Environmental Resources Management

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January 17, 2019

Mr. Michael Malone
CPS Energy
145 Navarro Street
San Antonio, Texas 78205

Project No. 0352456

Subject: CCR Units – 2018 Annual Inspection and Fugitive Dust Control Report
Calaveras Power Station
San Antonio, Texas

Dear Mr. Malone:

Environmental Resources Management (ERM) conducted an inspection of coal combustion residual (CCR) units for two power plants located at the CPS Energy Calaveras Power Station in Bexar County, Texas. The CCR units are shared by the J.K. Spruce and J.T. Deely Power Plants, which are co-located at 12940 U.S. Highway 181 South in San Antonio, Texas. The CCR units utilized by the power plants are described in Table 1.

Table 1. Calaveras Power Station CCR Unit Descriptions

Unit Name	Unit ID	Purpose of Unit
Fly Ash Landfill (a.k.a. 5-Year Landfill)	010	Receives fly ash, bottom ash, economizer ash, scrubber sludge from flue gas desulphurization ponds, and flue gas desulphurization gypsum (temporary storage).
Evaporation Pond	021	Receives boiler chemical cleaning waste and other authorized liquid wastes.
North Bottom Ash Pond (North BAP)	005	Receives sluiced bottom ash.
South Bottom Ash Pond (South BAP)	006	Receives sluiced bottom ash.
Sludge Recycle Holding (SRH) Ponds (North and South)	026	Receives flue gas desulphurization scrubber sludge.

The annual inspection was conducted by Mr. Charles Johnson, P.E., on December 18, 2018. Photographs taken during the inspection are provided in Attachment 1. No issues were observed that indicated immediate stability or operational issues at the CCR units. Details of the observations made by Mr. Johnson are provided below.

Unit Descriptions

All units are built with above-grade earthen embankments reportedly composed of sandy clay and clayey sand fill. Some units have CCR ash used in the surface roadways of the features (e.g., Fly Ash Landfill and Bottom Ash Ponds). Figure 1 shows the locations of each CCR unit. Dimensions of the CCR units were not measured during the annual inspection.

Based on a comparison of recent and historical aerial photographs dating back to 1995, no significant changes in the dimensions or geometry of the units were observed. Table 2 provides a summary of the unit dimensions. The dimensions presented below are approximate and are based on publically available imagery as well as on an assessment conducted by CDM Smith (June 2014).

Table 2: Calaveras Power Station CCR Unit Dimensions

Dimension	Fly Ash Landfill	Evaporation Pond	North BAP	South BAP	SRH Ponds
Length (feet)	1,000	500	680-370 (a)	400	440
Width (feet)	950	400	460	680	330
Depth (feet)	32.5	22	12	12	8
Avg. Crest Width (feet)	20	20	15	15	15
Perimeter (feet)	4,000	1,800	2,100	2,200	1,550
Interior Slopes, H:V	3:1	3:1	2:1	2:1	3:1
Exterior Slopes, H:V	3:1	3:1	3:1	3:1	3:1
Total Area (acres)	21.8	4.5	6.0	7.0	3.5

(a) Length ranges from 680 to 370 feet along the southern and northern sides of the North BAP.

The Evaporation Pond is reportedly lined with 30-mil polyvinylchloride (PVC) geomembrane. Prior annual CCR unit inspection reports (for reporting years 2015 - 2017) indicated the Evaporation Pond was reportedly lined with a high-density polyethylene (HDPE) liner. Upon further review of the construction drawings, the *Liner Design Criteria for Existing CCR Surface Impoundments* (CPS Energy, 2016), and the *Compilation of Construction History* (ERM, 2016), it was confirmed that the Evaporation Pond is lined with PVC. There are no inlet or outlet structures to the Evaporation Pond. A four-inch polyethylene pipe is present in the eastern embankment and supplies water for equipment washout purposes within the Evaporation Pond area. Liquid from boiler chemical cleanouts and other authorized liquid wastes are trucked to the Evaporation Pond, and are allowed to evaporate. Periodically, dried material is removed from the Evaporation Pond and placed in the Fly Ash Landfill.

