Environmental Resources Management

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January 13, 2017

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

Project No. 0352436

Subject: CCR Units – 2016 Annual Inspection
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. Chris Cunningham, P.E., on December 20, 2016. Photographs taken during the inspection are provided in Attachment 1. No issues were observed that indicated potential stability or operational issues at the CCR units. Details of the observations made by Mr. Cunningham are provided below.

Unit Descriptions

All units are reportedly built with above-grade earthen embankments 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. Measurements used herein are based on an assessment conducted in June 2014 by CDM Smith, and checked using computer satellite mapping software.

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.

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	530	680	440
Width (feet)	950	400	460	400	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	2:1	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

The Evaporation Pond is reportedly lined with 30-mil high-density polyethylene (HDPE) liner. There are no inlet or outlet structures to the pond. Liquid from boiler chemical cleanouts and other authorized liquid wastes is trucked to the pond, and is allowed to evaporate. Periodically, dried material is removed from the 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 ponds have two discharge points. One 24-inch steel pipe in each pond allows water to be returned to the plant for reuse. Both ponds 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 pond (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 six-inch thick concrete slab. The 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 ponds to clarifiers via two 18-inch steel pipes. Both 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 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 landfill and is allowed to settle. A water quality sample is collected and analyzed prior to discharge through a TPDES permitted outfall.

No instrumentation is associated with the CCR units. All units are located within the Upper San Antonio River watershed; though water in the immediate vicinity drains to Calaveras Lake.

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 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 with a HDPE liner. 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 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 the document entitled "*Geotechnical Engineering Study for Ash Pond Berms – Spruce/Deely Generation Units, San Antonio, Texas*", dated May 7, 2014 by Raba Kistner Consultants, Inc., and are summarized in the reports entitled "*Assessment of Dam Safety*

of Coal Combustion Surface Impoundments Final Report" for the Deely and Spruce power plants, June 2014 revision, by CDM Smith.

As summarized in the CDM Smith report, embankment material is light clay (ASTM "CL") with 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 clay fraction between 50% and 60%, and liquid limit approximately 51; or clayey sand (ASTM "ML") with clay fraction approximately 35% and liquid limit 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

In general, signage was present at each CCR unit and no issues were observed at the CCR units which threatened structural integrity.

Fly Ash Landfill

The Fly Ash Landfill (a.k.a. 5-Year Landfill) was at approximately 39.5% capacity based on calculations provided by CPS Energy. Approximately three acres of the landfill interior were covered with discrete piles of ash, the largest piles appearing to be less than 20 feet in height. Minor surface erosion was observed in the interior of the west embankment, and minor rutting from vehicle traffic at the exterior toe of the north embankment. Animal burrows were observed on the exterior of the north embankment, near the center of the landfill. Most of the observed burrows were one to two inches diameter, though one larger burrow (~six inches) was present. Grass on the exterior of the landfill was less than six inches in height, with no woody plants observed. The erosion and animal burrows do not appear to immediately impact unit stability.

Inspection records from December 15, 2015 through December 8, 2016 reported no problems observed at the Fly Ash Landfill.

Since the 2015 annual inspection, there have been no noticeable changes in the geometry of the landfill, or any other changes that appear likely to have affected the stability or operation of the landfill.

Evaporation Pond

The Evaporation Pond had approximately three feet of freeboard available at the time of the inspection. This corresponds to an available capacity of approximately 19 acre-feet, with approximately 103 acre-feet of water and CCR contained.

Some erosion channels were observed on the interior of the all embankments. Animal burrows were observed on the exterior of the east embankment, near the southwest corner of the impoundment. Most of the observed burrows were one to two inches diameter, though one larger burrow (~six inches) was present. Grass along the external slope of the embankment was observed to be less than six inches high. The erosion and animal burrows do not appear to immediately impact unit stability.

Inspection records from December 15, 2015 through December 8, 2016 reported no problems observed at the Evaporation Pond.

Since the 2015 annual inspection, there have been no noticeable changes in the geometry of the impoundment, or any other changes that appear likely to have affected the stability or operation of the impoundment. Based on information provided by CPS Energy, the maximum depth of the water and CCR in the impoundment during 2016 was 20 feet, which corresponds to a volume of 109 acre-ft. The minimum depth was approximately 19 feet, which corresponds to a volume of 103 acre-ft.

