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Petition for Post-certification License Amendment

Increase in Electrical Production Associated with the Advanced Gas Path/Dry-Low NOx Combustor Project

for the

Cosumnes Power Plant

Sacramento, California
(01-AFC-19C)

Submitted to the:

California Energy Commission

Submitted by:

Sacramento Municipal Utility District Financing Authority

August 2018

With Technical Assistance by:

JACOBS

and

Trinity Consultants

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Executive Summary

The Sacramento Municipal Utility District Financing Authority (SFA) respectfully submits this petition to the California Energy Commission (CEC) for post-certification license modification for the Cosumnes Power Plant (CPP) (01-AFC-19C). The CPP consists of two General Electric (GE) combustion turbines (CT) with unfired heat recovery steam generators (HRSG), a condensing steam turbine (STG), an 8-cell cooling tower, and ancillary facilities. Each CT has a rated generating capacity of 170 megawatts (MW). The STG has a rated capacity of 194 MWs, for a facility total electrical generation rate of 534 MWs.

This petition for post-certification license amendment (Petition to Amend) proposes to operate the CPP utilizing the enhanced capabilities of the installed GE "Power FlexEfficiency Package" including Advanced Gas Path (AGP) components and Dry-Low Oxides of Nitrogen (DLN) combustors, and an oxidation catalyst emission control system (proposed project). The Petition to Amend (PTA) includes the following actions:

- Increase electrical production from the licensed CPP CTs from 340 MWs to 396 MWs[1], an increase of 56 MWs.
- Increase each CT's licensed fuel consumption from 1,865 million British thermal units per hour on a higher heating value (MMBtu/hr-HHV) basis to a heat input of 2,200 MMBtu/hour-HHV.
- The increased fuel consumption will increase the STG output from 194 MWs to 207 MWs[2].
- Overall CPP electrical output increases from 534 MWs to 603 MWs, an increase of 69 MWs.
- Increase air emission limits commensurate with the increased fuel consumption.

CPP was licensed as a 1,000 MW project consisting of two power blocks of 500 MWs each. To date, SFA has only constructed one of the power blocks, therefore the proposed increase in electrical output is well within the electrical generation envisioned for the site.

The Commission approved the construction-related impacts of the proposed project on January 8, 2018 pending the assignment of the delegated Chief Building Official (DCBO).

SFA expects the Sacramento Metropolitan Air Quality Management District (SMAQMD) to issue a Determination of Compliance (DOC) that will result in the modification of the Air Quality Conditions of Certifications (COC). As such, SFA is not proposing changes to the Air Quality COCs, but will wait for the SMAQMD to issue the DOC with revised permit conditions.

The environmental impacts assessment presented in Section 3 concludes that there will be no significant environmental impacts associated with the implementation of the actions specified in this Petition to Amend, and that the project, as modified, will comply with all applicable laws, ordinances, regulations, and standards.

[1] At 59 degrees Fahrenheit (F) and 60 percent relative humidity.
[2] At 59 degrees Fahrenheit (F) and 60 percent relative humidity.

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1. Introduction

1.1 Background

The CEC approved the CPP project in September 2003 (CEC, 2003a). The project is located adjacent to the former Rancho Seco Nuclear Plant in southern Sacramento County. Submitted in September 2001, the Application for Certification (AFC) for the CPP analyzed the impacts associated with four GE Model 7241FA CTs exhausting into four unfired HRSG units (01-AFC-19) (SMUD, 2001). The initial operation of Phase 1 of the CPP (two gas turbines, two HRSGs, one condensing steam turbine, one cooling tower) began in October 2005 and this phase of the project has been in commercial operation since February 2006.

SFA submitted a Petition to Amend the CEC license in November 2007. The purpose of the Amendment was to make the CPP project description and air quality Conditions of Certification (COC) consistent with the modified cooling tower specifications and operating parameters. The CEC approved the Petition to Amend in June 2008 (CEC, 2008).

SFA submitted a Petition to Amend in February 2009 to address increased total suspended and dissolved solids in the water supply. The Petition to Amend was approved by the CEC in April 2009 (CEC, 2009).

SFA submitted a Petition to Amend in December 2010 to allow the use of digester gas in the natural gas supply line serving CPP, refine the total dissolved solids levels in the cooling tower recirculation water to match the water filtration system's performance, and to remove the peak flow condition from the Conditions of Certification. The Petition to Amend was approved by the CEC in November 2011.

In December 2017, SFA submitted an informational petition regarding the installation of advanced gas path components, dry-low oxides of nitrogen 2.6+ combustors, and an oxidation catalyst emission control system on the combustion turbines and heat recovery steam generators. Commission staff reviewed the proposed activities and determined that they did not require the submittal of a Petition to Amend and that implementation of the existing Conditions of Certification would ensure no impacts resulted from the activities.

1.2 Overview of Proposed Amendments

This Petition to Amend addresses the operational impacts associated with the installation of the AGP components, DLN combustors, and an oxidation catalyst emission control system. The construction related impacts were determined by the CEC to not require the submittal of a post-certification amendment. The CEC determined that implementation of the COCs and assignment of a DCBO would ensure continued compliance with applicable LORS and that no significant impacts would occur.[3]

The licensed electrical output of CPP is 534 MWs, and the implementation of the proposed project increases the electrical output to 603 MWs, an increase of 69 MWs. Each CT was capable of producing up to 170 MWs, however with the installation of the AGP and DLN2.6+ combustors, they are capable of producing up to 198 MWs[4] each, an increase of 28 MWs each. CPP was licensed as a 1,000 MW project consisting of two power blocks of 500 MWs each. To date, SFA has only constructed one of the power blocks, therefore the proposed increase in electrical output is well within the electrical generation envisioned for the site.

This increased electrical output will require an increase in fuel consumption of approximately 335 MMBtu/hr-HHV, resulting in a maximum heat input per CT of 2,200 MMBtu/hr-HHV.

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[3] Letter from the Christine Root/Compliance Office Manager to Dave Blevins/CPP Plant Manager, January 8, 2018.
[4] At 59 degrees Fahrenheit (F) and 60 percent relative humidity.

The increase in CT fuel consumption will result in a slightly higher CT exhaust flow rate, which in turn will result in an increase in the STG electrical output. The current STG output is approximately 194 MWs and after the implementation of the proposed project, the STG output increases to 207 MWs[5]. The CPP electrical production after the implementation of the proposed project is expected to be 6603 MWs (396 MWs from the CTs and 207 MWs from the STG), an overall increase of 69 MWs.

The installation of the GE "Power FlexEfficiency Package" AGP components with DLN combustors (DLN2.6+), and the oxidation catalyst emission control systems was approved as an operational maintenance activity in January 2018. Therefore, this PTA only addresses the operational impacts of the proposed project.

Detailed descriptions of the proposed modifications are included in Section 2.

This Petition to Amend contains all of the information that is required pursuant to the CEC's Siting Regulations (California Code of Regulations [CCR] Title 20, Section 1769, Post Certification Amendments and Changes). The information necessary to fulfill the requirements of Section 1769 is contained in Sections 1 through 6 as summarized in Table 1.2-1.

TABLE 1.2-1
Informational Requirements for Post-certification Modifications

Section 1769 Requirement	Section of Petition Fulfilling Requirement
(A) A complete description of the proposed modifications, including new language for any conditions that will be affected	Section 2— Proposed modifications Section 3 — Proposed changes to COCs, if necessary, are located at the end of each technical section
(B) A discussion of the necessity for the proposed modifications	Section 1.3
(C) If the modification is based on information that was known by the petitioner during the certification proceeding, an explanation why the issue was not raised at that time	Section 1.3
(D) If the modification is based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision, an explanation of why the change should be permitted	Sections 1.4 and 3.0
(E) An analysis of the impacts the modification may have on the environment and proposed measures to mitigate any significant adverse impacts	Section 3
(F) A discussion of the impact of the modification on the facility's ability to comply with applicable laws, ordinances, regulations, and standards;	Section 3
(G) A discussion of how the modification affects the public	Section 4
(H) A list of property owners potentially affected by the modification	Section 5
(I) A discussion of the potential effect on nearby property owners, the public and the parties in the application proceedings.	Section 6

[5] At 59 degrees Fahrenheit (F) and 60 percent relative humidity.

TABLE 1.2-1
Informational Requirements for Post-certification Modifications

Section 1769 Requirement	Section of Petition Fulfilling Requirement

1.3 Necessity of Proposed Changes

The CEC Siting Regulations require a discussion of the necessity for the proposed revisions to CPP certification and whether the amendment is based on information known by the petitioner during the certification proceeding (Title 20, CCR, Sections 1769 (a)(1)(B), and (C)). This Petition to Amend proposes to increase electrical production and fuel consumption from the installation of upgraded original equipment manufacturer compressor and combustor components, which were not available at the time of licensing.

1.4 Consistency of Changes with Certification

The CEC Siting Regulations also require a discussion of the consistency of the proposed project revision with the applicable laws, ordinances, regulations, and standards (LORS) and whether the modifications are based on new information that changes or undermines the assumptions, rationale, findings, or other basis of the final decision (Title 20, CCR Section 1769 (a)(1)(D)). If the project is no longer consistent with the certification, the Petition to Amend must provide an explanation why the modification should be permitted.

The proposed project modifications are consistent with all applicable LORS, as discussed in Section 3, and this Petition to Amend is not based on new information that changes or undermines any basis for the final decision. The proposed project change would allow the CPP facility to continue to run efficiently, and to meet environmental goals and the current increased demand for electricity. The CPP facility would continue to operate in compliance with all applicable LORS. Therefore, the findings and conclusions contained in the Commission Decision for CPP (CEC, 2003a) and subsequent amendments would remain applicable to the project, as modified.

1.5 Summary of Environmental Impacts

The CEC Siting Regulations require that an analysis be conducted to address the potential impacts the proposed modifications may have on the environment and proposed measures to mitigate any potentially significant adverse impacts (Title 20, CCR, Section 1769 (a)(1)(E)). The regulations also require a discussion of the impact of the modification on the facility's ability to comply with applicable LORS (Section 1769 (1)(a)(F)). Section 3 of this Petition to Amend includes a discussion of the potential environmental impacts associated with the modifications as well as a discussion of the consistency of the modification with LORS. Section 3 also includes updated environmental baseline information if changes have occurred since the AFC was prepared that would have a bearing on the environmental analysis of this Petition to Amend. Section 3 concludes that there will be no significant environmental impacts associated with implementing the actions specified in this Petition to Amend and that the project, as modified, will comply with all applicable LORS.

1.6 Conditions of Certification

This Petition to Amend proposes to change the Air Quality COCs based on the SMAQMD's issuance of a DOC with revised permit conditions. No other changes to any other COCs are proposed in this post-certification amendment.

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2. Description of Proposed Amendments

This section includes a description of the proposed project modifications, consistent with CEC Siting Regulations (Title 20, CCR, Section 1769 (a)(1)(A)).

SFA has installed upgraded advanced gas path (AGP) and oxidation catalyst components as part of a previously scheduled maintenance event at CPP. The upgraded AGP/catalyst components are functionally identical to those scheduled for replacement, but with slight performance improvements that result in increased electrical output and efficiency, with a slightly higher fuel consumption.

2.1 Advanced Gas Path/Dry Low-NO_X and Oxidation Catalyst Description

2.1.1 Advanced Gas Path/Dry Low-NOX

The upgraded AGP components include redesigned compressor blades and stator vanes (R0 and S0), and an improved SpeedTronic Control system. These upgraded components complement the other AGP upgrades and increase potential electrical output.

The upgraded combustion components include new DLN2.6+ combustors, fuel nozzles, cap, transition pieces, and liners. In addition to the upgraded combustion components, upgraded power turbine components will be installed. These components include new Stage 1 nozzles, shrouds, and buckets, and Stages 2 and 3 nozzles/buckets.

These components improve turndown capabilities, increase hot gas path maintenance cycles to 32,000 operating hours or 1,250 start cycles, and simplify future maintenance with quick disconnect flanges. Other benefits include a heat rate improvement of up to 2 percent and up to 69 MWs of additional generation.

2.1.2 Oxidation Catalyst

The oxidation catalyst systems were installed in the HRSG at a location that minimizes impacts to heat recovery and optimizes the oxidation catalyst system's performance. The installation required HRSG tube bundles to be removed to make space for the oxidation catalyst. Once space in the HRSG was created, an oxidation catalyst support structure was erected within the HRSG and the catalyst loaded. The oxidation catalyst system does not require any reactants to function and no additional support systems are required.

2.2 Electrical Output Increase Associated with the AGP/DLN

The licensed electrical output of CPP is 534 MWs, and the implementation of the proposed project would increase the electrical output to 603 MWs, an increase of 69 MWs. Each CT was capable of producing up to 170 MWs and the installation of the AGP/DLN2.6+ combustors enabled an increase in electrical production of up to 198 MWs[6] per CT.

Achievement of this increased electrical output will require an increase in fuel consumption by approximately 335 MMBtu/hr-HHV, resulting in a maximum heat input per CT of 2,200 MMBtu/hr-HHV.

The increase in CT fuel consumption will result in a slightly higher CT exhaust flow rate, which in turn will result in an increase in the STG electrical output. The current STG output is approximately 194 MWs and after the implementation of the proposed project, the STG output will increase to 207 MWs[7]. The CPP electrical production after the implementation of the proposed project is expected to be 603 MWs (396 MWs from the CTs and 207 MWs from the STG), an overall increase of 69 MWs. No changes to the STG cooling system are expected due to the slightly higher electrical output of the STG.

[6] At 59 degrees Fahrenheit (F) and 60 percent relative humidity.
[7] At 59 degrees Fahrenheit (F) and 60 percent relative humidity.

Section 2: Description of Proposed Amendments

The installation of the GE “Power FlexEfficiency Package” AGP components with DLN combustors (DLN2.6+), and the oxidation catalyst emission control systems was approved as an operational maintenance activity in January 2018. Therefore, this PTA only addresses the operational impacts (the increased electrical production) from the proposed changes to operation of the components.