The North and South BAPs are reportedly lined with clay, but the thickness and hydraulic conductivity of the clay are unknown. Both BAPs have two discharge points. One 24-inch steel pipe in each BAP allows water to be returned to the plant for reuse. Both BAPs also have outlet structures consisting of a horizontal 12-inch steel discharge pipe at an approximate elevation of 489 feet MSL (bottom drain used to empty the pond), and a vertical 12-inch steel overflow pipe at an approximate of elevation 499 feet MSL (normal operation level pool drain). The outfall structure is in one corner of each BAP (northeast for North BAP and southeast for South BAP) and is partially surrounded by steel sheet piling. The sheet piling and pond berms create an opening for water to reach the discharge pipes. This opening is typically protected by floating

sorbent booms. Water from these outlets discharges to Calaveras Lake through a TPDES permitted outfall.

The interior slopes of the two SRH Ponds are reportedly covered with 30-mil HDPE liner and a 6-inch thick concrete slab. The SRH ponds are delineated by a concrete divider wall with a sluice gate that allows the two sides to be isolated from each other. Water is pumped from the SRH ponds to clarifiers via two 18-inch steel pipes. Both SRH ponds have eight-foot-wide concrete overflow chutes that discharge to the South BAP. These overflow chutes are at an approximate elevation of 499.5 feet MSL.

The Fly Ash Landfill is reportedly lined with a 30-mil HDPE liner covered with a 10-ounce geotextile and 12 inches of sand. The bottom of the Fly Ash Landfill slopes from west-to-east, from approximately 514 feet MSL to 503 feet MSL. The top berm is at an approximate elevation of 535.5 feet MSL, for a total landfill depth of approximately 32.5 feet at the deepest point. Storm water collects in the southeast corner of the Fly Ash Landfill and is allowed to settle. A water quality sample is collected and analyzed prior to discharge through a TPDES permitted outfall.

No electronic instrumentation is associated with the CCR units. A staff gauge is present at the South BAP. Rebar rods, used by CPS Energy to monitor water levels, are present at the Evaporation Pond.

Unit History

The Evaporation Pond was originally constructed as a fly ash landfill. In 1990, a pond liner was installed. Then in 1996, the unit was converted from a landfill to an impoundment. Fly ash was placed in the landfill prior to it being used as an impoundment. The top of the Evaporation Pond is at an approximate elevation of 522 feet MSL and the bottom is at an approximate elevation of 500 feet MSL.

The North and South BAPs were constructed in 1977, and the SRH Ponds were constructed in 1992. Embankments are reported to have been constructed of on-site material, though the actual location of the borrow pit is unknown. The top of the SRH Ponds embankments is at an approximate elevation of 500 feet MSL, and the bottom at an approximate elevation of 492 feet MSL. Up to a foot of ash and other material have been added to the roads on the top of the BAP embankments, making the top elevation approximately 501 feet MSL. The bottom of the BAPs is at an approximate elevation of 489 feet MSL.

The Fly Ash Landfill was constructed in 1992. Liner on the side slopes was originally not covered with a protective layer, and began to show signs of deterioration. Portions of the liner on the north and west side embankments were repaired in 2010 and all side slopes are currently covered with a protective layer

No other changes to unit operations or dimensions were reported to have occurred during the life of the facility.

Structural Integrity

There is no reported historic evidence of structural instability in the CCR units.

Geotechnical properties of the foundation and abutment materials, on which the ponds were constructed, are provided in *Geotechnical Engineering Study for Ash Pond Berms – Spruce/Deely Generation Units, San Antonio, Texas* by Raba Kistner Consultants, Inc. (May 2014), and are summarized in *Assessment of Dam Safety of Coal Combustion Surface Impoundments Final Report* for the J.K. Spruce and J.T. Deely Power Plants by CDM Smith (June 2014).

As summarized in the CDM Smith report, embankment material is light clay (ASTM "CL") with a clay fraction of approximately 45%, and an assumed liquid limit between 35 and 47. Foundation material for the BAPs and SRH Ponds consists of sandy clay (ASTM "CL") with a clay fraction between 50% and 60%, and a liquid limit of approximately 51; or clayey sand (ASTM "ML") with a clay fraction of approximately 35%, and a liquid limit of approximately 33. Evaporation Pond material is similar, except the liquid limits for the foundation materials are approximately 55.

No information on the embankment and foundation materials were available for the Fly Ash Landfill, but foundation materials are anticipated to be similar to those of the Evaporation Pond based on the proximity of the units.

Annual Inspection Summary

Signage was present at each CCR unit and no issues were observed that presented an immediate threat to structural integrity of the CCR units.

