

**ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION  
REPORT  
ASH LANDFILL GROUNDWATER MONITORING WELLS  
SPRINGVILLE GENERATING STATION  
SPRINGVILLE, ARIZONA**

Prepared for  
TUCSON ELECTRIC POWER COMPANY  
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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**

The material and data in this report were prepared under the supervision and direction of the undersigned.

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## **EXECUTIVE SUMMARY §257.90(e)(6)**

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The ash disposal landfill (Ash Landfill) at the Springerville Generating Station (SGS), operated by Tucson Electric Power Company (TEP), is an “existing CCR landfill” under the US EPA’s Coal Combustion Residuals (CCR) Rule in 40 CFR §257. The SGS, a coal-fired, steam electric generating facility located approximately 15 miles northeast of Springerville, Arizona, has been in operation since 1985.

A groundwater monitoring system for the Ash Landfill, comprised of 2 upgradient and 3 downgradient groundwater wells, was installed in 2016. The wells are listed below:

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

At the start of the current annual reporting period, the CCR unit was operating under the detection monitoring program under the CCR Rule. Semi-annual groundwater monitoring was conducted at each CCR well for all constituents listed in appendix III of the rule.

During the 2022 monitoring year, TEP completed two (2) semi-annual groundwater monitoring events and one (1) verification sampling event in accordance with the CCR rule and Sampling and Analysis Plan (SAP). No major actions or corrective actions were required based on the comparison of the analytical results and the numeric limits for each well-constituent pair. There was one Statistically Significant Increase (SSI) over the background the constituents listed in appendix III to 40 CFR §257.94(e). The total dissolved solids (TDS) detected in groundwater collected at CCR-2U exceeded the numeric limits during the February 2022 monitoring event and the exceedance was confirmed during the verification sampling event in May 2022. The TDS concentration detected in groundwater collected at CCR-2U during the September 2022 monitoring event was below the numeric limit. Since monitoring well CCR-2U is not a downgradient well, and the concentrations have lowered below the numeric limits during the most recent sampling event, a transition to the assessment monitoring program was not required. At the end of the current annual reporting period, the SGS Ash Landfill continues to operate under the detection monitoring program.

# **1 INTRODUCTION**

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## **1.1 Purpose and Content**

AMTECH Associates L.L.C. (AMTECH) has prepared this 2022 Annual Groundwater Monitoring and Corrective Action Report (2022 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 key project activities for the upcoming year.

To comply with these requirements, at a minimum, this Report contains the following information for the 2022 calendar year, to the extent applicable:

- 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 production 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 SSIs 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 illustrated in the most recent groundwater contour map shown on **Figure 1**. Groundwater elevations measured in September 2022 for wells CCR-1U, CCR-3D, and CCR-2D, were similar to those collected historically and showed little fluctuation. For well CCR-2U, groundwater elevations have declined since 2017 (approximately 15 feet). For well CCR-1D, groundwater elevations were found to be lower confirming a declining trend that has been observed since February 2020 (approximately 12 feet).

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 analytical results indicated that all well-constituent pairs were within their respective numeric limits with the exception of one (1) well-constituent, 2U-TDS. The concentration level of 2U-TDS was 4,180 mg/L, higher than the respective numeric limit of 4,130 mg/L, (**Table 1**).

A verification sample collected on May 4, 2022, for Well 2U revealed a 2U-TDS concentration at 4,740 mg/L, which was again above its numeric limit and identified as an SSI. Further discussion regarding this result is included in Section 2.6 below.



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

The second semi-annual monitoring event (2022 Semiannual 02) occurred on September 7 and 8, 2022. The analytical results indicated that all well-constituent pairs were within their respective numeric limits (**Table 2**).

For this monitoring event, the analytical results indicated that all well-constituent pairs were within their respective numeric limits and confirms no SSIs for these well-constituent pairs.

## **2.6 CCR Monitoring Program §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). With the exception of the upgradient well-constituent pair 2U-TDS as discussed above, no SSI was determined for any other well-constituent pair during the 2022 groundwater monitoring events. Further discussion regarding the 2U-TDS SSI is included below.

Based on historical data, there were no previous exceedances of TDS for upgradient well CCR-2U prior to March 2022. The TDS concentrations in well CCR-2U in March and May 2022 at 4,180 mg/L and 4,740 mg/L may be due to the well location near the local anticline and possible dissolution of sandstone in the groundwater formation. Also, as the groundwater numerical limits used a statistical analysis to find the upper prediction limit, an updated statistical analysis may result in a higher numerical limit for 2U-TDS and show these results to be below the updated numerical limit. Conversely, an updated statistical analysis could demonstrate these higher concentrations as outliers.

