# GROUNDWATER MONITORING SYSTEM CERTIFICATION
# ASH LANDFILL GROUNDWATER MONITORING WELLS
# SPRINGERVILLE GENERATING STATION
# SPRINGERVILLE, ARIZONA

Prepared for

TUCSON ELECTRIC POWER COMPANY

OCTOBER 17, 2017

Prepared by

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Project No. 1062.03

AMTECH

**Groundwater Monitoring System Certification**
**Ash Landfill Groundwater Monitoring Wells**
**Springerville Generating Station**
**Tucson Electric Power Company**
**Springerville, Arizona**

I hereby certify that the monitoring system identified herein has been designed and constructed to meet the requirements of 40 CFR §257.91(f), as included in 40 CFR Part 257, Subpart D, Disposal of Coal Combustion Residuals from Electric Utilities. The material and data in this report were prepared by me or under my supervision, and I am a duly Professional Engineer under the laws of the State of Arizona.

AMTECH Associates, L.L.C.

Tamara M. Jim, Engineer


Expires: 3/31/2018

Syed S. Amanatullah, P.E.
Managing Member

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## APPENDICES

# 1 INTRODUCTION

The US Environmental Protection Agency (UESPA) published the final rule for the Coal Combustion Residues (CCR) Rules under the Resource Conservation and Recovery Act (RCRA) on April 17, 2015. The CCR Rules are published as Subpart D to Title 40 of the US Code of Federal Regulations (40 CFR) Part 257, Sections §257.50 to §257.107.

AMTECH Associates L.L.C. (AMTECH) has prepared this report to comply with the groundwater monitoring system requirements pursuant to the CCR Rules for Landfill and Surface Impoundments of electric utilities. The Springerville Generating Station (SGS) is a four-unit, pulverized coal-fired, steam electric generating facility and these standards are applicable to the facility's Ash Landfill as an "Existing CCR landfill" as defined in 40 CFR §257.53.

This report certifies that the groundwater monitoring system installed at the Ash Landfill meets the groundwater monitoring systems requirements of 40 CFR §257.91.

## 1.1 Site Description and Location

The SGS is a four-unit, pulverized coal-fired, steam electric generating facility, operated by Tucson Electric Power Company (TEP), that began operations in 1985 and consists of a combined net generating output of approximately 1600-megawatts.

SGS is located approximately 15 miles northeast of Springerville, in Apache County, Arizona. 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. The SGS site occupies 14,355 acres, which includes the power plant area, ash landfill area and the east and west well fields.

The Ash Landfill, located southwest of the power plant area, 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 used for the disposal of other items in lesser quantities, i.e. reactivator sludge, construction debris and power plant outage refuse, sump sludges, demineralizer resins, PCS, cooling tower sludge, lime, soda ash, sewage pond sludge, evaporation pond solids, miscellaneous pond clean-outs, cooling tower treated lumber, and other inert and non-hazardous materials.

# 2 GROUNDWATER MONITORING SYSTEM REQUIREMENTS

## 2.1 Performance Standard §257.91(a)

The owner or operator of an existing CCR landfill must install a groundwater monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer that:

(1) Accurately represent the quality of background groundwater that had not been affected by the leakage of a CCR landfill. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where: (i) Hydrogeologic conditions do not allow the owner or operator of the CCR unit to determine what wells are hydraulically upgradient; or (ii) Sampling at other wells will provide an indication of background groundwater quality that is as representative or more representative than that provided by upgradient wells, and

(2) Accurately represent the quality of groundwater passing the waste boundary of the CCR landfill. The downgradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer. All potential contaminant pathways must be monitored.

The groundwater monitoring system at the SGS Ash Landfill consists of five (5) groundwater monitoring wells, with two (2) upgradient wells and (3) downgradient wells installed into the uppermost aquifer. The groundwater monitoring system installed at the site includes the minimum number of wells at appropriate locations and depths to provide groundwater samples that represent background groundwater quality not affected by (potential) leakage of the CCR landfill and downgradient groundwater quality passing the CCR landfill boundary.