Fly Ash Landfill

The Fly Ash Landfill was at approximately 37.1% of the approximate 900,000 cubic yard capacity based on calculations provided by CPS Energy. Approximately 4 to 6 acres of the Fly Ash Landfill interior were covered with discrete piles of ash, the largest piles approximately 25 feet in height. A unit identification marker on the northeast corner was observed to be damaged and laying on the ground.

Grass along the exterior embankment slopes was observed to be generally well maintained and no woody plants were observed.

Weekly inspection records from January 4, 2018 through December 26, 2018 reported minor rutting on side slopes, the periodic need for mowing, and animal burrows. No significant rutting, erosion, animal burrows, or other problems were observed at the time of the annual inspection.

Since the 2017 annual inspection, there have been no noticeable changes in the geometry of the Fly Ash Landfill, or any other changes that appear likely to have affected the stability or operation of the Fly Ash Landfill.

Evaporation Pond

The Evaporation Pond had approximately five feet of freeboard available at the time of the inspection. This corresponds to approximately three feet below the top of the geomembrane liner as measured by a set of rebar rods recently installed within the Evaporation Pond by CPS Energy. The Evaporation Pond has an available capacity of approximately 21 acre-feet, with approximately 62 acre-feet of water and CCR contained.

Grass along the exterior embankment slopes was observed to be generally well maintained and no woody plants were observed.

Weekly inspection records from January 4, 2018 through December 26, 2018 reported minor rutting and sloughing on embankment side slopes. Some minor erosion was observed on interior embankment side slopes at the time of the annual inspection. No seepage was observed at the time of the annual inspection.

Since the 2017 annual inspection, there have been no noticeable changes in the geometry of the Evaporation Pond, or any other changes that appear likely to have affected the stability or operation of the Evaporation Pond. Based on information provided by CPS Energy, the maximum depth of the water and CCR in the Evaporation Pond during 2018 was 20 feet, which corresponds to a volume of 74.4 acre-feet. The minimum depth was approximately 18 feet, which corresponds to a volume of 66.1 acre-feet.

North Bottom Ash Pond

The North BAP was offline and had approximately four feet of freeboard at the time of the inspection. A pile of accumulated CCR was present in the center of the BAP, above the water line, awaiting removal.

Grass along the western and eastern exterior embankment slopes was observed to be generally well maintained. The grass in an area of approximately 50 by 50 feet of the northwestern exterior embankment slope was observed to be damaged by wild hog activity, however, no erosion was observed in the area. Some woody plant growth was observed on the north exterior embankment slope. There is no apparent immediate impact to unit stability, however, the hog damaged area should be monitored for erosion and to confirm grass is restored and the woody plants should be removed from the north exterior embankment slope to facilitate inspection of the slope. No obstruction of or damage to outfall structures was observed.

Weekly inspection records from January 4, 2018 through December 26, 2018 reported minor rutting and erosion along embankment side slopes. Some minor erosion was observed on interior embankment slopes at the time of the annual inspection; however, the erosion does not appear to present an immediate impact to unit stability. No seepage was observed at the time of the annual inspection.

Since the 2017 annual inspection, there have been no noticeable changes in the geometry of the North BAP, or any other changes that appear likely to have affected the stability or operation of the North BAP. Based on information provided by CPS Energy, the maximum depth of the

water and CCR in the North BAP during 2018 was 10 feet, which corresponds to a volume of 50.3 acre-feet. The minimum depth was approximately 0 feet (BAP was emptied).

South Bottom Ash Pond

The South BAP was in use during the inspection, with an estimated freeboard of approximately 12 inches. This is above the recommended operating capacity, corresponding to approximately 6 acre-feet of available capacity (including freeboard), with approximately 63 acre-feet of water and CCR contained. There is no apparent immediate impact to unit stability as a result of the elevated water level; however, according to the *Inflow Design Flood Control Plan* (ERM, 2016), a minimum of 24 inches of freeboard should be maintained to prevent impoundment overtopping in the event of a major rain event.

Grass along the external embankment slopes was observed to be generally well maintained. Some minor erosion was observed on interior and minor rutting was observed on the exterior embankment slopes of the South BAP. This erosion does not appear to impact unit stability. Obstruction of or damage to outfall structures could not be observed since the outfall structure was below the water surface at the time of the annual inspection.

Weekly inspection records from January 4, 2018 through December 26, 2018 reported minor rutting, erosion, and depressions as well as the need for periodic mowing. Minor erosion and rutting were observed at the time of the inspection; however, these features do not appear to present an immediate impact to unit stability. The staff gauge used to monitor the water level should be added to the inspection record for the South BAP.