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3. Environmental Analysis of Proposed Amendments

The proposed modifications to the CPP would be limited to the operational impacts associated with the previously installed AGP/DLN2.6+ components and the oxidation catalyst systems. No ground disturbance or excavation is expected and no other physical changes to CPP are planned. As a result, the environmental analysis for most of the environmental disciplines does not differ significantly from that described in the AFC and the impacts associated with this Petition to Amend would be less than significant. However, for completeness, a review of the impacts and LORS compliance is provided for applicable topic areas.

The following subsections present a discussion of the potential impacts that the proposed changes may have on the environmental analysis as presented in applicable sections of the AFC. Each discussion includes an environmental analysis, an assessment of compliance with applicable LORS, proposed mitigation measures, and, if applicable, proposed changes to the COCs that are necessary as a result of project modifications.

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3.1 Air Quality and Greenhouse Gases

3.1.1 Environmental Baseline Information

The air quality or greenhouse gases (GHG) environmental baseline information described in the AFC require updating. Table 3.1-1 presents the National and State Ambient Air Quality Standards (NAAQS and CAAQS) which will be used, in combination with measured ambient pollutant concentrations, to assess the Petition's air quality impacts.

TABLE 3.1-1
National and State Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS Standard[1]	Units	CAAQS Standard[2]	Units
CO	1 Hour	35	ppm	20	ppm
	8 Hour	9	ppm	9	ppm
NO_2	1 Hour	100	ppb	0.18	ppm
	Annual	53	ppb	0.03	ppm
$PM_{2.5}$	24 Hour	35	$\mu g/m^3$	--	--
	Annual	12	$\mu g/m^3$	12	$\mu g/m^3$
PM_{10}	24 Hour	150	$\mu g/m^3$	50	$\mu g/m^3$
	Annual	--	--	20	$\mu g/m^3$
SO_2	1 Hour	75	ppb	0.25	ppm
	3 Hour	0.5	ppm	--	--
	24 Hour	--	--	0.04	ppm

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1
1. NAAQS Standards come from https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed 6/8/2018
2. CAAQS Standards come from https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed 6/8/2018

The project is located in Sacramento County, which is within the Sacramento Metropolitan Air Quality Management District's (SMAQMD) jurisdiction. The SMAQMD is delegated authority to implement state and federal air quality regulations. The SMAQMD also monitors and reports the status of the county's air quality attainment of the CAAQS and NAAQS. Table 3.1-2 presents the attainment status for Sacramento County.

TABLE 3.1-2
State and Federal Air Quality Designations for Sacramento County, California

Pollutant	State Designation	Federal Designation
Ozone	1-hour: Nonattainment 8-hour: Nonattainment	1-hour: Attainment 8-hour: Nonattainment (Severe)
CO	1-hour: Attainment 8-hour: Attainment	1-hour: Attainment 8-hour: Attainment

TABLE 3.1-2
State and Federal Air Quality Designations for Sacramento County, California

Pollutant	State Designation	Federal Designation
NO2	1-hour: Attainment (2012) Annual: Attainment	1-hour: Unclassified/Attainment (2012) Annual: Attainment (2012)
SO2	1-hour: Attainment 24-hour: Attainment	1-hour: Attainment/Unclassified 24-hour: N/A
PM10	24-hour: Nonattainment Annual: Nonattainment	24-hour: Attainment Annual: N/A
PM2.5	24-hour: Attainment Annual: Attainment	24-hour: Nonattainment Annual: Attainment
Lead	Attainment	Attainment
H2S, Sulfates, Visibility, Vinyl Chloride	NA	Attainment/Unclassified

Notes:
N/A = Not applicable (i.e., no standard)
Sources: http://www.airquality.org/Air-Quality-Health/Air-Quality-Pollutants-and-Standards

Background values for the NAAQS and CAAQS were obtained from the EPA Air Data Air Quality Design Values website[8], calculated using the EPA Air Data Monitor Values Report[9] and obtained from the California Air Resources Board (CARB) iADAM Air Quality Data Statistics[10]. A summary of background values are shown in Table 3.1-3.

TABLE 3.1-3
2016 Ambient Design Values for CPP

Pollutant	Averaging Period	NAAQS Design Value	CAAQS Design Value
CO (ppm)	1 Hour	2.4	2.4
	8 Hour	1.7	1.7
NO_2 (ppb)	1 Hour	22	60
	Annual	13	11
$PM_{2.5}$ ($\mu g/m^3$)	24 Hour	31	--
	Annual	9.3	6

[8] https://www.epa.gov/air-trends/air-quality-design-values

[9] https://www.epa.gov/outdoor-air-quality-data/monitor-values-report
[10] https://arb.ca.gov/adam

TABLE 3.1-3
2016 Ambient Design Values for CPP

Pollutant	Averaging Period	NAAQS Design Value	CAAQS Design Value
$PM_{10}(\mu g/m^3)$	24 Hour	44.67	46
	Annual	--	19.5
SO_2 (ppb)	1 Hour	7	9.7
	3 Hour	No Data Available	No Data Available
	24 Hour	8.9	8.9

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1
ppm = parts per million
ppb = parts per billion
$\mu g/m^3$ = micrograms per cubic meter
1. NAAQS design values were obtained from the EPA Air Data Air Quality Design Values website
2. CAAQS design values were obtained from the CARB iADAM Air Quality Data Statistics website
3. iAdam was used for PM_{10} NAAQS because the EPA Air Data site did not designate PM_{10} design values.
4. No data is available for the SO_2 3 hour standard because the standard is exclusive to secondary formation.

3.1.2 Environmental Consequences

The increased fuel consumption from the proposed change in operation of the CPP turbines will result in an increase in CPP's potential to emit (PTE) air emissions. Table 3.1-4 presents the existing CPP permitted hourly, daily, quarterly, and annual CPP PTE emission limits.

TABLE 3.1-4
CPP Permitted PTE Emission Limits[1,2]

Pollutant	lb/hr	lb/day	1st Quarter Pounds	2nd Quarter Pounds	3rd Quarter Pounds	4th Quarter Pounds	Annual tons/year
VOC	3.30	117.3	7,403	7,479	7,555	7,555	30.0
NOx	13.51	523.7	31,010	31,321	31,632	31,632	96.0
SO_2	1.67	40.1	3,095	3,130	3,164	3,164	12.6
PM_{10}	9.00	216.0	19,440	19,656	19,872	19,872	80.6
$PM_{2.5}$	--	--	19,401	19,617	19,832	19,832	79.3
CO	16.46	3,051.7	73,965	74,343	74,722	74,722	123.1
CO_{2e} (tons)	--	--	467,351	472,544	477,737	477,737	1,895,368

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1
[1]Hourly, daily, and quarterly emissions are for a single turbine, annual emissions are a facility total.
[2]Emissions are per turbine except for annual, which is facility total.

The proposed emissions are summarized in Table 3.1-5. Short term emissions (hourly and daily) are based on a combustion turbine heat input of 2,200 MMBtu/hr with 3 hours of startup per day.

Quarterly emissions for VOC, NOx, $PM_{10}/PM_{2.5}$, and CO are based on current permit limits. SO_2 and greenhouse gas (GHG) CO_2 equivalent (CO_{2e}) emissions are based on operating 8,760 hours per year at full load. The proposed annual emission limits presented in Table 3.1-5 are less than the sum of the quarterly emissions totals for NOx, PM_{10}, $PM_{2.5}$, and CO in order to avoid Prevention of Significant Deterioration (PSD) review for the proposed modification.

TABLE 3.1-5
CPP Post-Modification Emissions[1]

Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Sum of Quarters tons/year	Annual tons/yr
VOC	3.95	131.0	7,403	7,479	7,555	7,555	30.0	30.0
NOx	16.21	580.4	31,010	31,321	31,632	31,632	125.6	96.0
SO_2	1.91	45.8	4,126	4,171	4,217	4,217	16.7	16.7
PM_{10}	10.63	255.1	19,440	19,656	19,872	19,872	78.8	80.6
$PM_{2.5}$	--	--	19,401	19,617	19,832	19,832	78.7	79.3
CO	19.73	3,120.3	73,965	74,343	74,722	74,722	297.8	99.4
CO_{2e} (tons)	--	--	556,450	562,633	568,816	568,816	2,256,714	2,256,714

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1
[1] Hourly, daily, and quarterly emissions are for a single turbine, annual emissions are a facility total.

The increases in the PTE (comparison of pre- and post-Project maximum potential emissions) for the proposed CPP modification are summarized in Table 3.1-6.

TABLE 3.1-6
Proposed Change in the CPP PTE[1]

Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Proposed Annual tons/yr
VOC	0.65	13.7	0	0	0	0	0.0
NOx	2.70	56.7	0	0	0	0	0.0
SO_2	0.24	5.7	1,031	1,041	1,053	1,053	4.1
PM_{10}	1.63	39.1	0	0	0	0	0.0
$PM_{2.5}$	--	--	0	0	0	0	0.0
CO	3.27	68.6	0	0	0	0	-23.7
CO_{2e} (tons)	--	--	89,099	90,089	91,079	91,079	361,346

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1.
[1] Hourly, daily, and quarterly emissions are for a single turbine, annual emissions are a facility total.

3.1.3 Regulatory Requirements

3.1.3.1 Federal Regulations

The federal pre-construction PSD program for sources subject to PSD pre-construction review permitting applies to sources located in attainment areas, which are classified as major sources. The CPP is located in an area that attains the NAAQS for all criteria pollutants except 24-hour PM2.5 standard, therefore the PSD program applies to CPP. CPP is classified as a fossil fuel-fired steam electric plan with a heat input greater than 250 MMBtu/hr, which requires a major source threshold of 100 tons per year to be applied. As shown in Table 3.1-5, CPP is not proposing any annual criteria pollutant emissions more than 100 tons per year. Therefore, PSD review does not apply to the proposed modifications to CPP and a comparison of CPP's net increase in air emissions is not applicable to determine if there is a significant net increase in emissions.

The federal operating permit program (Title V) and prohibitory rules applicable to CPP will be addressed below in the Local Regulations discussion.

3.1.3.2 Local Regulations

The SMAQMD has promulgated rules governing the need for sources to apply for pre-construction/operating permits, and prohibitory rules. Below is an analysis of the SMAQMD rules applicable to CPP due to the proposed modification.

3.1.3.2.1 Rule 201 – General Permit Requirements

Rule 201 states that any facility building, erecting, installing, altering, or replacing non-exempt equipment that causes or controls the emission of air pollutants must first obtain an authority to construct from the SMAQMD. Because the CPP combustion turbines were altered, SFA submitted an authority to construct application to the SMAQMD. Appendix 3.1 presents a copy of the submitted application.

3.1.3.2.2 Rule 202 – New Source Review

Rule 202 provides for preconstruction review of new or modified facilities, to ensure that affected sources do not interfere with the attainment of ambient air quality standards. In general, Rule 202 contains three separate elements as part of a New Source Review (NSR) analysis:

- Best Available Control Technology (BACT);
- Emission Offsets; and
- Air Quality Impact Analysis.

These NSR elements apply to CPP only if CPP is defined as a "major stationary source" and then whether the proposed modification meets the SMAQMD's definition of a "major modification."

CPP is a "major stationary source" per Rule 202, section 228 for NOx, VOC, $PM_{2.5}$, and CO per the information presented in Table 3.1-7.

TABLE 3.1-7
SMAQMD Major Stationary Source Applicability Determination (tpy)

Pollutant	Major Source Threshold	Proposed Permit Limit	Major Source?
VOC	25	30.0	**YES**
NOx	25 (or 100 tpy as $PM_{2.5}$ precursor)	96.0	**YES**

TABLE 3.1-7
SMAQMD Major Stationary Source Applicability Determination (tpy)

Pollutant	Major Source Threshold	Proposed Permit Limit	Major Source?
SO_2	100	16.7	**NO**
PM_{10}	100	41.3	**NO**
$PM_{2.5}$	100	40.5	**NO**
CO	100	99.4	**NO**

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1

For the pollutants CO, SO_2, PM_{10}, and $PM_{2.5}$, which do not result in a "major stationary source" determination, emission increases are calculated pursuant to Rule 202, Sections 411 and 225 based on a comparison of "historic potential emissions" to future potential emissions.

For the pollutants VOC and NOx, which result in a major stationary source determination, it must be determined whether the project is a "major modification" for these pollutants. Emission increases are determined by the calculation method in Rule 202, Section 411.5:

> *The sum of the Potential to Emit for the project minus the Historic Actual Emissions, as defined in Section 224.1, for the project. However, the potential to emit, instead of historic actual emissions, can be used for emissions units if either of the following conditions applies:*
>
> *a. Actual emissions are at least 80% of the potential to emit limit, or*
>
> *b. The emissions unit was fully offset for any emissions increase during the 5 year period prior to the date that the application is deemed complete.*

CPP has not had a permitted project at the site that required offsets in the last five years. Therefore, the next step is to check whether "actual emissions are at least 80% of the potential to emit limit." SMAQMD regulations do not specify how this "actual emissions" value is calculated. "Actual emissions" are defined in Rule 202 and do not include a time period reference. However, SMAQMD staff requires that "actual emissions" be determined by averaging the actual historic emissions over the immediately preceding two-year (24-consecutive month) period. Therefore, SFA compiled the two-year average actual emission rates for the "major" pollutants (NOx and VOC) and compared them to the CPP annual NOx and VOC emission limits. If the actual total annual (12-month average) emission rate is less than 80% of the CPP annual permit limit, the Project must then use these baseline "historic actual emissions" to determine whether a "major modification" has occurred.

A "major modification" is defined in Rule 202, Section 227 as any physical change, change in method of operation, or addition to any stationary source classified as a "major source" that results in emission increases above the levels specified in Section 227. The emission increase calculation is based on the same procedure described above for determining the 80% of potential to emit value.

