changes in groundwater quality (**Table 1**).

Following repair to CCR-1D, Confluence collected a sample from CCR-1D on October 10, 2018. Analytical results from this sampling event indicated there were no exceedances in CCR-1D. Confluence also collected a verification sample, on the same date, from CCR-1U. Based on the analysis of this semi-annual monitoring event, the Facility remained in the Detection Monitoring program.

## **2.6 Transition between Monitoring Programs §257.90(e)(4)**

The Detection Monitoring Program was initiated following completion of the initial eight rounds of groundwater quality sampling in June, 2017, in accordance with 40 CFR §257.94(a). No SSI was determined for any well-constituent pair during the 2018 groundwater monitoring events. Consequently, the Facility is continuing to monitor under the Detection Monitoring Program.

## **2.7 Other Information §257.90(e)(5)**

In accordance with 40 CFR §257.93(e), other information to be provided regarding the current annual reporting period includes the following, which are summarized below:

- Summarizing key actions completed;
- Describing problems encountered;
- Discussing actions to resolve the problems;
- Projecting key activities for the upcoming year.

### **2.7.1 Key Actions Completed**

Completion of the 2017 Annual Groundwater Report, completion of the required 2018 semi-annual groundwater monitoring events, and the completion of repairs in CCR-1D

were the major actions completed this reporting period. Numeric limits were revised early this year following discovery of a calculation error. An addendum to the 2017 Annual Groundwater Report was completed in July 2018, and followed the recordkeeping, notification, and internet requirements in 40 CFR 257.105-107.

### **2.7.2 Problems Encountered and Related Corrective Actions**

During the second semi-annual monitoring event, tubing for the dedicated pump in CCR-1D failed and prevented collection of a complete sample on August 20, 2018. Confluence replaced the tubing and conducted the follow-up sampling event on October 10, 2018.

### **2.7.3 Key Actions Projected for Upcoming Year**

During 2019, the facility will complete this 2018 Annual Groundwater Report and continue with the required groundwater monitoring. Re-evaluation of numeric prediction limits may be considered. No other actions are anticipated.

## **2.8 Conclusion**

TEP completed the two semi-annual groundwater monitoring events in 2018 as required by 40 CFR §257.94(b). No other major actions or corrective actions were required. Analytical results were compared against established numeric limits and reviewed for exceedances. It was concluded that there were no verified SSIs in the three compliance (downgradient) wells, therefore, the SGS Ash Landfill remains under the Detection Monitoring program.

### **3 RECORDKEEPING, NOTIFICATION, INTERNET POSTING**

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As per CFR Part 40 CFR §257.90(f), the owner or operator of the CCR landfill must comply with the recordkeeping requirements specified in 40 CFR §257.105(h)(1), the notifications requirements specified in 40 CFR §257.106(h)(1), and the internet requirements specified in 40 CFR §257.107(h)(1).

In accordance with CFR Part 40 CFR §257.105(h)(1), TEP will place this Annual Groundwater Monitoring and Corrective Action report in the facility's operating record.

In accordance with CFR Part 40 CFR §257.106(h)(1), within 30 days of placing this 2018 Annual Groundwater Report in the operating record, TEP will notify the State Director when this report has been placed in the operating record and on the facility's publicly accessible internet site.

In accordance with CFR Part 40 CFR §257.107(h)(1), within 30 days of placing this 2018 Annual Groundwater Report in the operating record, TEP will place this report on the facility's CCR internet site.

## **TABLES**

**TABLE 1**  
**SUMMARY OF GROUNDWATER ELEVATIONS**

SAMPLING EVENT	SGS CCR WELLS GROUNDWATER ELEVATIONS (FT AMSL)				
	CCR-1U	CCR-2U	CCR-1D	CCR-2D	CCR-3D
November 15, 2016	6,147.43	5,991.80	5,873.86	5,941.66	6,038.82
December 20, 2016	6,147.25	6,008.89	5,874.83	5,942.68	6,038.63
January 31, 2017	6,146.56	6,009.42	5,875.35	5,939.64	6,036.36
February 21, 2017	6,147.38	5,999.37	5,875.33	5,934.89	6,038.54
March 28, 2017	6,147.23	6,003.52	5,875.30	5,934.83	6,038.94
April 26, 2017	6,147.78	6,002.62	5,877.65	5,936.14	6,038.86
May 24, 2017	6,150.62	6,001.08	5,879.83	5,937.38	6,041.41
June 21, 2017	6,147.16	6,003.40	5,875.32	5,934.72	6,038.84
July 18, 2017	6,147.75	5,997.77	5,877.24	5,936.01	6,038.99
February 27, 2018	6,147.81	5,999.82	5,875.30	5,937.00	6,037.55
May 30, 2018	N/S	N/S	N/S	N/S	6,038.97
August 20, 2018	6,147.60	5,998.52	5,867.19	6,009.57	6,038.85
October 10, 2018	6,147.72	N/S	5,865.38	N/S	N/S

Notes: FT AMSL - feet above mean sea level

N/S - No Sample collected and water level not recorded.