Since the 2017 annual inspection, there have been no noticeable changes in the geometry of the South BAP, or any other changes that appear likely to have affected the stability or operation of the South BAP. Based on information provided by CPS Energy and observations made during the annual inspection, the maximum depth of the water and CCR in the South BAP during 2018 was 11 feet, which corresponds to a volume of 62.9 acre-feet. The minimum depth was approximately 0 feet (BAP was emptied).

Sludge Recycle Holding (SRH) Ponds

The SRH Ponds contained water at the time of the inspection. Only the North SRH Pond was in use during the inspection. The South SRH Pond appeared to be approximately 75% full with CCR solids and was not in use. The North SRH Pond appeared to have approximately 4 feet of freeboard. This corresponds to an approximate combined available capacity (including freeboard) of 9 acre-feet, with approximately 14 acre-feet of water and CCR contained.

Grass along the external embankment slopes was observed to be generally well maintained. Spillways that flow to the South BAP appeared partially obstructed with sand and plastic sheeting.

Weekly inspection records from January 4, 2018 through December 26, 2018 reported ruts, cracks, tears, blockage, erosion, sloughing, depressions, and the need for periodic mowing. Minor erosion and rutting were observed at the time of the annual inspection; however, these

features do not appear to present an immediate impact to unit stability. No seepage was observed at the time of the annual inspection.

Since the 2017 annual inspection, there have been no noticeable changes in the geometry of the SRH Ponds, or any other changes that appear likely to have affected the stability or operation of the SRH Ponds. Based on information provided by CPS Energy, the maximum depth of the water and CCR in the impoundment during 2018 was 6 feet in both SRH Ponds, which corresponds to a volume of 16.8 acre-ft. The minimum depth was approximately 0 feet (one SRH Pond was emptied while the other was in operation with a water depth of 6 feet), which corresponds to a volume of 8.4 acre-feet.

Fugitive Dust Control

ERM assessed compliance with the *Fugitive Dust Control Plan* (FDCP) in conjunction with the annual inspection. CPS Energy reported no citizen complaints regarding fugitive dust emissions from the CCR units or the handling equipment. Paved roads are reportedly swept several times per month, which is more frequent than the minimum monthly requirement specified in the FDCP. Visual observations are made quarterly at each CCR unit.

Emission observations are recorded on a standard opacity form utilized for non-CCR inspections and not on the form provided in the FDCP. The standard opacity form contains more detailed information than the FDCP form. Emissions were observed and recorded during various operations (i.e., stacking at gypsum pile, truck loading at ash silos/dust collectors, ash dumping at landfill) associated with the CCR units and handling equipment. All reported opacity observations were within the limits of the New Source Performance Standard.

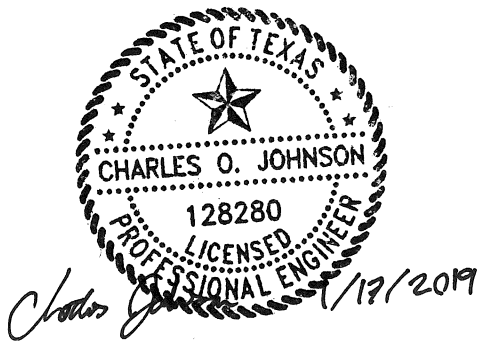
We appreciate the opportunity to work with you on this project. Should you have any questions, please contact us.

Sincerely,

Environmental Resources Management

Charles Johnson

Charles Johnson, P.E.