Attachment 3.1, Appendix C includes the two-year baseline calculation. The SMAQMD determines "normal source operations" based on the electrical output of the turbines, not on emissions. The previous two-year period, beginning April 2018, results in an average 12-month normal source operation of 2,308,875 MWs. The average 12-month normal source operation for the previous 60-month (five-year) period, beginning April 2018, is 2,555,530 MWs. The normal source operation of 2,308,875 MWs for the previous two-year period is the lowest normal source operation for the entire 60-month period. Therefore, the previous two-year period is "unrepresentative of normal source

operations" pursuant to Rule 202, Section 224.1, and consequently SFA may use "any two consecutive years of the last 5-years that represent normal source operation."

The two-year period in the last five years that is most representative of normal source operation is the two-year period ending February 2017, when 12-month average MW production was 2,604,892 MWs, which is close to the 60-month average of 2,555,530 MWs.

Table 3.1-8 compares the historic actual emissions for the two-year period ending February 2017 to the CPP potential to emit for comparison to the 80% threshold.

TABLE 3.1-8
Rule 202 CPP Potential to Emit Comparison

Pollutant	CPP Actual Emissions Baseline (tpy)	CPP Potential to Emit Permit Limit (tpy)	Percent of Potential to Emit	Actual at Least 80% of PTE?
VOC	5.2	30.0	**17.3%**	**NO**
NOx	71.1	96.0	**74.1**	**NO**

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1

As indicated in Table 3.1-8, no emissions are greater than 80% of the CPP PTE during the normal source operation period; therefore, none of these pollutants can use the potential to emit of the existing turbines to determine if there is an emissions increase and must use the historic actual to future potential emissions test to determine if the proposed modification to CPP is a major modification. This test subtracts the historic actual emissions over the last two years from the future PTE permit limits proposed. Table 3.1-9 presents this comparison for CPP, showing that the proposed CPP modification is not considered a major modification.

TABLE 3.1-9
SMAQMD Major Modification Applicability Determination (tpy)

Pollutant	CPP Actual Emissions	CPP Future Potential to Emit	Actual to Potential Increase	Major Modification Threshold	Major Modification?
NOx	71.1	96.0	24.9	25	**NO**
VOC	5.2	30.0	24.8	25	**NO**

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1

3.1.3.2.3 Rule 202 – Best Available Control Technology

Rule 202, Section 301 requires projects apply the Best Available Control Technology (BACT) to a new emissions unit or modification of an existing emissions unit for each emissions change of a regulated air pollutant, if the change would result in any emission increase (except for CO). If the modification is defined as a major modification, then BACT must be applied for each regulated pollutant that triggers major modification requirements. The proposed modification to CPP does not result in a major modification for any regulated pollutant and no CPP pollutants trigger BACT as major modifications.

For all pollutants that do not result in a major modification designation, Rule 202 requires a comparison of historic potential emissions to future potential emissions on a daily basis. Table 3.1-6 shows an increase in daily potential emissions for all pollutants. However, the increase in CO emissions is below 550 lb/day; therefore, BACT is triggered for all pollutants except CO.

BACT for combustion turbines primarily includes good combustion practices and natural gas fuel. BACT for NOx is proposed at 2.0 ppm corrected to 15% oxygen, averaged over a 1-hour period utilizing the existing selective catalytic reduction system, which is the current CPP permit limit. This is the lowest achieved in practice BACT level found after reviewing other state air districts and California Air Pollution Control Officers Association (CAPCOA) BACT guidance documents. CAPCOA lists the IDC Bellingham (Massachusetts) project as permitted at 1.5 ppm NOx at 15% oxygen, but this project was never built.

Table 3.1-10 summarizes the NOx BACT guidelines for combined cycle gas turbines reviewed for CPP, as well as the CAPCOA guidance.

TABLE 3.1-10
NOx BACT Determinations for Combined-Cycle Gas Turbines[1]

District	Source Description	Achieved in Practice	Technologically Feasible	Date	Reference Number
CAPCOA	170 MW Gas Turbine	2 ppmvd @ 15% O_2, 1 hr avg	1.5 ppmvd @15%O_2, 1 hr avg	12/12/03 9/11/00	SJVAPCD, IDC Bellingham
SJVAPCD	Gas Turbine $\geq$50 MW, with heat recovery	2.5 ppmvd @ 15% O_2, 1 hr avg	2.0 ppmvd 15%O_2, 1 hr avg	10/01/02	Guideline 3.4.2
BAAQMD	Combined Cycle Gas Turbine $\geq$40 MW	2.5 ppmvd @ 15% O_2, 1 hr avg	2.0 ppmvd @15%O_2, 1 hr avg	07/18/03	Document 89.1.6
SCAQMD	Combined Cycle Gas Turbine, 328 MW	2.0 ppmvd @ 15% O_2, 3-hr avg	NA	01/30/04	Application 386305

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1

[1] No determination was available from the Sacramento Metropolitan Air Quality Management District.

3.1.3.2.4 Rule 202 – Emission Offsets

Rule 202 requires that emission offsets be provided on a per-pollutant basis for increases in quarterly emissions from a new or modified emissions unit if the stationary source's post-project potential to emit exceeds the levels specified in the rule. Table 3.1-11 shows that CPP exceeds the Rule 202 offset trigger levels for all pollutants except SOx.

TABLE 3.1-11
CPP Rule 202 Offsets Applicability

Pollutant	Offset Liability (lb/quarter) [1]	Rule 202 Offsets Threshold (lb/quarter)	Above Offsets Threshold?
NOx	63,264	5,000	Yes
CO[2]	149,444	49,500	Yes
PM_{10}	39,744	7,300	Yes
$PM_{2.5}$	79.3 tpy	15 tpy	Yes
VOC/ROC	15,110	5,000	Yes
SOx	8,434	13,650	No

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1
Notes:
1. Presented previously in Table 3.1-5 and includes emissions from both combustion turbines.
2. CO emissions offsets are not required pursuant to Rule 202, Section 302.7 if the modeled increase in ambient CO concentration does not exceed 500 micrograms per cubic meter, 8-hour average, at and beyond the property line of the stationary source.

The quantities of offsets required are determined by calculating the emission increases as the potential to emit minus the Historic Potential Emissions. Historic Potential Emissions are based on permitted quarterly emission limits, except for $PM_{2.5}$ which is calculated on an annual basis. Table 3.1-12 shows that the calculated emissions do not result in an increase in emissions and that no emission offsets are required.

TABLE 3.1-12
Calculation of Offsets Emission Increase

Pollutant	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Annual tons/year
Offsets Baseline (2 turbines)					
VOC	14,806	14,958	15,110	15,110	30.0
NOx	62,020	62,642	63,264	63,264	125.6
PM_{10}	38,880	39,312	39,744	39,744	78.8
$PM_{2.5}$	--	--	--	--	78.7
Proposed Emissions (2 turbines)					
VOC	14,806	14,958	15,110	15,110	30.0
NOx	62,020	62,642	63,264	63,264	125.6
PM_{10}	38,880	39,312	39,744	39,744	78.8
$PM_{2.5}$	--	--	--	--	78.7

TABLE 3.1-12
Calculation of Offsets Emission Increase

Pollutant	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Annual tons/year
Offsets Increase (2 turbines)					
VOC	0	0	0	0	0.0
NOx	0	0	0	0	0.0
PM_{10}	0	0	0	0	0.0
$PM_{2.5}$	--	--	--	--	0.0

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1

3.1.3.2.5 Rule 202 - Ambient Air Quality Impact Analysis

Rule 202 prohibits a new or modified stationary source from interfering with the attainment or maintenance of an applicable ambient air quality standard. An ambient air quality impact analysis is required for a new major source or major modification, but the proposed CPP modification is neither a new major source nor a major modification as indicated in Tables 3.1-7 through 3.1-9. Nonetheless, Table 3.1-13 shows the maximum modeled ambient impacts for the increases in hourly and daily emissions. The detailed modeling outputs, operating scenarios, and background air quality data used in calculating these impacts are included in Attachment 3.1, Appendix D.

As shown in Table 3.1-13, the maximum ambient impacts remain either below ambient air quality standards or below the significant impact levels for the particular pollutant. Consequently, there are no new significant ambient air quality impacts associated with the proposed CPP modification.

TABLE 3.1-13
CPP Proposed Modification Ambient Air Quality Impacts

Pollutant	Averaging Period	Maximum Facility Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)
NO_2	1-hour (CA)	43.40	112.80	156.17	339	–	7.5
	1-hour (Fed)	43.40	41.36	84.73	–	188	7.5
	Annual (CA)	0.27	20.68	20.95	57	–	1
	Annual (Fed)	0.27	24.44	24.71	–	100	1
SO_2	1-hour (CA)	1.46	25.41	26.87	655	–	7.8
	1-hour (Fed)	1.46	18.34	19.80	–	196	7.8
	24-hour (CA)	0.35	23.32	23.67	105	–	5
CO	1-hour	690	2,748	3,438	23,000	40,000	500
	8-hour	114	1,947	2,061	10,000	10,000	2,000

TABLE 3.1-13
CPP Proposed Modification Ambient Air Quality Impacts

Pollutant	Averaging Period	Maximum Facility Impact (µg/m^3)	Background (µg/m^3)	Total Impact (µg/m^3)	State Standard (µg/m^3)	Federal Standard (µg/m^3)	Significant Impact Level (µg/m^3)
PM_{10}	24-hour (Fed)	2.14	44.67	46.81	–	150	5
	24-hour (CA)	2.14	46.00	48.14	50	–	5
	Annual (CA)	0.29	19.50	19.79	20	–	1
$PM_{2.5}$	24-hour (Fed)	1.47	31.00	32.47	–	35	1.2
	Annual (Fed)	0.26	9.30	9.56	–	12.0	0.3
	Annual (CA)	0.26	6.00	6.26	12	–	0.3

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1

3.1.3.2.6 Rule 203 – Prevention of Significant Deterioration

Rule 203 incorporates the Federal Prevention of Significant Deterioration (PSD) Program by reference (40 CFR 52.21). The PSD program requires pre-construction review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies to pollutants for which ambient concentrations do not exceed the corresponding National Ambient Air Quality Standards (i.e., attainment pollutants). As noted above, the PSD program is only applicable to areas that attain the NAAQS and the SMAQMD is classified as an attainment area for NOx, SOx, CO, and PM_{10} and nonattainment with respect to the $PM_{2.5}$ and ozone (VOC). Consequently, the PSD regulations do not apply to the project's VOC and $PM_{2.5}$ emissions.

The federal PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source (these terms are defined in the PSD regulations at 40 CFR 52.21). CPP no longer is an existing major source because its proposed permitted emissions are less than 100 tons per year for all regulated pollutants. Additionally, since the facility is no longer a PSD major stationary source, a PSD applicability review is not needed. Finally, since PSD review is not triggered by non-GHG pollutants, PSD does not apply to the project solely due to any GHG emissions increases based on a June 2014 decision by the U.S. Supreme Court regarding the EPA's PSD GHG Tailoring regulation. Consequently, the proposed modification of CPP is not subject to PSD review.

3.1.3.2.7 Rule 207 – Title V Federal Operating Permit Program

CPP is an existing Title V facility with Permit No. TV2012-19-01. The proposed operation of CPP utilizing the enhanced capabilities will require a significant modification to CPP's Title V permit. In order to expedite the Title V permit modification process, SFA has requested that the SMAQMD process an authority-to-construct/permit-to-operate application and Title V permit modification under the Enhanced New Source Review process allowed pursuant to Rule 202 (Sections 101 and 404).

3.1.3.2.8 Rule 217 – Public Notification Requirements for Permits

Rule 217 notes that notification requirements shall not apply if the application is for any new or modified emissions unit where the combined PTE from the project would have an increase in PTE less than the amounts listed below (and provided that offsets are not triggered).

- Volatile organic compounds 5,000 pounds per quarter
- Nitrogen oxides 5,000 pounds per quarter

- Sulfur oxides 9,200 pounds per quarter
- PM10 7,300 pounds per quarter
- PM2.5 10 tons per year
- Carbon monoxide 49,500 pounds per quarter

The proposed modification to CPP will not result in an increase in potential to emit exceeding the listed thresholds and offsets are not triggered. Therefore, the project does not trigger the Rule 217 public notice requirements. However, publication and public notification are required under Rule 207, the Title V Federal Operating Permit Program, due to the significant Title V permit modification being requested.

In addition to the notification requirements of Rule 217, California Health and Safety Code Section 42301.6 requires that a public notice be distributed whenever an Authority to Construct is issued that would allow increased toxic air contaminant emissions within 1,000 feet of the outer boundary of a school site. However, the CPP is not located within 1,000 feet of the outer boundary of a school site and public notification is not required under Section 42301.6.

3.1.3.3 Regulation 3 – Fees

3.1.3.4 Rule 301 – Stationary Source Permit Fees

The proposed CPP modification is subject to the permit fees established by Rule 301 and SFA has submitted the initial permit application fees at the time of submittal to the SMAQMD. SFA will be invoiced by the SMAQMD based on actual review hours spent by SMAQMD staff and for modification of the Title V Permit to Operate consistent with Rule 301.

3.1.3.5 Regulation 4 – Prohibitions

3.1.3.6 Rule 401 – Rule 401: Ringelmann Chart/Opacity

Rule 401 prohibits the emission of air contaminants darker than Ringelmann No. 1 or 20% opacity for more than 3 minutes in a one-hour period. Water vapor is not included in an opacity determination. The proposed modification to CPP is not expected to create visible emissions in excess of the limits of this rule.

3.1.3.7 Rule 402 – Nuisance

This rule prohibits the discharge of air contaminants in quantities that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public. The SMAQMD regulates new and modified sources of toxic air contaminants (TACs) under this rule by implementing the California Air Resources Board (CARB)/CAPCOA “Risk Management Guidance for Stationary Sources of Air Toxics,” dated July 23, 2015. These guidelines implement what is commonly known as “Toxics New Source Review.”

The CPP combustion sources result in TAC emissions associated with increase in hourly heat input increase. EPA AP-42 TAC emission factors were used to calculate the TAC emission increase associated with the CPP modification. Detailed TAC emission calculations are included in Attachment 3.1, Appendix B.