**TABLE 2**  
SUMMARY OF 2018 GROUNDWATER MONITORING RESULTS

Well ID	Parameter	Units	Analytical Laboratory Report ID		Numeric Limits (Detection Monitoring)	Units
			550-98649-1	550-108432-1		
			Sampling Date			
			2/27/2018	8/20/2018		
1U	Boron	mg/L	0.91	0.82	0.98	mg/L
1U	Calcium	mg/L	480	420	499	mg/L
1U	Chloride***	mg/L	550	29	581	mg/L
1U	Fluoride	mg/L	3.1	3.0	3.4	mg/L
1U	pH	SU	6.6	6.6	5.8-7.3	SU
1U	Sulfate***	mg/L	1,330	1,300	1,379	mg/L
1U	Total Dissolved Solids	mg/L	3,200	3,000	3,525	mg/L
2U	Boron	mg/L	1.1	1.1	1.33	mg/L
2U	Calcium	mg/L	710	640	752	mg/L
2U	Chloride	mg/L	470	420	516	mg/L
2U	Fluoride	mg/L	2.5	2.5	3.1	mg/L
2U	pH	SU	6.4	6.4	6.0-7.6	SU
2U	Sulfate	mg/L	2,000	1,890	2,112	mg/L
2U	Total Dissolved Solids	mg/L	3,900	4,000	4,130	mg/L
1D	Boron	mg/L	0.89	0.80	0.98	mg/L
1D	Calcium	mg/L	490	410	546	mg/L
1D	Chloride**	mg/L	510	510	557	mg/L
1D	Fluoride**	mg/L	2.8	3.0	3.9	mg/L
1D	pH	SU	6.5	6.5	5.8-7.7	SU
1D	Sulfate**	mg/L	1,290	1,250	1,523	mg/L
1D	Total Dissolved Solids**	mg/L	3,100	3,100	3,489	mg/L
2D	Boron	mg/L	0.93	0.86	1.03	mg/L
2D	Calcium	mg/L	660	600	693	mg/L
2D	Chloride	mg/L	590	480	596	mg/L
2D	Fluoride	mg/L	2.7	2.7	3.6	mg/L
2D	pH	SU	6.5	7.0	5.9-7.5	SU
2D	Sulfate*	mg/L	1,690	1,690	1,929	mg/L
2D	Total Dissolved Solids	mg/L	3,700	3,800	3,898	mg/L
3D	Boron	mg/L	0.92	0.83	0.97	mg/L
3D	Calcium	mg/L	470	410	486	mg/L
3D	Chloride	mg/L	610	490	615	mg/L
3D	Fluoride	mg/L	3.1	3.0	3.9	mg/L
3D	pH	SU	6.4	6.6	6.2-7.3	SU
3D	Sulfate*	mg/L	1,370	1,260	1,402	mg/L
3D	Total Dissolved Solids	mg/L	3,100	3,200	3,402	mg/L