North Bottom Ash Pond

The North BAP was in use during the inspection, with an estimated freeboard of approximately two feet. This is the maximum operating capacity, corresponding to approximately 11.3 acre-feet of capacity, with approximately 55.5 acre-feet of water and CCR contained. Erosion was observed on the interior of the west and northwest embankments. The eroded material appears to be mostly ash, with no evidence of damage to underlying clay. This erosion does not appear to impact unit stability. No obstruction of or damage to outfall structures was observed. Grass along the external slope of the embankment was observed to be less than six inches high.

Inspection records from December 15, 2015 through December 8, 2016 reported no problems observed at the North BAP.

Since the 2015 annual inspection, there have been no noticeable changes in the geometry of the impoundment, or any other changes that appear likely to have affected the stability or operation of the impoundment. Based on information provided by CPS Energy, the maximum depth of the water and CCR in the impoundment during 2016 was 10 feet, which corresponds to a volume of 55.5 acre-ft. The minimum depth since the last inspection was approximately zero feet, when the impoundment was offline for CCR removal.

South Bottom Ash Pond

The South BAP was offline and completely drained of liquid during the inspection. Some shallow (i.e., less than one foot deep) erosion channels were observed on interior of the west embankment of the South BAP. The eroded material appears to be mostly ash, with no evidence of damage to underlying clay. This erosion does not appear to impact unit stability. No obstruction of or damage to outfall structures were observed. Grass along the external slope of the embankment was observed to be less than six inches high.

Inspection records from December 15, 2015 through December 8, 2016 reported no problems observed at the South BAP.

Since the 2015 annual inspection, there have been no noticeable changes in the geometry of the impoundment, or any other changes that appear likely to have affected the stability or operation of the impoundment. Based on information provided by CPS Energy, the maximum depth of the water and CCR in the impoundment during 2016 was 10 feet, which corresponds to a volume of 67.5 acre-ft. The minimum depth is zero feet, as observed during the inspection.

Sludge Recycle Holding (SRH) Ponds

The SRH Ponds contained water at the time of the inspection. The gate on the divider wall between the SRH Ponds was closed, with water approximately one foot deep in the South SRH Pond, and four feet deep in the North SRH Pond, for an average depth of 2.5 feet. This corresponds to an approximate available capacity of 21.5 acre-feet, with approximately 8.7 acre-feet of water and CCR contained. Some erosion channels were observed on interior of the south embankment of the South SRH Pond. The erosion appeared to be primarily of ash, with underlying clay relatively undisturbed. This erosion does not appear to impact the underlying HDPE liner or the unit stability. No obstruction of or damage to outfall structures was observed.

Inspection records from December 15, 2015 through December 8, 2016 reported no problems observed at the SRH Ponds.

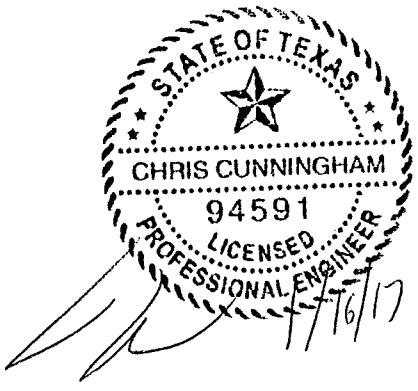
Since the 2015 annual inspection, there have been no noticeable changes in the geometry of the impoundment, or any other changes that appear likely to have affected the stability or operation of the impoundment. Based on information provided by CPS Energy, the maximum depth of the water and CCR in the impoundment during 2016 was six feet in both ponds, which corresponds to a volume of 22 acre-ft. The minimum depth is zero feet in one pond and six feet in the other, which corresponds to a volume of 10.5 acre-ft.

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

Sincerely,

Environmental Resources Management

Chris Cunningham, P.E.