Under the SMAQMD’s toxics policy, modified projects with TAC emission increases are required to perform a health risk assessment (HRA). To determine whether CPP will result in a significant increase in either the carcinogenic or non-cancer health impacts, a HRA was performed for the total TAC emissions. This conservative analysis of using total TAC emissions, rather than the TAC emissions increase, was prepared using EPA’s AERMOD dispersion modeling software together with ARB’s Hotspots Analysis and Reporting Program (HARP2) computer model Risk Assessment Standalone Tool (Version 17320, November 16, 2017). The HARP2 model was used to assess cancer risk as well as chronic and acute risk impacts. A risk of less than 10×10^{-6} for cancer and a Health Hazard Index of less than 1 for chronic or acute exposures are considered to be insignificant.

The results of the HRA are summarized in Table 3.1-14, and the detailed HARP2 modeling results are presented in Attachment 3.1, Appendix E.

Table 3.1-14 shows that the HRA results for the proposed CPP modification are below the significance thresholds for cancer, acute, and chronic impacts. Therefore, the TAC emission impacts for the proposed CPP modification will not be significant, and the project is not expected to create a nuisance due to health risk.

TABLE 3.1-14
CPP Health Risk Screening Results

Risk Component	Total Risk
Cancer Risk - Residential	0.3 x 10-6
Cancer Risk – Workplace	0.004 x 10-6
Acute Hazard Index	0.03
8-Hour Chronic Hazard Index	0.0001
Chronic Hazard Index	0.02

Source: Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1.

3.1.3.8 Rule 404 – Particulate Matter

Rule 404 prohibits emissions of PM in excess of 0.1 gr/dscf. The combustion turbines exhaust PM concentration has been measured on multiple occasions during annual source tests, with the results demonstrating compliance with this requirement. The proposed modification is not expected to change PM emission concentrations. Therefore, the CPP will comply with Rule 404.

3.1.3.9 Rule 406 – Specific Contaminants

Rule 406 prohibits emissions of combustion contaminants in excess of 0.1 gr/dscf @ 12% CO_2. As noted above, the combustion turbine exhaust PM concentration has been measured on multiple occasions during annual source tests and has demonstrated compliance with this requirement.

Rule 406 also prohibits emissions of sulfur compounds in excess of 0.2% by volume, or 2,000 ppmv. The combustion turbine exhaust SOx concentration is significantly less than 2,000 ppmv and has been measured during annual source tests and demonstrated compliance with this requirement. The proposed modification is not expected to change SOx emission concentrations. Therefore, the CPP will comply with the Rule 406 PM and sulfur compound emission limits.

3.1.3.10 Rule 413 – Stationary Gas Turbines

Rule 413 prohibits NOx emissions in excess of 9 ppmv @ 15% O_2 based on a 15-min average, with exceptions for excursions, from gaseous fuel-fired turbines with a maximum electrical output rating of 10 MW or greater operating 877 hours or more per year. Rule 413 is applicable to CPP, which have a maximum electrical output rating of 170 MW (increasing to 198 MW) and operate up to 8760 hours/year. At a permitted NOx concentration of 2 ppmv @ 15% O_2 averaged over one hour, CPP will comply with the Rule 413 NOx limit.

3.1.3.11 Regulation 8 – Standards of Performance for New Stationary Sources (NSPS)

Rule 801 incorporates, by reference, the federal Standards of Performance for New Stationary Sources (NSPS). NSPS applies to certain types of equipment that are newly constructed, modified, or reconstructed after specified applicability dates. Only the NSPS subparts that may be potentially apply to CPP are addressed below.

3.1.3.12 40 CFR 60 Subpart A – General Provisions

All affected sources are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification and performance testing, recordkeeping, monitoring; provides reference methods; and mandates general control device requirements for all other subparts as applicable. SFA will continue to meet all applicable requirements of the general provisions outlined in 40 CFR 60 Subpart A.

3.1.3.13 40 CFR Part 60 Subpart KKKK – NSPS for Stationary Combustion Turbines

NSPS Subpart KKKK, *Standards of Performance for Stationary Combustion Turbines*, applies to stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the lower heating value of the fuel fired. Based on the modification date for CPP (after February 18, 2005) and the heat input at peak loads, the combustion turbines at CPP are subject to NSPS Subpart KKKK. The project is a “modification” under NSPS because it results in an increase in hourly emissions of a regulated NSPS pollutant per 40 CFR 60.14. SFA will comply with all applicable NSPS Subpart KKKK requirements as outlined in its revised Title V permit.

3.1.3.14 40 CFR Part 60 Subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

NSPS TTTT, *Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units*, applies to electric generating units that commenced construction after January 8, 2014, and/or commenced modification or reconstruction after June 18, 2014. CPP will undergo an NSPS modification as a result of the proposed modification. As such, NSPS Subpart TTTT now applies to CPP because they have a baseload rating greater than 250 MMBtu/hr and serve generators greater than 25 MW.

Section 60.5520(d)(1) specifies that stationary combustion turbines that are permitted to burn only fuels with a consistent chemical composition (i.e., uniform fuels) that result in a consistent emission rate of 160 lb CO_2 per MMBtu or less are not subject to any monitoring or reporting requirements under this subpart. These fuels include, but are not limited to, natural gas, methane, butane, butylene, ethane, ethylene, propane, naphtha, propylene, jet fuel kerosene, No. 1 fuel oil, No. 2 fuel oil, and biodiesel. Stationary combustion turbines qualifying under this paragraph are only required to maintain purchase records for permitted fuels. CPP should qualify for the exemption in Section 60.5520(d)(1) because they burn biogas and natural gas, resulting in a consistent CO_2 emission rate below 120 lb/MMBtu based on EPA emission factors.

Even if CPP did not qualify for the exemption in Section 60.5520(d)(1), the CPP combustion turbines would be subject to a unit-specific GHG emission limit determined by the unit's best historical annual CO_2 emission rate (from 2002 to the date of the modification) and this emission limit would be no lower than 1,800 lb CO_2/MWh-gross for units with a base load rating greater than 2,000 MMBtu/hr. At a heat input of 2,200 MMBtu/hr, a gross output of 198 MWh,and using EPA’s standard CO_2 emission factor of 117 lb/MMBtu for natural gas, the resulting CO_2 emission rate of 1,300 lb CO_2/MWh is well below the minimum of 1,800 lb CO_2/MWh.

3.1.3.15 Rule 202 - California Environmental Quality Act (CEQA)

Under Rule 202, Section 307, the Air Pollution Control Officer shall deny an Authority to Construct or Permit to Operate if the Air Pollution Control Officer finds that the project which is the subject of an application would not comply with CEQA. Because CPP underwent review/approval by the CEC as an Application for Certification (AFC), and this petition for an amendment will require CEC review, the

review will satisfy CEQA. Therefore, the SMAQMD will be required to issue a preliminary or a final determination of compliance (PDOC/FDOC) prior to issuing the final Authority to Construct permit for the Project.

3.1.4 Mitigation Measures

The proposed CPP modifications will not create a significant air quality or GHG impact and will not require additional mitigation measures.

3.1.5 Consistency with LORS

As noted in Section 3.1.3 above, CPP will comply with applicable federal, state, and local air quality LORS.

3.1.6 Conditions of Certification

SFA is not proposing changes to the Conditions of Certification (COC) as the SMAQMD will issue a Determination of Compliance with revised COCs. The CEC staff will incorporate these revised air quality COCs into the Staff Assessment.

3.1.7 Reference

Trinity Consultants CPP Authority to Construct Permit Application, June 2018, Rev. 1.

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3.2 Biological Resources

3.2.1 Environmental Baseline Information

Due to the changes in the project area, the following updated environmental baseline is provided for completeness.

The project area is within the South Sacramento Habitat Conservation Plan (SSHCP) area (Figure 3.2-1). The Draft Environmental Impact Statement and Draft Environmental Impact Review were released to public in June 2017. The SSHCP aims to streamline state and federal permitting for certain developments as well as protecting land resources.

The project site is 10 miles north of San Joaquin County and is not within the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan area.

The Cosumnes River Nature Preserve is a large natural area of riparian forests and floodplains bordering the Cosumnes and parts of Laguna Creek northwest of the project site.

3.2.1.1.1 Sacramento County General Plan

In 2011, the Sacramento Board of Supervisors adopted a revised General Plan. The Conservation Element of the County General Plan (amended in September 2017) contains specific objectives to preserve water resources, soil resources, vegetation and wildlife, and aquatic resources. This includes specific policies and goals for preserving wetlands, riparian woodlands, oak woodlands, vernal pools, native vegetation habitat and special-status species habitat.

3.2.1.1.2 Mitigation Bank

In 2010, SMUD established a 1,200-acre SMUD Nature Preserve Mitigation Bank, located to the east and south of the Rancho Seco Nuclear Power Plant (Figure 3.2-1). This area is within 1 mile of the project site. This area was set aside to protect seasonal wetlands, vernal pools and swales, and target species including vernal pool fairy shrimp (*Branchinecta lynchi)*, vernal pool tadpole shrimp (*Lepidurus packardi)*, California tiger salamander (*Ambystoma californiense)*, western spadefoot (*Spea hammondii*), tricolored blackbird (*Agelaius tricolor)*, Boggs Lake hedge-hyssop (*Gratiola heterosepala),* dwarf downingia (*Downingia pusilla)*, legenere (*Legenere limosa),* and Sacramento orcutt grass (*Orcuttia viscida)*.

3.2.2 Setting

The following sections describe the biological conditions in the project area, beginning with the vegetation types and habitat present in the project area, a description of wildlife typical to the area, and a discussion of specific special-status species known to occur in the project area. Specific conditions of the project setting that would support these resources are discussed subsequently in Section 3.2.4.

3.2.2.1 Habitat

The project site is an operating power plant and is developed habitat (Figure 3.2-1). Within a 1-mile buffer of the project site, habitat types are disturbed or developed, agricultural, annual grassland, vernal pool or wetland, and woodland.

3.2.2.1.1 Agricultural

Agricultural-vineyard uses are within a 1-mile buffer of the project site. In developed vineyards, small ground-dwelling mammals are limited, but birds such as Brewer's and red winged blackbirds (respectively *Euphagus cyanocephalus* and *Agelaius phoeniceus)*, starlings (*Sturnus vulgaris*), house finches (*Haemorhous mexicanus*), and northern harriers (*Circus hudsonius)* are abundant. Larger mammals such as coyote, red fox (*Vulpes vulpes*), and striped skunks would be expected to forage in vineyards.

3.2.2.1.2 Annual Grassland

Annual grassland and ruderal vegetation dominate the project vicinity. Annual grassland or ruderal grassland is present along roadways.

Introduced mediterranean grasses dominate this community, such as brome (*Bromus hordeaceous, B. diandrus),* oats (*Avena fatua*), and barley *(Hordeum murinum*), which are interspersed with forbs such as storksbill (*Erodium cicutarium*), wild radish (*Raphanus sativa*), and mustard (*Brassica nigra*). These species are widespread and are typical of disturbed grasslands.

Wildlife species that use annual grasslands include, California hare (*Lepus californicus*), voles (*Microtus californicus*), coyote (*Canis latrans*), and striped skunks (*Mephitis mephitis*). A wide variety of grassland birds such as Savannah sparrow (*Passerculus sandwichensis)*, red-wing blackbird (*Agelaius phoeniceus),* and red-tailed hawk (*Buteo jamaicensis)* are also present. The habitat is regionally plentiful and the species that occur there are generally widely distributed and abundant.

3.2.2.1.3 Disturbed or Developed

Disturbed or developed is not a natural vegetation community. The entire project site and some of surrounding project vicinity (1-mile buffer of project site) are disturbed or developed. Development within the project vicinity includes the SMUD Nuclear Power Plant, roads, and residential development.

3.2.2.1.4 Vernal Pools

Vernal pools are present in the 1-mile buffer of the project site but are not mapped. Vernal pools are mostly protected in the SMUD Nature Preserve Mitigation Area (Figure 3.2-2).

Vernal pools that form from winter rains dry out in summer. The annual variation in hydrology and temperature support a community of highly adapted native species, and effectively exclude most of the invasive annuals that occupy most open upland habitats. Plants such as legenere, dwarf downingia, Sacramento orcutt grass, and pincushion navarretia (*Navarretia myersii* ssp. *myersii*) are endemic to vernal pools, as are vernal pool fairy shrimp, vernal pool tadpole shrimp and California tiger salamander. Development and hydrologic modification have greatly reduced the area of California that supports vernal pools. The grassy plateau east of Rancho Seco Plant supports hundreds of vernal pools in a nearly natural state. Between the project site and the Rancho Seco Plant, there is a dense complex of vernal pools that is crossed by existing power lines and underground pipelines. This particular complex of vernal pools is at a lower elevation than those east of the reservoir and appears to support sparse vegetation and turbid water indicating a degraded condition.

Ephemeral ponds and drainage ditches that occur along roadsides and railroad berms can also exhibit some of the characteristics of vernal pools, including the seasonal hydrology, vegetation, and characteristic fauna.

3.2.2.1.5 Wetlands

The project site has no wetlands because it is developed, but there are wetlands within the 1-mile buffer. Clay Creek to north of project site is considered seasonal ephemeral wetlands, with narrow swales that contain water during the winter and spring. In early summer, parts of these swales support sparse wild rye (*Elymus tricoides*), spike rush (*Eleocharis macrostachya*), coyote thistle (*Eryngium* sp.), pepper grass (*Lepidium* spp.), curly dock (*Rumex crispus*), and velvet grass (*Holcus lanatus*).

Wetland habitats on the project site imply conditions suitable to support Pacific treefrogs (*Pseudacris regilla*) and potentially help amphibians such as California tiger salamanders to move across the landscape, but do not have permanent water and dense cover that would support fish or highly aquatic species such as the giant garter snake (*Thamnophis gigas*).