## 2.2 Number, Spacing, and Depths of Wells §257.91(b)

The number, spacing, and depths of monitoring systems shall be determined based upon site-specific technical information that must include thorough characterization of:

(1) Aquifer thickness, groundwater flow rate, groundwater flow direction, including seasonal and temporal fluctuations in groundwater flow; and

(2) Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including, but not limited to, thickness, stratigraphy, lithology, hydraulic conductivities, porosities, and effective porosities.

Extensive sub-surface investigations were conducted at SGS as part of the previous facility expansion projects and as a result, considerable information regarding site-specific geologic and hydrogeological conditions has been collected.

The SGS is located in the southern portion of the Colorado Plateau Physiographic Province (CPPP), on the Mogollon slope structural subdivision of this province, in Arizona. Major faults and features systems trend northwest in the vicinity of SGS and are usually sub-parallel, or nearby collinear with anticlinal structures. Geologic units exposed in the general site vicinity and/or encountered in previous subsurface investigations include, from oldest to youngest: Permian Upper Supai Formation, Permian Coconino Sandstone, Permian Kaibab Limestone, Triassic Moenkopi Formation, Triassic Chinle Formation, Tertiary Bidahochi Formation, Quaternary to Tertiary travertine deposits, and Quaternary alluvium.

The SGS is located in the Little Colorado River (LCR) watershed which is the principal surface drainage area in northeastern Arizona. The Kaibab-Coconino aquifer is the principal source of groundwater and extends throughout much of northeastern Arizona. The groundwater flow direction through the Ash Landfill is generally to the southwest. The fine-grained deposits of the Chinle Formation serve as an impermeable barrier between the aquifer and the shallow formations beneath the site.

The groundwater monitoring system at the SGS Ash Landfill consists of five (5) groundwater monitoring wells, with two (2) upgradient wells and (3) downgradient wells installed into the uppermost aquifer. **Appendix A** contains the CCR groundwater monitoring well locations and groundwater contour map provided by Montgomery & Associates. A summary of the CCR groundwater monitoring wells including well depths and initial groundwater levels are included in **Appendix B**.

## 2.3 Minimum Number of Wells §257.91(c)

As per CFR Part §257.91(c), the groundwater monitoring system must include the minimum number of wells necessary to meet the performance standards specified in paragraph (a) of this section, based on the site-specific information specified in paragraph (b) of this section. The groundwater monitoring system must contain:

(1) A minimum of one upgradient and three downgradient wells; and

(2) Additional monitoring wells as necessary to accurately represent the quality of background groundwater that has not been affected by leakage from the CCR landfill and the quality of groundwater passing the waste boundary of the CCR landfill.

The groundwater monitoring system at the SGS Ash Landfill consists of five (5) groundwater monitoring wells, with two (2) upgradient wells and (3) downgradient wells, one more well than the minimum required. This system was installed to provide groundwater samples that represent background groundwater quality not affected by (potential) leakage of the CCR landfill and downgradient groundwater quality passing the CCR landfill boundary.

## 2.4 Multiple CCR Units §257.91(d)

As there are no multiple CCR units at the facility, this section is not applicable.

## 2.5 Well Casing §257.91(e)

Monitoring wells must be cased in a manner that maintains the integrity of the borehole. This casing must be screened or perforated and packed with gravel or sand, where necessary to enable collection of groundwater samples. The annular space (i.e. the space between the borehole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the groundwater.

(1) The owner or operator must document and include in the operating record the design, installation, development, and decommissioning of any monitoring wells, piezometers and other measurement, sampling, and analytical devices. The qualified professional engineer must be given access to this documentation when completing the groundwater monitoring system certification required under paragraph (f) of this section.

(2) The monitoring wells, piezometers and other measurement, sampling, and analytical devices must be operated and maintained so that they perform to the design specifications throughout the life of the monitoring program.

The following describes, in general, the construction of the groundwater monitoring wells at the Ash Landfill.

For three (3) of the wells, a conductor casing was installed at depths ranging from 9 ft to 13 ft bgs and the annulus of the bore hole and conductor casing was filled with cement. For each well, a steel casing was installed at depths ranging from 430 ft to 475 ft bgs and set using cement at the bottom of the boreholes as well as cement baskets, where necessary, and filled with cement to the surface.