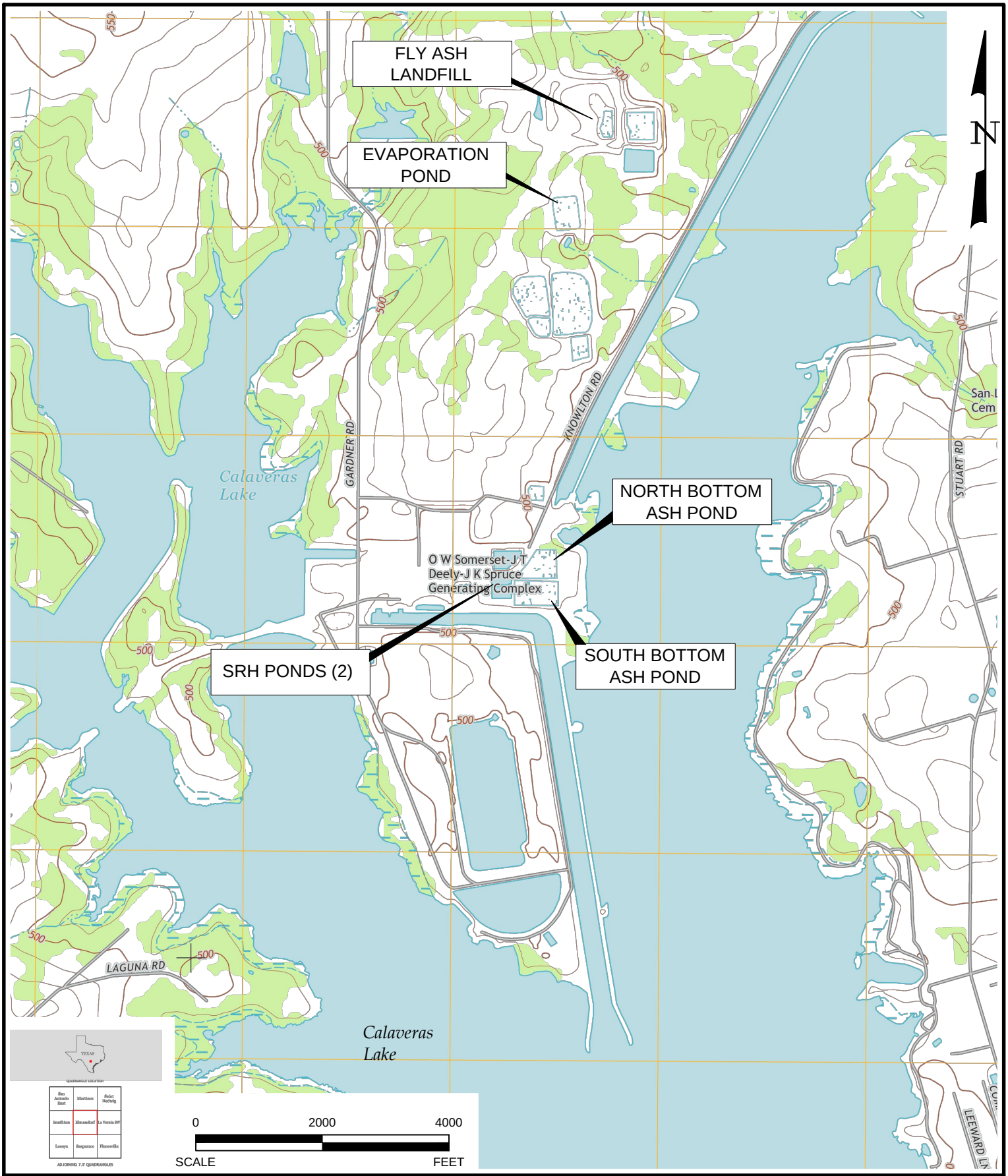


cc: Gregg Tieken, CPS Energy

Attachments

Figure

Environmental Resources Management
206 East 9th Street, Suite 1700
Austin, Texas 78701
(512) 459-4700



Environmental Resources Management

DESIGN: CC	DRAWN: RLM	CHKD.: CC
DATE: 1/5/2016	SCALE: AS SHOWN	REV.:
W.O. NO.: H:\DWG\A16\0328985A01.dwg, 1/5/2016 1:28:34 PM		

FIGURE 1
CCR Unit Locations
J.T. Deely & J.K. Spruce Power Plants
San Antonio, Texas

ERM

Photo Log

Attachment 1

January 2019
Project No. 0352436
CPS Energy

Environmental Resources Management
206 East 9th Street, Suite 1700
Austin, Texas 78701
(512) 459-4700

Photograph: 1	Fly Ash Landfill – standing on eastern berm – facing north. Class 1 landfill located east of Fly Ash Landfill. Photo taken 12/18/18.

Photograph: 2	Fly Ash Landfill – standing on eastern berm – facing west. Photo taken 12/18/18.

Photograph: 3	Fly Ash Landfill – standing on eastern berm – facing west. Radial stacker located in southwest corner of landfill. Photo taken 12/18/18.

Photograph: 4	Fly Ash Landfill – standing on northern berm – facing southwest. Mobile ash conditioning machine located in northwest corner of landfill. Photo taken 12/18/18.

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ERM Project Number 0352436

Photograph: 5	Fly Ash Landfill – standing on northern berm – facing east. Photo taken 12/18/18.