3.2.2.2 Special-Status Species

Relevant biological databases were reviewed to determine which vegetation or biological resources are known from the area or have suitable habitat present and could potentially occur. For the purposes of this document, species were considered special-status if they were included in the California Natural Diversity Database (CNDDB) and listed in the *Special Animals List* or *Special Vascular Plants, Bryophytes, and Lichens List* managed by the CDFW (CDFW, 2018a, 2018b); species listed by the USFWS as threatened, endangered, or candidate species or have Critical Habitat designated under the FESA; species listed under the CESA as endangered, threatened, or candidate species. In addition, there are numerous other special-status species that are evaluated, including CDFW SSP, birds afforded protection under the MBTA, Birds of Conservation Concern (BCC) (USFWS, 2008), and plant species identified as California Rare Plant Ranks (CRPR) by the California Native Plant Society (CNPS) (CNPS, 2018). This report also addresses sensitive natural communities, as defined by CDFW, as they have a limited distribution or are vulnerable to environmental effects from the proposed project (CDFW, 2018b).

Both a 1-mile and 10-mile query of CNDDB database were used to determine potential for special-status plant and animal species to occur in the project vicinity (CNDDB, 2018). The USFWS Information for Planning and Consultation (IPaC) was queried for federally listed species known within the vicinity. Figure 3.2-2 provides the results of the 1-mile CNDDB query of the project site and Attachment 3.2A provides the CNDDB report details. The 10-mile buffer and IPaC results were used to assess potential special-status species that are recorded or that could potentially occur in the project area (Table 3.2-3).

Although no biological resources surveys were conducted to support this amendment, the project vicinity has been extensively surveyed in the last 50 years. The site was field surveyed for the original development of the Rancho Seco Plant (ca. 1969), was surveyed in 1994 as part of the Master Plan for development of the Rancho Seco Park and for the CPP licensing, and has been surveyed numerous times to establish and monitor the SMUD Nature Preserve Mitigation Bank for that supports a variety of special-status species.

3.2.2.2.1 Special-Status Plants

The project site is developed/disturbed and therefore does not have potentially suitable habitat for special-status plant species (Table 3.2-3). The CNDDB did not identify any known occurrences of special-status plant species in the 1-mile buffer of the project site, but did identify a sensitive natural community or sensitive natural area (SNA), Northern Hardpan Vernal Pool (Attachment 3.2A). An analysis of the 10-mile CNDDB resulted in several special-status plant species that have the potential to occur in the project vicinity. Table 3.2-3 provides a list of all special-status plant species assessed for the potential to occur in the project site vicinity (CNDDB, 2018). The qualifications of the biologist performing this review are presented in Attachment 3.2B.

In the project vicinity, SMUD Nature Preserve Mitigation Area, several vernal pool special-status plant species have the potential to occur including but not limited to, Boggs Lake hedge hyssop, dwarf downingia, legenere, pincushion navarretia, Sacramento orcutt grass (*Orcuttia tenuis*), and slender Orcutt grass.

3.2.2.2.2 Special-Status Animals

Although the project site is developed, one special-status animal, burrowing owl (*Athene cunicularia*), has the potential to use the project site. There are eight special-status animal species that have the potential to occur in the 1-mile buffer of the project site (Figure 3.2-2; Table 3.2-3). There is no potentially suitable habitat for the other remaining seven special-status animals in the project site. There is no potential for special-status fish to occur in the project site or vicinity.

3.2.2.2.2.1 Invertebrates

Vernal pool fairy shrimp and vernal pool tadpole shrimp are both listed by FESA and the CPP is within USFWS designated critical habitat for both of these species. California linderiella (*Linderiella occidentalis*) is another crustacean that has a Global and State rank but no other special-species status. These species are short-lived crustaceans, approximately 1-inch long, that live in vernal pools and occasionally ditches or swales that have similar hydrology to vernal pools. They exist as cysts (eggs) in the summer, and hatch when hydrated by winter rains. These species are known to occur in vernal pools throughout the 1-mile buffer of the project site (Figure 3.2-2).

3.2.2.2.2.2 Amphibians and Reptiles

California tiger salamander is listed by both FESA and CESA as threatened and the salamander breeds in vernal pools and ephemeral ponds. When the pools dry, the adult salamanders spend the summer in burrows in upland grasslands near the pools. They are known to move up to a mile from breeding sites. Historic CNDDB locations show this species overlapping the project site, but there are currently no breeding or upland burrow sites noted in the project area. This species does have the potential to occur in the 1-mile buffer of the project site (Figure 3.2-2).

Western spadefoot CDFW State Species of Concern (SSC) that primarily occurs in areas with sandy or gravelly soil in valley and foothill grasslands, open chaparral, and pine-oak woodlands. The western spadefoot is almost completely terrestrial and enters water only to breed. It has two distinct habitat requirements including quiet streams or seasonal pools for breeding, and uplands for foraging and dry-season aestivation. Western spadefoot adults and larvae have been observed at the SMUD Nature Preserve Mitigation Bank.

Western pond turtle is a CDFW SSC that is highly aquatic, and nearly always found in or close to water. The pond turtle exits water to lay eggs in grasslands near the ponds and does not move far from permanent water. Western pond turtles have been observed in Clay Creek, north of the project site. They are also likely to occur in Badger Creek and Laguna Creek.

3.2.2.2.2.3 Birds

Burrowing owls are a USFWS FSC and BCC and CDFW SSC. While they occur from Canada to South America, their habitat in California and the western states is being reduced by land conversions for urban and agricultural uses. Most burrowing owls in this region are migratory, spending winters in southern California or Mexico, and appearing in Sacramento to breed in summer. Burrowing owls occupy and nest in abandoned ground squirrel burrows, particularly along the relatively barren area along railroad tracks and road cuts. They are likely to occur seasonally along Twin Cities Road. Burrowing owls tend to use the same burrows from year to year, such that the presence of burrowing owls usually indicates they will be back in following years. Young owls could colonize any suitable squirrel burrows in any year. Even though the project site is developed, any squirrel burrows may provide potentially suitable habitat for this species.

The Swainson's hawk (*Buteo swainsoni*) is listed by CESA as threatened. This species spends the winter in Mexico and South America and migrates to the prairie states and California to breed in the summer. There is evidence to indicate that the population that breeds in California is distinct from those in the central United States and may warrant additional protection. Swainson's hawks nest in large riparian cottonwoods or oaks, and suitable trees occur around the reservoir east of the project site. Swainson's hawks also forage over short-grass prairies and would be expected to use grasslands within one mile of the project site.

The tricolored blackbird is a candidate for listing under CESA, CDFW SSC, and USFWS BCC. Tricolored blackbirds are sporadic migrants and summer residents throughout California's Central Valley and the Sierra Nevada foothills. They generally breed near fresh water and emergent vegetation, such as tall, dense cattails or tules, or willow thickets. They are distinct from their smaller cousins, the red-winged blackbird in that they breed in huge colonies often of 1,000 birds or more, but

seldom breed in the same place every year. Their sporadic movements and unpredictable reproduction cycles make it especially difficult to predict when and where they will occur, although they tend to return to traditional nest sites every 3 years or so. Land conversion for agriculture and urban development and massive nest predation has resulted in this species being greatly reduced from former numbers. A 2015 CNDDB occurrence notes breeding sites in the 1-mile buffer of the project site (Figure 3.2-2; Attachment 3.2A).

3.2.2.3 Biological Surveys

Since the scope of this project does not require any vegetation disturbance, no field biological surveys were conducted to support the Petition to Amend. Literature searches, aerial photos, and previous biological survey results in the vicinity were sufficient for assessing potentially suitable habitat and occurrence of special-status species in the project site vicinity.

3.2.3 Environmental Consequences

Impacts on biological resources are considered significant if one or more of the following conditions could result from implementation of the proposed project:

- Substantial effect, reduction in numbers, restricted range, or loss of habitat for a population of a state- or federally-listed threatened or endangered species
- Substantial effect, reduction in numbers, restricted range, or loss of habitat for a population of special-status species, including fully-protected, candidate proposed for listing, species of special concern, and certain CNPS CRPR designation
- Substantial interference with the movement of any resident or migratory fish or wildlife species
- Substantially diminish or reduce habitat for native fish, wildlife, or plants
- Substantial disturbance of wetlands, marshes, riparian woodlands, and other wildlife habitat
- Remove trees designated as heritage or significant under County of local ordinances

3.2.3.1.1 Potential Impacts of Change of Operation of Project Site

1) Change of operation of the project facility would not result in any disturbance of special-status species habitat in form of natural or cropland vegetation; soils; wetlands; vernal pools or vernal swales. There would be no adverse impacts to special-status species habitat from the proposed project.

2) Burrowing owls could potentially use squirrel burrows or disturbed berms at the project site. The change of operation of the CPP would have no adverse impact on burrowing owls use of the project site.

3) Swainson's hawks could potentially nest in the riparian trees in the 1-mile buffer of the project site (in the trees surrounding Rancho Seco Reservoir). The change in project would have no adverse impact on Swainson's hawks in the project vicinity.

4) California tiger salamander moving through their upland habitat have potential to occur on the project site. The project site has no potentially suitable upland or breeding habitat. The Biological Resources and Mitigation and Monitoring Plan (BRMIMP) gives the Designated Biologist the authority to address California tiger salamanders observed on the project site. The change in project operation would have no adverse impact on California tiger salamander in project site or vicinity.

5) Because the increased electrical generation of the proposed CPP modifications is not accompanied by an increase in the maximum permitted annual nitrogen emissions (see Table 3.1-6), nitrogen deposition impacts are not expected to increase above the levels analyzed during

the licensing of CPP. Furthermore, since 2004 the Sacramento County oxides of nitrogen emissions have been reduced approximately 2.6 times through the implementation of emission control strategies necessary to attain the federal and state ozone standards.[11] Given that the CPP was licensed for up to 1,000 MWs of generation and associated nitrogen emissions, any minor nitrogen emissions increase over the existing condition will not significantly affect nitrogen deposition and will have no adverse impact on special-status plant or wildlife species.

3.2.3.1.1.1 Potential Impacts to Wetlands or Vernal Pools

This project will have no impacts to wetlands or vernal pools. The change of operation of the project facility would not result in any disturbance of natural vegetation communities.

3.2.3.1.1.2 Impacts to Trees

There are no trees on the project site or adjacent to it. No adverse impact to native or heritage trees from the proposed project is expected.

3.2.3.1.1.3 Potential for Impacts to Birds Protected by MBTA

Change of operation of the project facility would not result in any disturbance of natural or cropland vegetation and no adverse impact to birds protected by the MBTA from the proposed project is expected.

3.2.3.1.2 Conflict with Regional Habitat Conservation Plans

The project site is within Sacramento County General Plan and SSHCP areas (Figure 3.2-1). Due to the change of operations of the facility, and no additional ground disturbance required, no adverse impact to any resource is expected. Operation of the facility does not conflict with goals of the General Plan or SSHCP (See Table 3.2-2).

3.2.4 Mitigation Measures

The following measures would be implemented during CPP operation:

- Provide all operational personnel with worker environmental awareness training that identifies the sensitive biological resources and measures required to minimize adverse project impacts during operation.
- Implement the BRMIMP to avoid and minimize impacts to special-status plant and animal species and their habitat. Implementation of the BRMIMP includes having a qualified Designated Biologist on staff.

Implement the USFWS and National Marine Fisheries Service (NMPS)-issued Biological Opinion's avoidance and minimization measures for CPP (USFWS, 2003). Change in operations will not require re-initiation of consultation regarding the Biological Opinion, because no adverse impacts are anticipated for federally listed species or their USFWS designated critical habitat.

This project will have no adverse impacts to special-status plants or animals, including but not limited to vernal pool crustaceans, California tiger salamander, western spadefoot, western pond turtle, burrowing owl, Swainson's hawk, tricolored blackbird, birds protected by the MBTA, or special-status plant species and their habitats.

3.2.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for biological resources.

[11] https://www.arb.ca.gov/app/emsinv/fcemssumcat/cepam_emssumcat_query_v5.php

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TABLE 3.2-1
Laws, Ordinances, and Regulations Applicable to CPP Biological Resources

LORS	Purpose	Regulating Agency	Permit or Approval	Petition to Amend Conformance and Applicability
Federal				
Endangered Species Act of 1973 and implementing regulations, Title 16 United States Code (USC) §1531 et seq. (16 USC 1531 et seq.), Title 50 Code of Federal Regulations (CFR) §17.1 et seq. (50 CFR 17.1 et seq.).	Designates and protects federally threatened and endangered plants and animals and their critical habitat.	USFWS and NMFS	USFWS and NMPS issued Biological Opinion for CPP (USFWS, 2003).	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
Migratory Bird Treaty Act 16 USC §§703-711	Prohibits the non-permitted take of migratory birds.	USFWS and CDFW	CEC Conditions	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
State				
California Endangered Species Act of 1984, Fish and Game Code, §2050 through §2098.	Protects California's endangered and threatened species.	CDFW	Comments as cooperating agency on USFWS and NMFS issued Biological Opinion.	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
Title 14, California Code of Regulations (CCR) §§670.2 and 670.5.	Lists plants and animals of California declared to be threatened or endangered.	CDFW	N/A	

TABLE 3.2-1
Laws, Ordinances, and Regulations Applicable to CPP Biological Resources

LORS	Purpose	Regulating Agency	Permit or Approval	Petition to Amend Conformance and Applicability
Fish and Game Code Fully Protected Species. §3511: Fully Protected birds §4700: Fully Protected mammals §5050: Fully Protected reptiles and amphibians §5515: Fully Protected fishes	Prohibits the taking of listed plants and animals that are Fully Protected in California.	CDFW	N/A	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
Fish and Game Code §1930, Significant Natural Areas(SNA)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitats. Listed in the CNDDB.	CDFW		The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
Fish and Game Code §1580, Designated Ecological Reserves	The CDFG commission designates land and water areas as significant wildlife habitats to be preserved in natural condition for the general public to observe and study.	CDFW		The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
Native Plant Protection Act of 1977, Fish and Game Code, §1900 et seq.	Designates state rare and endangered plants and provides specific protection measures for identified populations.	CDFW	Reviews mitigation options if there will be significant project effects on threatened or endangered plant species.	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.