Based on the discussion above and as CCR Well 2U is an upgradient well and not a downgradient compliance well,, it is recommended that SGS's CCR monitoring well network may remain in the detection monitoring program and there was no transition to the assessment monitoring program during 2022.

## **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 2022 Annual Groundwater Report and completion of the required 2022 semi-annual groundwater monitoring events (and one verification event) were the major actions completed this reporting period.

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

With the exception of the higher concentrations found in the upgradient well-constituent 2U-TDS during the 2022 first semi-annual monitoring event, there were no other problems encountered during the 2022 first and second semi-annual monitoring events.

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

During 2023, the facility will maintain this 2022 Annual Groundwater Report in the operating record and will post a copy to the company's publicly accessible CCR website, as discussed in Section 3. SGS will also continue with the required semi-annual detection monitoring program with groundwater monitoring events planned for the 1<sup>st</sup> and 3<sup>rd</sup> quarter of 2022.

## **2.8 Conclusion**

TEP completed the two semi-annual groundwater monitoring events (and one verification sampling event) in 2022 as required by 40 CFR §257.94(b). Analytical results were compared against established numeric limits and reviewed for exceedances. With the exception of upgradient well-constituent pair 2U-TDS as discussed above, no SSI was determined for any other well-constituent pair during the 2022 groundwater monitoring events. 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. No corrective actions were required for the downgradient compliance wells.

### **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 §257.107(h)(1), within 30 days of placing this 2022 Annual Groundwater Report in the operating record, TEP will place this report on the facility's CCR internet site.

In accordance with CFR Part 40 CFR §257.106(h)(1), within 30 days of placing this 2022 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.

## TABLES

**TABLE 1**

**SGS CCR Ash Landfill Groundwater Monitoring Well Elevations**

WELL NAME	CCR-1U		CCR-2U		CCR-1D		CCR-2D		CCR-3D	
MEASURING POINT ELEVATION (FT AMSL)	6951.63		6782.62		6708.98		6837.64		6867.04	
SAMPLING EVENT	DTW (FT)	ELEVATION (FT ASML)	DTW (FT)	ELEVATION (FT ASML)	DTW (FT)	ELEVATION (FT ASML)	DTW (FT)	ELEVATION (FT ASML)	DTW (FT)	ELEVATION (FT ASML)
November 15, 2016	804.20	6147.43	790.82	5991.80	835.12	5873.86	895.98	5941.66	828.22	6038.82
December 20, 2016	804.38	6147.25	773.73	6008.89	834.15	5874.83	894.96	5942.68	828.41	6038.63
January 31, 2017	805.07	6146.56	773.20	6009.42	833.63	5875.35	898.00	5939.64	830.68	6036.36
February 21, 2017	804.25	6147.38	783.25	5999.37	833.65	5875.33	902.75	5934.89	828.50	6038.54
March 28, 2017	804.40	6147.23	779.10	6003.52	833.68	5875.30	902.81	5934.83	828.10	6038.94
April 26, 2017	803.85	6147.78	780.00	6002.62	831.33	5877.65	901.50	5936.14	828.18	6038.86
May 24, 2017	801.01	6150.62	781.54	6001.08	829.15	5879.83	900.26	5937.38	825.63	6041.41
June 21, 2017	804.47	6147.16	779.22	6003.40	833.66	5875.32	902.92	5934.72	828.20	6038.84
July 18, 2017	803.88	6147.75	784.85	5997.77	831.74	5877.24	901.63	5936.01	828.05	6038.99
February 27, 2018	803.82	6147.81	782.80	5999.82	833.68	5875.30	900.64	5937.00	829.49	6037.55
May 30, 2018 *									828.07	6038.97
August 20, 2018	804.03	6147.60	784.10	5998.52	841.79	5867.19	896.58	5941.06	828.19	6038.85
October 10, 2018 *	803.91	6147.72			843.60	5865.38				
February 26, 2019	804.19	6147.44	788.21	5994.41	840.64	5868.34	897.09	5940.55	828.18	6038.86
April 9, 2019 *									828.11	6038.93
August 20, 2019	804.00	6147.63	792.60	5990.02	841.19	5867.79	897.15	5940.49	827.89	6039.15
October 1, 2019 *	803.08	6148.55							828.00	6039.04
February 25, 2020	805.41	6146.22	793.40	5989.22	833.15	5875.83	897.60	5940.04	829.34	6037.70
August 25, 2020	804.00	6147.63	792.01	5990.61	834.99	5873.99	896.36	5941.28	827.72	6039.32
October 1, 2020 *							896.90	5940.74		
February 23, 2021	804.00	6147.63	792.09	5990.53	839.40	5869.58	897.02	5940.62	828.15	6038.89
August 24, 2021	805.25	6146.38	795.50	5987.12	842.20	5866.78	898.00	5939.64	828.15	6038.89
October 6, 2021 *	803.79	6147.84								
March 1, 2022	804.34	6147.29	794.55	5988.07	843.36	5865.62	896.79	5940.85	827.00	6040.04
May 4, 2022 *			794.92	5987.70						
September 7, 2022	805.18	6146.45	797.6	5985.02	845.82	5863.16	898.20	5939.44	828.22	6038.82

Notes: FT AMSL - feet above mean sea level

\* Verification Sampling Date.