CAC/skd
Attachments

cc: Gregg Tieken, CPS Energy

Figure

January 13, 2017
Project No. 0352436

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CityCentre Four
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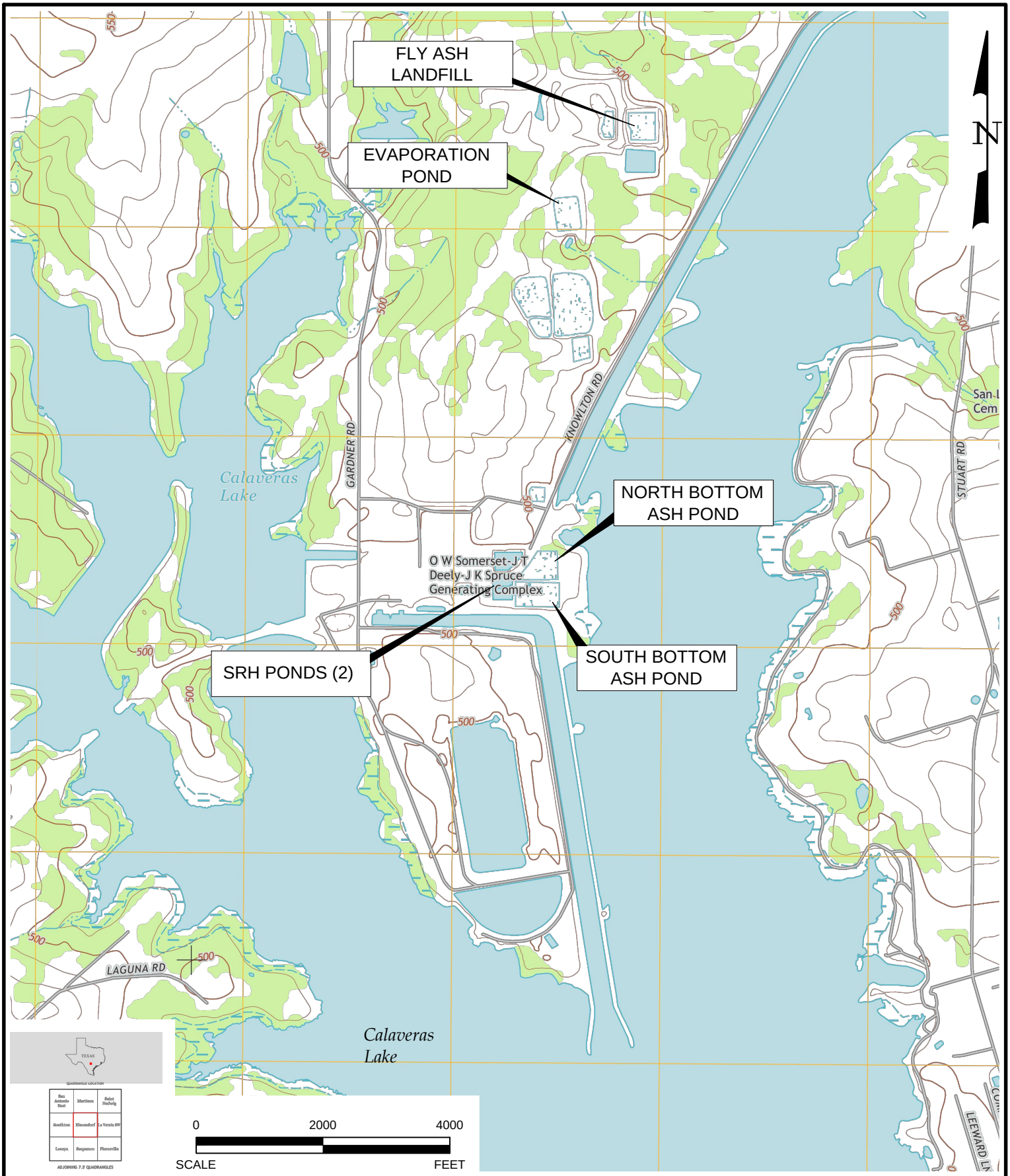

Environmental Resources Management

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FIGURE 1
CCR Unit Locations
Calaveras Power Station
CPS Energy
San Antonio, Texas

ERM

ERM-Southwest, Inc. TX PE Firm No. 2393

P:\Projects\0352436\DM\25120H(fig).pdf

Photo Log

Attachment 1

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840 West Sam Houston Parkway North, Suite 600
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Photograph: 1	Fly Ash Landfill – standing on western berm – facing north. Mobile ash conditioning machine located in northwest corner of landfill. Photo taken 12/20/16.