TABLE 3.2-1
Laws, Ordinances, and Regulations Applicable to CPP Biological Resources

LORS	Purpose	Regulating Agency	Permit or Approval	Petition to Amend Conformance and Applicability
Public Resource Code §§25500 & 25527	Siting of facilities in certain areas of critical concern for biological resources, such as ecological preserves, wildlife refuges, estuaries, and unique or irreplaceable wildlife habitats of scientific or educational value, is prohibited, or when none alternative, strict criteria is applied.	USFWS CDFW	Issues Biological Opinion or Authorization with Conditions after review of project impacts.	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
Title 20 CCR §§1702 (q) and (v); and	Protects “areas of critical concern” and “species of special concern” identified by local, state, or federal resource agencies within the project area, including the CNPS.	USFWS CDFW	Issues Biological Opinion or Authorization with Conditions after review of project impacts.	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.
Title 14 CCR Section 15000 et seq.	Describes the types and extent of information required to evaluate the effects of a proposed project on biological resources of a project site.	USFWS CDFW	Review and comment on PTA.	The Petition to Amend will not change impacts to biological resources and the PTA provides this information.

TABLE 3.2-2
Sacramento Plans, Conservation Element and Avoidance and Minimization Measures

Conservation Element/AMM	Goal/Policy	Conformance
Sacramento County General Plan		
Conservation Element (CO)		
	CO-58 Ensure no net loss of wetlands, riparian woodlands, and oak woodlands.	This project will not impact wetlands, riparian woodlands or oak woodlands.
	CO-75 Maintain viable populations of special status species through the protection of habitat in preserves and linked with natural wildlife corridors.	This project will not impact special-status species and their habitats.
	CO-89 Protect, enhance and maintain riparian habitat in Sacramento County.	This project will not impact any riparian habitat.
	CO-138 Protect and preserve non-oak native trees along riparian areas if used by Swainson's Hawk, as well as landmark and native oak trees measuring a minimum of 6 inches in diameter or 10 inches aggregate for multi-trunk trees at 4.5 feet above ground.	This project will not impact any trees.
South Sacramento Habitat Conservation Plan		
Avoidance and Minimization Measure (AMM)		
	BMP-8 Staffing trained in environmental and biological issues	SFA's BRMIMP requires training all onsite staff to identify/avoid/minimize impacts to biological resources and sensitive environmental habitats.

Source: Sacramento County General Plan, Conservation Element (2017), South Sacramento Habitat Conservation Plan (2017)

TABLE 3.2-3
Special-Status Species Potentially Occurring in CPP Project Site and Project Vicinity

Common Name	Scientific Name1	Status2 (Fed/CA/ Other Status)	Season3	Primary Habitat4	Observed5	Comments
Plants						
Legenere	*Legenere limosa*	--/--/1B.1	May-June	Vernal Pools	U	No suitable habitat on the project site. Not known from 1-mile buffer, but has potential to occur in 1-mile buffer of project site.
Boggs Lake Hedge-Hyssop	*Gratiola heterosepala*	--/CE/1B.2	April-June	Marshes, swamps, and vernal pools	U	No suitable habitat on the project site. Not known from 1-mile buffer, but has potential to occur in 1-mile buffer of project site.
Sacramento Orcutt Grass	*Orcuttia viscida*	FE/CE/1B.1	May-June	Vernal Pools	U	No suitable habitat on the project site. Not known from 1-mile buffer, but has potential to occur in 1-mile buffer of project site.
Ione manzanita	*Arctostaphylos myrtifolia*	FT/--/1B.2	January-February	Ione formation soils in chaparral, cismontane woodland from 120 to 1800 feet	U	No suitable habitat in the project area.
Dwarf downingia	*Downingia pusilla*	--/--/2B.2	March-May	Vernal pools and swales in grasslands and foothills; blooms	U	No suitable habitat on the project site. Not known from 1-mile buffer, but has potential to occur in 1-mile buffer of project site.
Ione buckwheat	*Eriogonum apricum var. apricum*	FE/CE/1B.1	July-October	Ione soils in openings in chaparral from 180 to 450 feet	U	No suitable habitat in the project area.
Irish Hill buckwheat	*Eriogonum apricum var. prostratum*	FE/CE/1B.1	June-July	Openings in chaparral on Ione soils from 270 to 390 feet	U	No suitable habitat in the project area.

TABLE 3.2-3
Special-Status Species Potentially Occurring in CPP Project Site and Project Vicinity

Common Name	Scientific Name1	Status2 (Fed/CA/ Other Status)	Season3	Primary Habitat4	Observed5	Comments
Tuolumne button-celery	*Eryngium pinnatisectum*	FSC/--/1B.2	June-August	Vernal pools and mesic sites within cismontane woodland and lower montane coniferous forest from 210 to 2800 feet	U	No suitable habitat in the project area.
Bisbee Peak rush-rose	*Crocanthemum (=Helianthemum) suffrutescens*	--/--/3.2	April-June	Serpentinite, gabbroic, or Ione soils in chaparral from 120 to 2,500 feet	U	No suitable habitat in the project area.
Rose-mallow	*Hibiscus lasiocarpos*	--/--/1B.2	June-September	Freshwater marshes and swamps	U	No suitable habitat; not found in the project area.
Parry's horkelia	*Horkelia parryi*	FSC/--/1B.2	April-June	Ione formation soils in chaparral or cismontane woodland from 240 to 3,000 feet	U	No suitable habitat in the project area.
Delta tule pea	*Lathyrus jepsonii var jepsonii*	FSC/--/1B.2	May-September	Coastal freshwater marshes from 0 to 12 feet; blooms	U	No suitable habitat; not found in the project area.
Mason's lilaeopsis	*Lilaeopsis masonii*	FSC/CR/1B.1	April-November	Brackish or freshwater marshes and riparian scrub from 0 to 30 feet	U	No suitable habitat; not found in the project area.
Pincushion navarretia	*Navarretia myersii ssp. myersii*	--/--/1B.1	May	Vernal pools from 20 to 270 feet	U	No suitable habitat in the project site. Not known from 1-mile buffer, but has potential to occur in 1-mile buffer of project site.
Slender Orcutt grass	*Orcuttia tenuis*	FT/CE/1B.1	Blooms from May-October	Vernal pools from 90 to 5,000 feet	U	No suitable habitat in the project site. Not known from 1-mile buffer, but has potential to occur in 1-mile buffer of project site.

TABLE 3.2-3
Special-Status Species Potentially Occurring in CPP Project Site and Project Vicinity

Common Name	Scientific Name1	Status2 (Fed/CA/ Other Status)	Season3	Primary Habitat4	Observed5	Comments
Sanford's arrowhead	*Sagittaria sanfordii*	FSC/--/1B.2	May-October	Shallow freshwater marshes and swamps	U	No suitable habitat; not found in the project area.
Succulent owl's-clover	*Castilleja campestris var. succulenta*	FT/CE/1B.2	March-May	Vernal pool and wetland	U	No suitable habitat in the project site. Not known from 1-mile buffer, but has potential to occur in 1-mile buffer of project site.
Insects and Crustacea						
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT, CH/--/--	Resident	Vernal pools and ephemeral swales	U	No suitable habitat on the project site. CNDDB occurrence in 1-mile buffer of project site.
California linderiella	*Linderiella occidentalis*	--/--/--	Resident	Vernal pools and ephemeral swales	U	No suitable habitat on the project site. CNDDB occurrence in 1-mile buffer of project site.
Conservancy fairy shrimp	*Branchinecta conservatio*	FE/--/--	Resident	Valley & foothill grassland, Vernal pool Wetland	U	No suitable habitat on the project site.
Vernal Pool tadpole shrimp	*Lepidurus packardi*	FE/--/--	Resident	Vernal pools and ephemeral swales	U	No suitable habitat on the project site. CNDDB occurrence in 1-mile buffer of project site.
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT, CH/--/--	Resident	Requires specific host plan valley elderberry shrub	U	No suitable habitat on the project site.
Mammals						
None						

TABLE 3.2-3
Special-Status Species Potentially Occurring in CPP Project Site and Project Vicinity

Common Name	Scientific Name1	Status2 (Fed/CA/ Other Status)	Season3	Primary Habitat4	Observed5	Comments
Reptiles and Amphibians						
California tiger salamander	*Ambystoma californiense*	FT/CT/ WL	Resident	Ephemeral ponds and vernal pools	U	No suitable habitat on the project site. CNDDB occurrence in 1-mile buffer of project site.
Western pond turtle	*Emys marmorata (=Clemmys marmorata marmorata)*	FSC/SSC/ --	Resident	Ponds, still pools along creeks and rivers, usually with well-developed riparian vegetation on fringes. Nests in uplands near water	U	No suitable habitat on the project site. CNDDB occurrence in 1-mile buffer of project site.
Western spadefoot	*Spea hammondii (=Scaphiopus hammondii)*	--/SSC/--	Resident	Primarily grassland habitats. Occasionally in valley-foothill hardwood woodlands	U	No suitable habitat on the project site.
Giant garter snake	*Thamnophis gigas*	FT/CT/--	Resident	Ponds and slow moving streams with dense emergent vegetation	U	No suitable habitat on the project site.
California red-legged frog	*Rana draytonii*	FT/SSC/--	Resident	Aquatic, artificial flowing waters, artificial standing waters, freshwater marsh	U	No suitable habitat on the project site.
Birds						
White tailed kite	*Elanus leucurus*	--/FP/--	Resident	Nests in trees near open grassy fields	U	No suitable nesting habitat on project site.
Burrowing owl	*Athene cunicularia*	FSC/SSC/ BCC	Primarily summer migrant	Nests in former squirrel burrows in short-grass prairie	P	Berms or banks on project site may contain suitable habitat for burrowing owls, if squirrels and burrows were present. Species is known from 1-mile buffer.

TABLE 3.2-3
Special-Status Species Potentially Occurring in CPP Project Site and Project Vicinity

Common Name	Scientific Name1	Status2 (Fed/CA/ Other Status)	Season3	Primary Habitat4	Observed5	Comments
California horned lark	*Eremophila alpestris actia*	--/WL/--	Summer migrant	Nests in open grassland prairies	U	No suitable habitat; not found in the project area.
Swainson's hawk	*Buteo swainsoni*	--/CT/BCC	Primarily summer migrant	Nests in large cottonwoods along riparian corridors	U	No suitable nesting habitat on project site. Potential to forage within 1-mile buffer of project site.
Bald eagle	*Haliaeetus leucocephalus*	Delisted/CE, FP/--	Winter	Lower montane coniferous forest Oldgrowth	U	No suitable nesting habitat on project site. Nesting occurrence in 10-mile buffer of project site (CNDDB, 2018).
Golden eagle	*Aquila chrysaetos*	--/FP,WL/BCC	Winter and Summer	Builds large platform nest in large trees or lattice transmission line towers	U	No suitable nesting habitat on project site.
Cooper's hawk	*Accipiter cooperii*	--/WL/--	Winter and Summer	Nests in oak woodlands and conifer forests. Most common in live oak	U	No suitable nesting habitat on project site.
Prairie falcon	*Falco mexicanus*	--/WL/--	Resident	Great Basin grassland, Great Basin scrub, Mojavean and Sonoran desert scrub, Valley & foothill grassland	U	No suitable nesting habitat on project site.
Tricolored blackbird	*Agelaius tricolor*	FSC/CC, SCC/BCC	Summer migrant	Cattail or tule marshes; Forages in fields, farms	U	No suitable habitat on project site. Species is known from 1-mile buffer
Loggerhead shrike	*Lanius ludovicianus*	--/SSC/BCC	Summer	Open habitats with sparse shrubs and trees. Uses perches such as trees, fences, and power lines to scan for prey	U	No suitable nesting habitat on project site. Loggerhead shrikes are present in the project vicinity.

TABLE 3.2-3
Special-Status Species Potentially Occurring in CPP Project Site and Project Vicinity

Common Name	Scientific Name1	Status2 (Fed/CA/ Other Status)	Season3	Primary Habitat4	Observed5	Comments
Double-crested cormorant	*Phalacrocorax auritus*	--/WL/--	Summer	Coast, inland lakes, fresh, salt, and estuarine waters. Lacustrine and riverine habitats in Central Valley	U	No suitable nesting habitat on project site. Occasionally present in Rancho Seco Reservoir.
Bank swallow	*Riparia riparia*	--/CT/--	Summer	Colonial breeder in vertical banks, usually close to water. Requires soft substrate for excavation	U	No suitable nesting habitat on project site.
Grasshopper sparrow	*Ammodramus savannarum*	--/SSC/--	Resident	Valley & foothill grassland	U	No suitable nesting habitat on project site.
Yellow-breasted chat	*Icteria virens*	--/SSC/--	Summer	Riparian forest, Riparian scrub, Riparian woodland	U	No suitable nesting habitat on project site.
Osprey	*Pandion haliaetus*	--/WL/--	Resident	Riparian, ocean shore, bays, freshwater lakes, and larger streams.	U	No suitable nesting habitat on project site.

Notes:
[1]Scientific names are based on the following sources: AOU, 1983; Jennings, 1983; Zeiner et al. 1990.
[2]Status of species relative to the Federal and California State Endangered Species Acts and Fish and Game Code.
[3]Season: Blooming period for plants. Season of use by animals.
[4]Primary Habitat: Most likely habitat association.
[5]Present on site.

STATUS:
Federal (Fed)
Listed by the Federal Endangered Species Act (FESA) as
FT – Federally Threatened
FE – Federally Endangered
FC - Candidate for listing under FESA
CH – USFWS designated Critical Habitat

TABLE 3.2-3
Special-Status Species Potentially Occurring in CPP Project Site and Project Vicinity

Common Name	Scientific Name1	Status2 (Fed/CA/ Other Status)	Season3	Primary Habitat4	Observed5	Comments

FSC Federal Species of Special Concern. Proposed rules have not yet been issued because they have been precluded at present by other listing activity.