Empty/shaded cells are due to no sample collected and water level not recorded.

For Well CCR-2D on October 1, 2019, the water level was not measured due to the well sounder stuck at ~515' depth.

**TABLE 2.**  
**SUMMARY OF 2022 GROUNDWATER QUALITY DETECTION MONITORING RESULTS**

**SGS CCR Ash Landfill Groundwater Monitoring Wells**

Well ID	Constituent	Lab Report ID 550-J180057-1	Lab Report ID 550-J190152-1	Numeric Limits	Units
		Sampling Date March 1-2, 2022	Sampling Date September 7-8, 2022		
1U	Boron	0.82	0.83	0.98	mg/L
1U	Calcium	440	440	499	mg/L
1U	Chloride	482	510	581	mg/L
1U	Fluoride	3.32	3.3	3.4	mg/L
1U	pH	6.8	6.8	5.8-7.3	SU
1U	Sulfate	1,260	1,290	1,379	mg/L
1U	TDS	3,070	3,220	3,525	mg/L
1U Dup	Boron	--	0.85	0.98	mg/L
1U Dup	Calcium	--	440	499	mg/L
1U Dup	Chloride	--	510	581	mg/L
1U Dup	Fluoride	--	3.3	3.4	mg/L
1U Dup	pH	--	6.8	5.8-7.3	SU
1U Dup	Sulfate	--	1,290	1,379	mg/L
1U Dup	TDS	--	3,160	3,525	mg/L
2U	Boron	1.1	1.1	1.33	mg/L
2U	Calcium	670	680	752	mg/L
2U	Chloride	420	440	516	mg/L
2U	Fluoride	2.43	2.2	3.1	mg/L
2U	pH	6.6	6.6	6.0-7.6	SU
2U	Sulfate	1,860	1,830	2,111	mg/L
2U	TDS	4,180	3,990	4,130	mg/L
2U*	TDS	4,740	--	4,130	mg/L
1D	Boron	0.82	0.83	0.98	mg/L
1D	Calcium	440	470	546	mg/L
1D	Chloride	467	500	557	mg/L
1D	Fluoride	2.83	2.8	3.9	mg/L
1D	pH	6.7	6.8	5.8-7.7	SU
1D	Sulfate	1,230	1,290	1,523	mg/L
1D	TDS	3,070	3,190	3,489	mg/L
1D Dup	Boron	0.81	--	0.98	mg/L
1D Dup	Calcium	430	--	546	mg/L
1D Dup	Chloride	461	--	557	mg/L
1D Dup	Fluoride	3.04	--	3.9	mg/L
1D Dup	pH	6.7	--	5.8-7.7	SU
1D Dup	Sulfate	1,180	--	1,523	mg/L
1D Dup	TDS	2,900	--	3,489	mg/L
2D	Boron	0.86	0.88	1.03	mg/L
2D	Calcium	610	640	693	mg/L
2D	Chloride	497	510	596	mg/L
2D	Fluoride	2.81	2.5	3.6	mg/L
2D	pH	6.7	6.8	5.9-7.5	SU
2D	Sulfate	1,750	1,680	1,929	mg/L
2D	TDS	3,740	3,790	3,898	mg/L
3D	Boron	0.84	0.86	0.97	mg/L
3D	Calcium	440	450	486	mg/L
3D	Chloride	501	520	615	mg/L
3D	Fluoride	3.13	3.1	3.9	mg/L
3D	pH	6.6	6.6	6.2-7.3	SU
3D	Sulfate	1,270	1,280	1,402	mg/L
3D	TDS	3,070	3,120	3,402	mg/L

Notes: Samples analyzed by TestAmerica.