After each well borehole was extended into the uppermost aquifer at depths appropriate to provide groundwater samples, slotted wall PVC casing (with PVC end cap) and blank walled PVC casing, were installed to the depths as indicated in the groundwater monitoring well construction summary in **Appendix B.** Centralizers were also installed on the bottom and top of the slotted wall PVC casing and then on the solid wall PVC casing at 100 foot intervals to land surface. Silica sand filter pack material was placed at the bottom of the borehole (to backfill the well bottom to the specified PVC casing depth) and within the annulus of the bore hole and slotted wall PVC casing. Above the silica sand filter pack, a bentonite (pellet) seal was placed within the annulus of the bore hole and solid wall PVC casing to prevent contamination of samples and the groundwater. A cement mix seal was installed in each well within the annulus of the steel casing and solid wall PVC casing to depths ranging from 6 ft to 10 ft bgs**.** To secure the wellhead, a steel casing (with lockable cap) was installed as a riser and a concrete pad was constructed around the base of the riser. Permanent low flow sampling pump systems were also installed in the wells.

Completion of this groundwater monitoring system certification report was based on AMTECH's documentation of the groundwater monitoring wells installation. TEP will maintain these wells for proper operation performance throughout the life of the monitoring program.

## 2.6 Professional Engineer Certification §257.91(f)

The owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section. If the groundwater monitoring system includes the minimum number of monitoring wells specified in paragraph (c)(1) of this section, the certification must document the basis supporting this determination.

The certification statement by a qualified professional engineer is included on Page ii of this document.

## 2.7 Recordkeeping, Notification, Internet Posting §257.91(g)

As per CFR Part §257.91(g), the owner or operator of the CCR landfill must comply with the recordkeeping requirements specified in §257.105(h)(3), the notifications requirements specified in §257.106(h)(2), and the internet requirements specified in §257.107(h)(2).

In accordance with CFR Part §257.105(h)(3), TEP will place this Groundwater System Certification report in the facility's operating record.

In accordance with CFR Part §257.106(h)(2), TEP will provide notification of the availability of the Groundwater System Certification report to the relevant State Director

and/or Tribal authority before the close of business on the day the notification is required to be completed.

In accordance with CFR Part §257.107(h)(2), TEP will place the Groundwater System Certification report on TEP's CCR web site.

# APPENDIX A

GROUNDWATER MONITORING WELL LOCATIONS AND
GROUNDWATER CONTOUR MAP

R. 29 E.

R. 30 E.

T. 11 N.

T. 10 N.

E-1 5,875.78

P-21 5,876.50

P-14/14A* 5,700.76

P-18*

P-17

P-11/11A*

P-19* 5,839.02

E-3 5,874.80

P-15* 5,802.69

P-10/10A*

P-20*

P-16* 5,767.56

P-5 6,206.03

P-6 6,241.35

CCR-2U 6,017.10

CCR-1D 5,882.07

CCR-1U 6,150.34

CCR-2D 5,946.09

CCR-3D 6,042.30

5,900

5,950

6,000

6,050

6,100

6,150

6,200

6,250

Coyote Wash Fault

Cedar/Mesa Anticline



## EXPLANATION

- P-5 ● Springerville Generating Station Production Water Well and Identifier
- E-3 ■ Springerville Generating Station Monitor Well and Identifier
- ● Other Water Well
- CCR-1D 5,882.07 ▲ Monitor Well Location and Identifier; Groundwater Elevation, in feet above mean sea level; * = pumping
- 6,100 — Estimated Water Level Contour, Kaibab-Coconino Aquifer, in feet above mean sea level
- Ash Disposal Facility

DRAFT

N

0 2,000

Feet

TEP Tucson Electric Power

**GROUNDWATER ELEVATION JUNE 2016**

MONTGOMERY & ASSOCIATES Water Resource Consultants

2016

FIGURE 3

GIS-Tuc\934.5302\CCR_GWelev_June2016\14July2016 UTM27 meters Zn12

# APPENDIX B

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.

AMTECH