California (CA)
Listed by California Endangered Species Act (CESA) as
CT –State Threatened
CE – State Endangered
CC – Candidate for listing under CESA

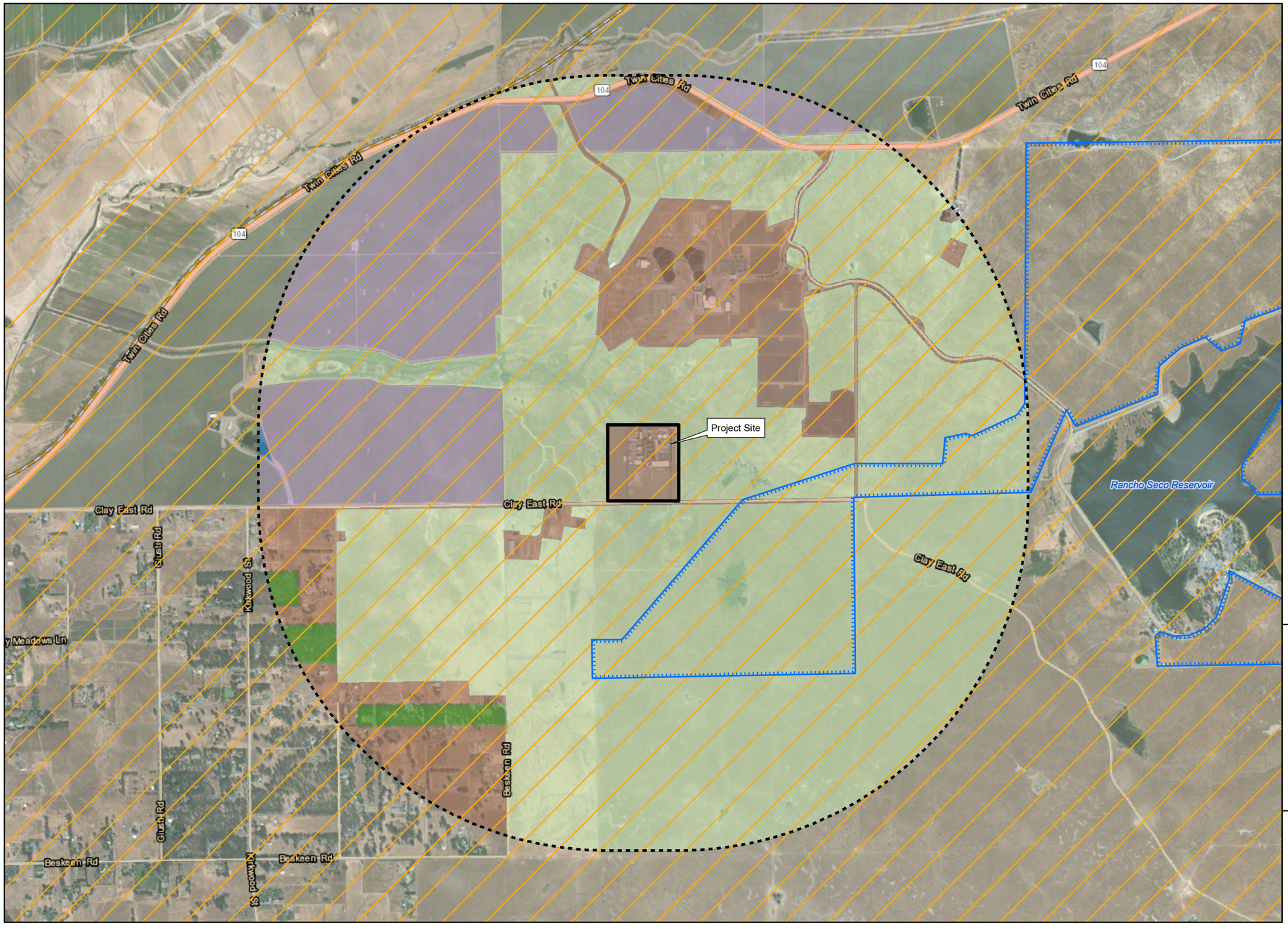
CDFW
FP- Fully protected against take pursuant to the Fish and Game Code Section 3503.5.
SSC - State Species of Concern
WL - Watch List
Other Status

California Native Plant Society California Rare Plant Rank (CNPS CRPR) (does not apply to wildlife species):
1A = Presumed extinct from California
1B = Rare, threatened, or endangered in California and elsewhere
2A = Extirpated in California, common elsewhere
2B = Rare, threatened, or endangered in California, but more common elsewhere

Threat Ranks:
0.1 = Seriously threatened/endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2 = Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
0.3 = Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)
BCC - USFWS Bird Species of Conservation Concern

OBSERVED:
O Observed on site.
R Recorded on site.
P Potential suitable habitat on site.
U Unsuitable habitat on site.

Sources: CDFW, 2018a, CDFW, 2018b, CNDDB, 2018, USFWS, 2018



Cosumnes Power Plant
1-mile Buffer of Cosumnes Power Plant
South Sacramento Habitat Conservation Plan Area
SMUD Nature Preserve Mitigation Bank

Vegetation and Land Cover

Disturbed or Developed
Grassland
Vineyard
Wetland
Woodland

Basemap Source: ESRI World Imagery

N

0 1,500 3,000
Feet

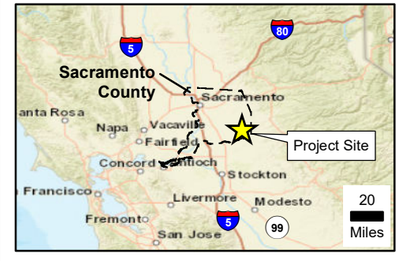


Figure 3.2-1
Biological Sensitive Resources
Cosumnes Power Plant
Petition to Amend
Sacramento County, California

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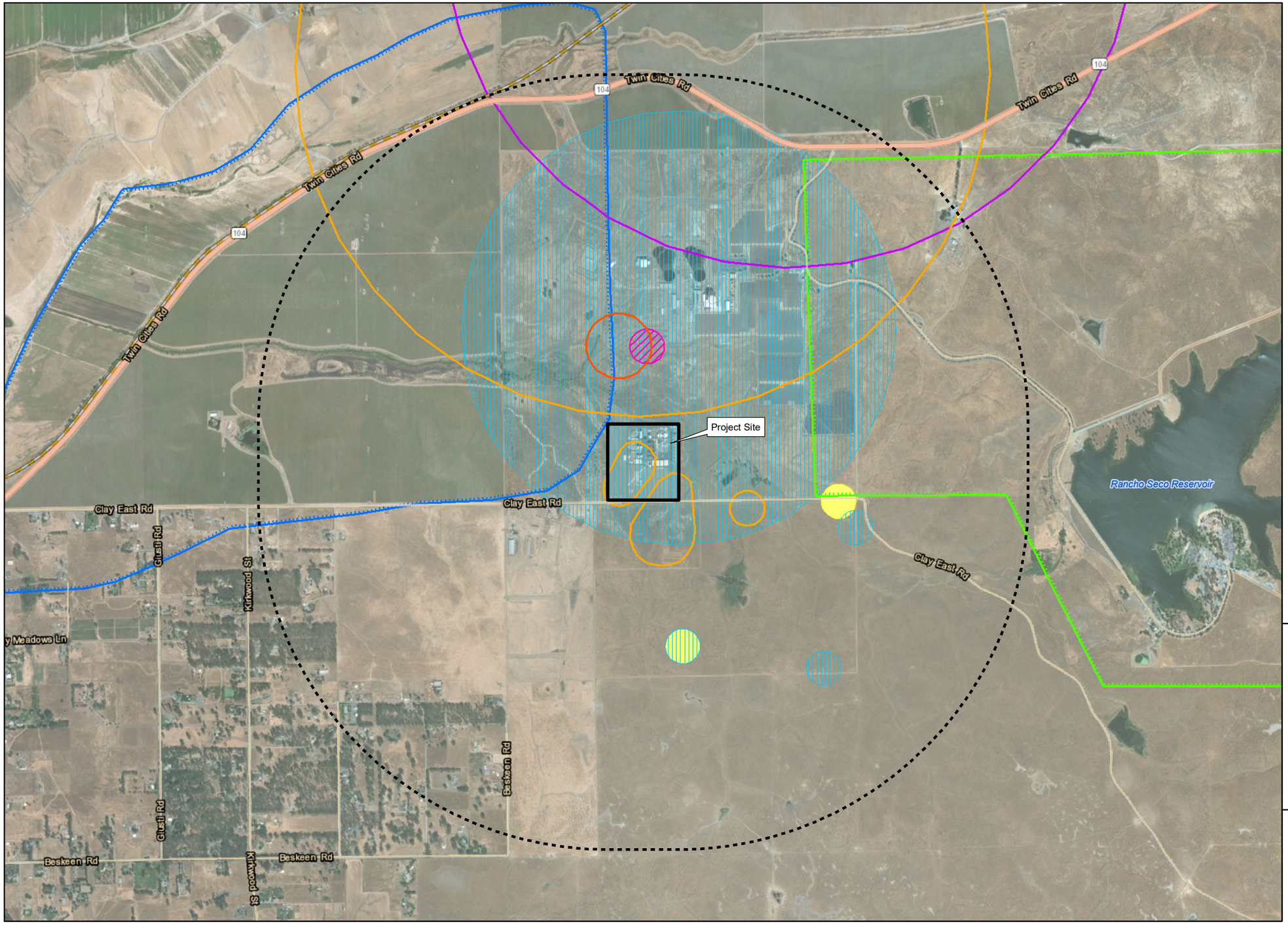

Cosumnes Power Plant

1-mile Buffer of Cosumnes Power Plant

CNDDB Occurrences within 1-mile of the Project Site

- Burrowing owl
- California linderiella
- California tiger salamander
- Northern Hardpan Vernal Pool
- Tricolored blackbird
- Vernal pool fairy shrimp
- Vernal pool tadpole shrimp
- Western pond turtle

CNDDB Source: California Natural Diversity Database from California Department of Fish and Wildlife; accessed May 2018.

Basemap Source: ESRI World Imagery

N

0 1,500 3,000

Feet

Figure 3.2-2
Sensitive Biological Species Locations for Project Site
Cosumnes Power Plant
Petition to Amend
Sacramento County, California

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3.3 Cultural Resources

3.3.1 Environmental Baseline Information

Due to the changes in the project area, the following updated environmental baseline is provided for completeness.

The CPP site was subject to cultural resources inventory by Garcia and Associates (Hart, Jenks, and Dore, 2001) during licensing. This resources inventory was based on both archive/ background research. As the proposed project will not result in the disturbance of native soils, a pedestrian reconnaissance survey was not performed. The qualifications of the cultural resource staff conducting this assessment are presented in Attachment 3.3.

However, on May 2, 2018, an updated literature search from the Northern California Information Center (NCIC) at California State University, Sacramento was performed. The literature search included a 0.5-mile Area of Potential Effect (APE) around the CPP (see Figure 3.3-1). Results from the NCIC literature search were provided on May 4, 2018, identifying four additional cultural resources records not included in the information used by the Commission in licensing of CPP. These materials were discovered during construction monitoring of CPP, performed under the direction of the Designated Cultural Resource Specialist. A summary of these records is presented below:

P-34-001185. This resource was recorded in 2003 as an isolate mining feature likely associated with Placer Mining. This mining feature consists of a depression measuring 9 feet in diameter and 4 feet in depth with a berm 6-8 inches high surrounding it.

P-34-001186. This resource was recorded as an isolate historic pail fragment found in 2005.

P-34-001187. This resource was recorded as an isolate obsidian bifacial core tool, found in 2005.

P-34-001188. This resource was recorded as an isolate retouched chert tool, found in 2005.

Isolate finds, by their definition, lack the data potential for inclusion to the NRHP and no further work was requested by the CEC's cultural resources staff. The Department of Parks and Recreation 523 forms were provided to the CPM at the time of discovery as required by COC CUL-6 and in the Final Cultural Resources Report as required by COC CUL-4. However, additional copies of these records will be provided upon request.

3.3.1.1 Architectural Reconnaissance

Based on online aerial mapping, it was determined that there are no new structures present within the APE. Therefore, a historic architectural survey was not warranted. Additionally, the proposed CPP modifications will not alter the physical appearance of the project site.

3.3.2 Environmental Consequences

The proposed CPP modifications will not impact native soils and no excavations or earth moving are expected. SFA contracted for a cultural resources literature search for the CPP site to be performed in June 2018, which determined that no new archaeological sites occurred within the APE and no project feature onsite is over 45 years old. Therefore, no impacts to cultural resources are expected.