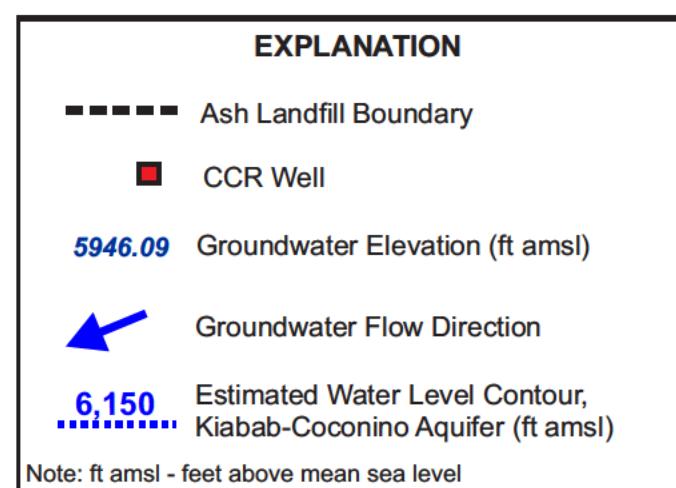
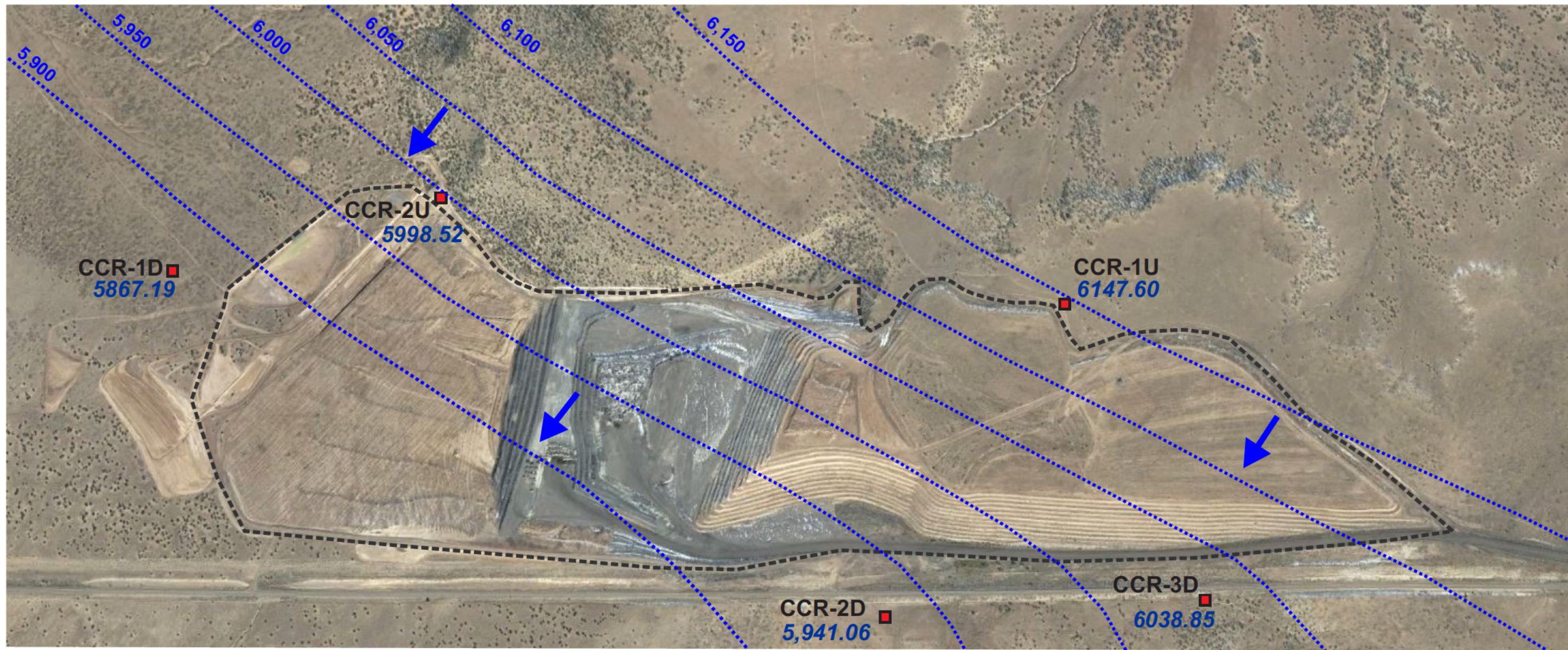
\*Results reported are from the verification sample collected on May 30, 2018. See text for details.

\*\*Equipment failure required additional sample collection (October 10, 2018) to characterize the constituent. See text for details.

\*\*\*Additional sample collected (October 10, 2018) to verify anomalous concentrations. See text for details.

**FIGURE**

**MONITORING WELL LOCATIONS AND GROUNDWATER  
CONTOUR MAP**



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**MONITORING WELL LOCATIONS AND GROUNDWATER CONTOUR MAP**  
Springerville Generating Station  
Tucson Electric Power Company  
Springerville, Arizona

**Figure**  
**1**

Notes:

1. Groundwater water level elevation contours modified from Montgomery & Associates, Groundwater Elevation, Figure 3 (2016).
2. Groundwater elevations reflect the measurements obtained during the August 2018 sampling event.

**APPENDIX A**

**MONITORING WELL CONSTRUCTION SUMMARY**

## **Springerville Generating Station**

### **Ash Landfill Facility**

#### **CCR Monitoring Wells Construction Summary**

Well Name	Upgradient or Downgradient	Approx. Distance from CCR Landfill Boundary (FT)	Completion Date	Total Drilled Depth (FT)	Screened Interval (FT)	Casing Material	Pump Placement Depth (FT)	Pump Installation Date	Groundwater Level (FT)	Date Measured
CCR-1U	Upgradient	150	3/1/2016	860	792-842	PVC	826.4	6/22/2016	803.95	6/22/2016
CCR-2U	Upgradient	92	4/28/2016	1067	740-840	PVC	790.8	6/22/2016	768.44	6/22/2016
CCR-1D	Downgradient	1000	3/12/2016	904	820-900	PVC	846.3	6/22/2016	830.00	6/22/2016
CCR-2D	Downgradient	195	4/7/2016	1000	860-960	PVC	910	6/21/2016	894.55	6/21/2016
CCR-3D	Downgradient	190	4/9/2016	963	810-910	PVC	839.7	6/21/2016	827.78	6/21/2016

Note: All depths in feet (FT) are below ground surface.