Photograph: 2	Fly Ash Landfill - standing on western berm – facing northeast. Photo taken 12/20/16.

ERM	**CPS Energy** **Calaveras Power Station** ERM Project Number 0328985

Photograph: 3	Fly Ash Landfill – standing on western berm – facing southeast. Radial stacker located in southwest corner of landfill. Photo taken 12/20/16.

Photograph: 4	Fly Ash Landfill – standing on eastern berm - facing south. Photo taken 12/20/16.

ERM	**CPS Energy** **Calaveras Power Station** ERM Project Number 0328985

Photograph: 5	Fly Ash Landfill – standing on southeast corner of landfill – facing northwest. Rain water accumulates in southeast corner of landfill. Photo taken 12/20/16.

Photograph: 6	Fly Ash Landfill – standing on northern berm – facing west. Rutting at base of slope from vehicles. Photo taken 12/20/16.

Photograph: 7	Fly Ash Landfill – standing on northern berm. Animal burrow in exterior slope. Photo taken 12/20/16.

Photograph: 8	Fly Ash Landfill – standing on southern berm – facing west. Photo taken 12/20/16.

ERM

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Calaveras Power Station
ERM Project Number 0328985

Photograph: 9	Evaporation Pond – standing on northwest corner – facing east. Photo taken 12/20/16.

Photograph: 10	Evaporation Pond – standing on northwest corner – facing south. Photo taken 12/20/16.

ERM

CPS Energy
Calaveras Power Station
ERM Project Number 0328985

Photograph: 11	Evaporation Pond – standing on northeast corner – facing south. Photo taken 12/20/16.

Photograph: 12	Evaporation Pond – standing on southwest corner of pond – facing east. Photo taken 12/20/16.

ERM

CPS Energy
Calaveras Power Station
ERM Project Number 0328985

Photograph: 13	North Bottom Ash Pond – standing on southwestern corner – facing northeast. Photo taken 12/20/16.

Photograph: 14	North Bottom Ash Pond – standing on northern berm – facing east. Photo taken 12/20/16.

Photograph: 15	North Bottom Ash Pond – standing on northern berm – facing south. Photo taken 12/20/16.

Photograph: 16	North Bottom Ash Pond – Erosion features on inside of eastern berm. Photo taken 12/20/16.

Photograph: 17	North Bottom Ash Pond – standing on northeast corner – facing south. Photo taken 12/20/16.

Photograph: 18	North Bottom Ash Pond – standing on southern berm – facing west. Photo taken 12/20/16.

ERM

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Calaveras Power Station
ERM Project Number 0328985

Photograph: 19	North SRH Pond – standing on northwest corner – facing south. Photo taken 12/20/16.

Photograph: 20	North SRH Pond – standing on northwest corner – facing east. Photo taken 12/20/16.

Photograph: 21	North SRH Pond – standing on northeast corner – facing south. Photo taken 12/20/16.

Photograph: 22	North SRH Pond – standing on southeastern corner – facing east. Photo taken 12/20/16.

Photograph: 23	South SRH Pond – standing at southeastern corner – facing northwest. Photo taken 12/20/16.

Photograph: 24	South SRH Pond – standing on western berm – facing north. Photo taken 12/20/16.

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CPS Energy
Calaveras Power Station
ERM Project Number 0328985

Photograph: 25	South SRH Pond – standing on northwestern corner – facing east. Photo taken 12/20/16.

Photograph: 26	South SRH Pond – standing on eastern berm – facing north. Photo taken 12/20/16.

Photograph: 27	South Bottom Ash Pond – standing on southwestern corner – facing north. Photo taken 12/20/16.

Photograph: 28	South Bottom Ash Pond – standing on southern berm – facing west. Outfall structure visible. Photo taken 12/20/16.

Photograph: 29	South Bottom Ash Pond – standing on eastern berm – facing southwest. Erosional features on eastern berm. Photo taken 12/20/16.

Photograph: 30	South Bottom Ash Pond – standing on northwest corner of pond – facing west. Pond was drained to remove residuals. Photo taken 12/20/16.