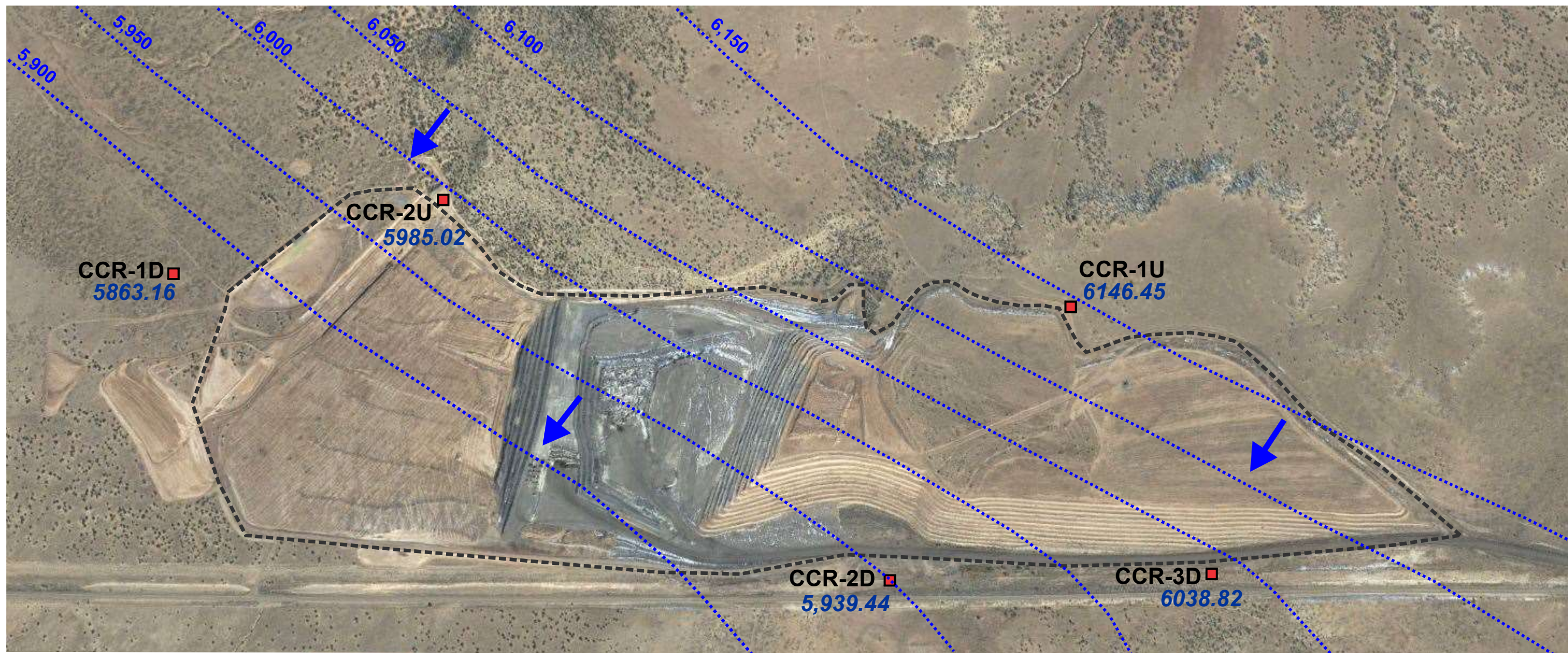
Abbreviations: TDS - Total Dissolved Solids. mg/L - milligrams per liter. SU - standard units. NS - Not Applicable.

\* A verification sample for CCR 2U-TDS was collected on 5/04/22 (Ref: Laboratory Report ID 550-183571-1).

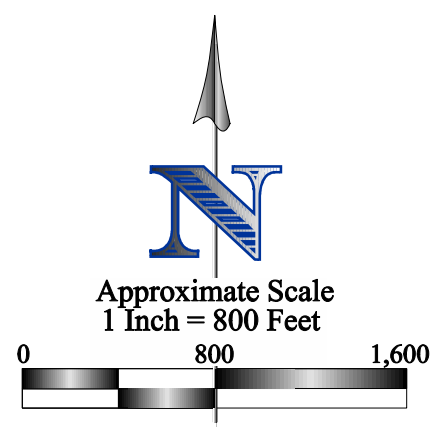
**FIGURE**

MONITORING WELL LOCATIONS AND GROUNDWATER  
CONTOUR MAP





Notes:  
1. Groundwater elevations reflect the measurements obtained during the September 2022 sampling event.



EXPLANATION	
	Ash Landfill Boundary
	CCR Well
5939.44	Groundwater Elevation (ft amsl)
	Groundwater Flow Direction
6,150	Estimated Water Level Contour, Kiabab-Coconino Aquifer (ft amsl)

Note: ft amsl - feet above mean sea level


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**MONITORING WELL LOCATIONS  
AND GROUNDWATER CONTOUR MAP**

Springerville Generating Station  
Tucson Electric Power Company  
Springerville, Arizona

**Figure**  
**1**



## **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	575	3/12/2016	904	820-900	PVC	846.3	6/22/2016	830	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.