Photograph: 6	Fly Ash Landfill – standing outside the southwest corner of the landfill – facing east. Radial stacker located in southwest corner of landfill. Photo taken 12/18/18.

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Photograph: 7	Fly Ash Landfill – standing outside of southern berm – facing east. Photo taken 12/18/18.

Photograph: 8	Fly Ash Landfill – standing outside of southern berm – facing west. Photo taken 12/18/18.

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ERM Project Number 0352436

Photograph: 9	Fly Ash Landfill – standing outside of northern berm – facing west. Photo taken 12/18/18.

Photograph: 10	Fly Ash Landfill – outside northern berm – facing east. Photo taken 12/18/18.

ERM

CPS Energy
Calaveras Power Station
ERM Project Number 0352436

Photograph: 11	Evaporation Pond – standing on southeast corner – facing west. Photo taken 12/18/18.

Photograph: 12	Evaporation Pond – standing on southeast corner – facing north. Photo taken 12/18/18.

Photograph: 13	Evaporation Pond – standing on northwest corner – facing southeast. Photo taken 12/18/18.

Photograph: 14	Evaporation Pond – standing on northwest corner – facing south. Photo taken 12/18/18.

Photograph: 15	Evaporation Pond – standing outside the northeast corner – facing south. Photo taken 12/18/18.

Photograph: 16	Evaporation Pond – standing outside the southeast corner – facing west. Photo taken 12/18/18.

Photograph: 17	North Bottom Ash Pond – standing on northwest corner – facing east. Photo taken 12/18/18.

Photograph: 18	North Bottom Ash Pond – standing on northwest corner – facing south. Photo taken 12/18/18.

Photograph: 19	North Bottom Ash Pond – standing on southeast corner – facing west. Photo taken 12/18/18.

Photograph: 20	North Bottom Ash Pond – standing on southeast corner – facing north. Photo taken 12/18/18.

Photograph: 21	North Bottom Ash Pond – standing on northern berm – facing east. Woody plant growth noted on northern berm exterior side slope. Photo taken 12/18/18.

Photograph: 22	North Bottom Ash Pond – standing on western berm – facing north. Surficial vegetation damage due to hog activity. Photo taken 12/18/18.

Photograph: 23	South Bottom Ash Pond – standing on eastern berm – facing south. Photo taken 12/18/18.

Photograph: 24	South Bottom Ash Pond – standing on eastern berm – facing north. Minor rutting due to vehicle traffic noted on eastern berm exterior side slope. Photo taken 12/18/18.

Photograph: 25	South Bottom Ash Pond – standing on southeast corner – facing west. Outfall intake noted below water level. Photo taken 12/18/18.

Photograph: 26	South Bottom Ash Pond – standing on southeast corner – facing west. Photo taken 12/18/18.

Photograph: 27	South Bottom Ash Pond – standing on southwest corner – facing north. Photo taken 12/18/18.

Photograph: 28	South Bottom Ash Pond – standing on southwest corner – facing east. Photo taken 12/18/18.

Photograph: 29	North SRH Pond – standing on eastern berm – facing southwest. Photo taken 12/18/18.

Photograph: 30	North SRH Pond – standing on eastern berm – facing northwest. Photo taken 12/18/18

Photograph: 31	North SRH Pond – standing on eastern berm – facing southwest. Spillway structure. Photo taken 12/18/18.

Photograph: 32	North SRH Pond – standing on northeast corner – facing southwest. Photo taken 12/18/18.

Photograph: 33	North SRH Pond – standing on northeast corner – facing west. Photo taken 12/18/18.

Photograph: 34	North SRH Pond – standing on northwest corner – facing south. Photo taken 12/18/18.

Photograph: 35	South SRH Pond – standing outside the southeast corner – facing northwest. Photo taken 12/18/18.

Photograph: 36	South SRH Pond – standing on the southeast corner – facing west. Photo taken 12/18/18.

Photograph: 37	South SRH Pond – standing on the southeast corner – facing northwest. Photo taken 12/18/18.

Photograph: 38	South SRH Pond – standing on the eastern berm – facing northwest. Spillway structure. Photo taken 12/18/18.

Photograph: 39	South SRH Pond – standing on the eastern berm – facing west. Substantially full of solids and not in use. Photo taken 12/18/18.

Photograph: 40	South SRH Pond – standing on the eastern berm – facing southwest. Photo taken 12/18/18.