3.3.3 Mitigation Measures

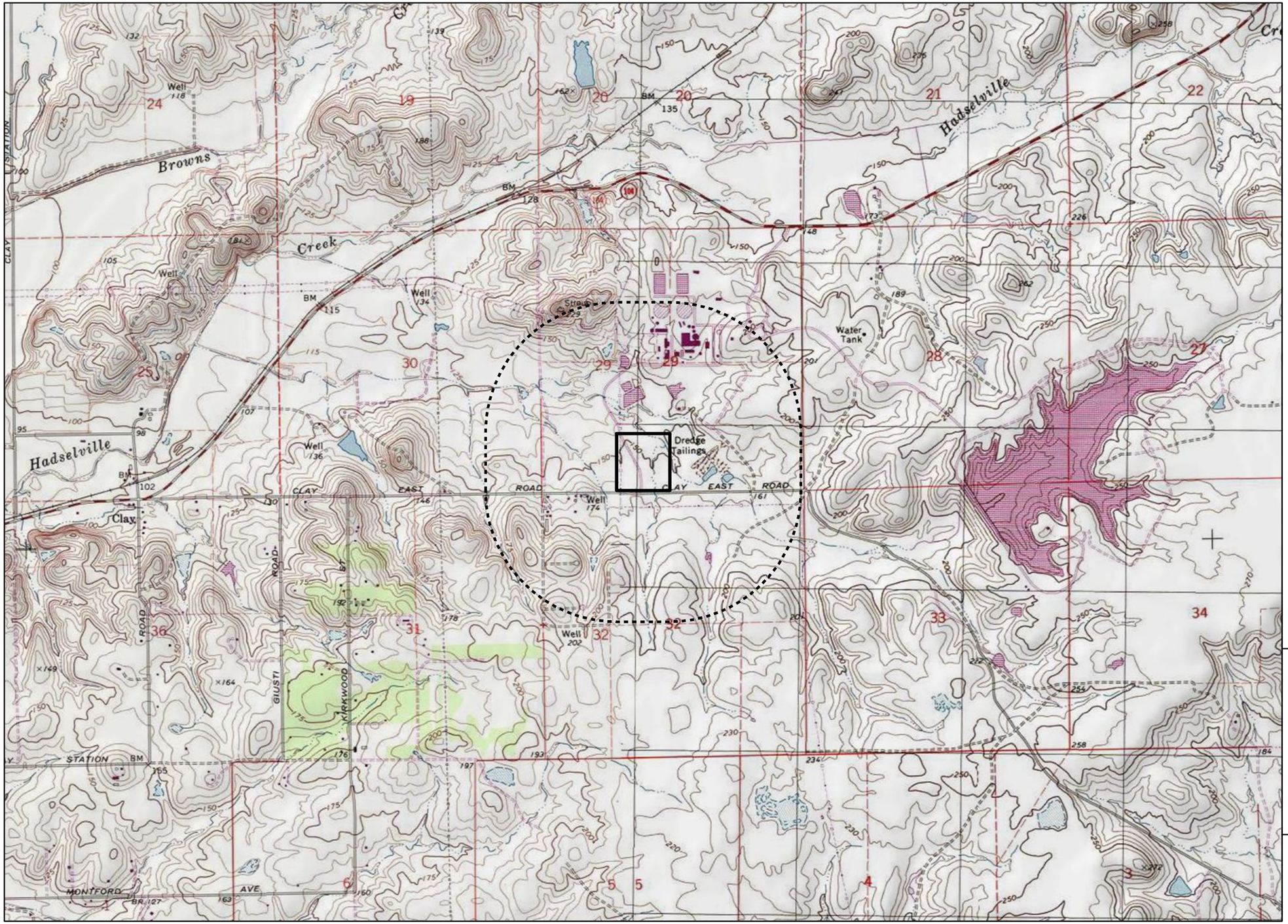
The proposed CPP modifications will not create a significant cultural resource impact and will not require additional mitigation measures.

3.3.4 Consistency with LORS

CPP intends to continue to implement the cultural resource COCs during the operation of the AGP and oxidation catalyst systems. Therefore, the project conforms to applicable laws related to cultural resources.

3.3.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for cultural resources.



Cosumnes Power Plant

0.5-mile Buffer of Cosumnes Power Plant

USGS 1:24,000 Quadrangles: Clay and Goose Creek

Township 6 North, Range 8 East
Sections 29, 30, 31, 32

Basemap Source: ESRI USA Topo Maps

N

0 2,000 4,000
Feet

Figure 3.3-1
Cultural Resources Literature Search Buffer
Cosumnes Power Plant Petition to Amend
Sacramento County, California

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3.4 Geologic Hazards and Resources

3.4.1 Environmental Baseline Information

This Petition to Amend does not require changes to the geologic hazards and resources environmental baseline information as described in the AFC.

3.4.2 Environmental Consequences

The proposed CPP modifications will not result in ground disturbance, excavations, earth moving, or foundation installation. No additional geologic resources or geologic hazards have been identified in the project area. Therefore, no impacts to geologic hazards and resources are expected.

3.4.3 Mitigation Measures

The proposed CPP modifications will not create a significant impact to geologic resources, and new geologic hazards have not been identified that require additional mitigation measures.

3.4.4 Consistency with LORS

The project conforms to applicable laws related to geologic hazards and resources.

3.4.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for geologic hazards and resources.

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3.5 Hazardous Materials Handling

3.5.1 Environmental Baseline Information

This Petition to Amend does not require changes to the hazardous materials handling environmental baseline information as described in the AFC.

3.5.2 Environmental Consequences

The proposed CPP modifications will not result in the use of a new hazardous material onsite or increase the amount or delivery frequency of hazardous materials use. As only a minor increase in hourly and daily air emissions is expected (see Table 3.1-5), the number and frequency of ammonia deliveries will not increase. Therefore, no impacts from hazardous materials handling are expected.

3.5.3 Mitigation Measures

The proposed CPP modifications will not create a significant impact from hazardous materials handling that will require additional mitigation measures.

3.5.4 Consistency with LORS

The project conforms to applicable laws related to hazardous materials handling.

3.5.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for hazardous materials handling.

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3.6 Land Use

3.6.1 Environmental Baseline Information

Due to changes in the project area subsequent to licensing of the CPP, the following updated environmental baseline is provided for completeness.

The CPP site is located in southeastern Sacramento County, approximately 1.75 miles east of the intersection of Twin Cities and Clay East Road. The site exists on the southwestern quarter of Sacramento County Assessor's Parcel Number 140-0050-010 and the southeastern corner of APN 140-0050-008. The land use designation for the site (both parcels) is Public/Quasi-Public with a Resource Conservation overlay. The site is zoned as AG-80, which is compatible with the land use designation.

The proposed project is part of 2,480 acres purchased by SMUD in the 1960s to establish Rancho Seco Nuclear Power Plant. Over the years, other power generating sources have been established on the property, including CPP. Adjacent uses include photovoltaic farms, the Rancho Seco Plant site, Rancho Seco Reservoir (established for Rancho Seco Plant's emergency water supply), areas set aside for a wildlife refuge and a permanent conservation easement area used for mitigating sensitive habitat.

No existing recreational, scenic, natural resource protection, natural resource extraction, educational, or religious land uses exist in the vicinity (i.e., within 1 mile) of the project site.

CPP is approximately 2 miles west of the Rancho Seco Park, which is owned and operated by SMUD. Recreational facilities include fishing, boating, swimming, and camping. No other recreational facilities exist in the vicinity of the project site.

A wildlife refuge exists approximately 2 miles southeast of the project site, and sensitive habitat and a conservation easement area have been identified to the east and south of Rancho Seco Reservoir, approximately 4 miles from the project site.

3.6.1.1 General Plan Policies Applicable to the Project

The following subsections summarize General Plan policies for land uses affected by the project. Specific General Plan goals and policies and the project's consistency with these policies are presented below.

3.6.1.1.1 Public Facilities

The proposed CPP modifications constitute the continued maintenance and operation of a public utility on land designated for Public/Quasi-Public Use. Policies regarding the operation of a public utility for power generation are found in the Sacramento County General Plan Public Facilities Element. The main goal of the Public Facilities Element is to site and provide public facilities, including power generation, in a manner that does not compromise public and environmental health. This goal is currently achieved through compliance with the CEC permitting process during licensing and amendment of CPP's license.

3.6.1.1.2 Agricultural Lands

The increase in electrical production at CPP occurs entirely within the existing site, without the need to developed any other areas of the CPP site. The CPP site does not include any agricultural lands or areas. Furthermore, increased electrical production at CPP is not expected to result in impacts to agricultural lands or operation as the generation capacity of the original CPP license assumed 1,000 MWs of generation at the site.

3.6.1.1.3 Resource Conservation Areas

The Resource Conservation Area land use designation is based on potential, unconfirmed resource availability and is subject to change based on a project's consistency with general plan, land use, and zoning requirements. The proposed CPP modifications will occur onsite and will not impact any unconfirmed resources.

3.6.2 Future Growth Trends

Sacramento County's General Plan has defined an Urban Service Boundary (USB), which defines a permanent boundary beyond which the County does not provide urban levels of public infrastructure. The CPP site is outside of the USB, and urban growth is not planned for the project vicinity.

3.6.3 Discretionary Reviews by Public Agencies

A review of Sacramento County Planning Department's Planning Projects Viewer[12] indicates that no other major projects are scheduled in the vicinity of CPP.

3.6.4 Environmental Consequences

3.6.4.1 Significance Criteria

Significance criteria for impacts to land use were determined through a review of applicable state and local regulations. Because the Warren-Alquist Act is equivalent to CEQA review, the following criteria have been developed from the CEQA Guidelines and CEQA Checklist to evaluate the potential environmental impacts of the project:

- Physically divide an established community?
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?
- Conflict with any applicable habitat conservation plan or natural community conservation plan?

3.6.4.2 Potential Effects on Land Use

The project does not constitute a loss of lands as it occurs entirely within the existing CPP site. The project is consistent with existing land uses, the policy for consistent land use designation/zoning district, and policies related to the siting of public utilities for energy generation.

3.6.4.3 Cosumnes Power Plant Site and Surrounding Area

CPP has been in operation for approximately a decade and was determined to be an allowable use within the Public/Quasi-Public land use designation and the parcel's AG-80 zoning during licensing.

3.6.4.3.1 Compatibility with Plans and Policies

The proposed project is consistent with goals and policies of the Sacramento County General Plan, Public Facilities Element. Table 3.6-1 provides a summary of the project's consistency and conformity with the County's Public Facilities Element of the General Plan.

The proposed CPP modification is consistent with existing land uses in the vicinity, including the former Rancho Seco Plant, transmission lines, water supply pipeline, solar generating plant, and electrical switchyard located nearby. The project is located away from planned residential

[12] https://planningdocuments.saccounty.net/

development. Adequate buffering from residential developments is achieved through existing land use designations surrounding the project vicinity.

3.6.5 Mitigation Measures

The proposed CPP modifications will not create a significant impact to land use that requires additional mitigation measures.

3.6.6 Consistency with LORS

The project conforms to applicable laws related to land use.

3.6.7 Conditions of Certification

The proposed modifications do not require changes to the COCs for land use.

3.6.8 References

Sacramento County. 2017, as revised. County of Sacramento General Plan.

Sacramento County Website: http://www.co.sacramento.ca.us (accessed July, 2018).

TABLE 3.6-1
CPP Land Use Consistency with the Sacramento County General Plan

Element	Goal/Policy	Consistency
Sacramento County General Plan		
Public Facilities Element		
Energy Facilities	*Goal: Appropriately sited energy facilities that efficiently and safely produce and distribute energy to Sacramento County residents without compromising environmental quality or human health.*	
	Objective: Minimize the health, safety, aesthetic, cultural, agricultural and biological impacts of energy facilities in Sacramento County.	
	Policy PF-66: The Board of Supervisors and the County Planning Commission may approve, or recommend approval wherein the county has jurisdiction, of development projects for energy facilities that are contrary to any of the policies in this section only when justification is provided through findings.	The project is consistent with the Public Facilities Element of the General Plan.
	Policy PF-67: Cooperate with the serving utility in the location and design of production and distribution facilities so as to minimize visual intrusion problems in urban areas and areas of scenic and/or cultural value including the following: Recreation and historic areas; scenic highways; state and federal designated wild and scenic rivers; visually prominent locations such as ridges, designated scenic corridors, and open viewsheds; and Native American sacred sites.	No changes to CPP's physical appearance will occur as a result of the proposed AGP upgrade. Furthermore, no impacts to recreation, historic or cultural resources, visual or scenic resources, or water resources are expected. Likewise, impacts to Native American resources or sacred sites are not expected as no ground disturbance is required.

TABLE 3.6-1
CPP Land Use Consistency with the Sacramento County General Plan

Element	Goal/Policy	Consistency
	Policy PF-68: Cooperate with the serving utility in the location and design of energy production and distribution facilities in a manner that is compatible with surrounding land uses by employing the following methods when appropriate to the site: Visually screen facilities with topography and existing vegetation and install site-appropriate landscaping consistent with surrounding land use zone development standards where appropriate, except where it would adversely affect access to utility facilities, photovoltaic performance or interfere with power generating capability. Provide site-compatible landscaping. Minimize glare through siting, facility design, nonreflective coatings, etc. except for the use of overhead conductors. Site facilities in a manner to equitably distribute their visual impacts in the immediate vicinity.	No changes to CPP's physical appearance will occur as a result of the proposed AGP upgrade, due to the remote nature of the site and the number of sensitive viewers in the project vicinity. Furthermore, Condition VIS-3 require SFA to develop and install site-compatible visual screening/landscaping to minimize impacts to adjacent residences to suitably distribute visual impacts equitably.
	Policy PF-69: Cooperate with the serving utility to minimize the potential adverse impacts of energy production and distribution facilities to environmentally sensitive areas by, when possible, avoiding siting in the following areas: wetlands; permanent marshes; riparian habitat; vernal pools; oak woodlands; and historic and/or archaeological sites and/or districts.	The AGP upgrade project will not result in any offsite impacts to natural habitats (wetlands, marshes, riparian habitats, vernal pools, or oak woodlands). Additionally, no excavation is required, so impacts to archaeological sites or districts are not expected. The AGP upgrade project will not alter the appearance of the CPP, therefore, impacts to historic resources are not expected.
	Policy PF-70: Cooperate with the serving utility so that energy production and distribution facilities shall be designed and sited in a manner so as to protect the residents of Sacramento County from the effects of a hazardous materials incident.	The CPP site is located in a rural area with few nearby residents. The proposed AGP upgrade project will not increase the amount of hazardous materials stored on the project site. Therefore, no hazardous materials impacts are expected. Furthermore, the CPP has operated for over a decade without any hazardous materials incidences that impacted Sacramento County residents.

Source: Sacramento County General Plan (2017) - http://www.per.saccounty.net/LandUseRegulationDocuments/Documents/General-Plan/Public%20Facilities%20Element%20-%20Amended%2009-26-17.pdf

3.7 Noise and Vibration

3.7.1 Environmental Baseline Information

This Petition to Amend does not require changes to the noise and vibration environmental baseline information as described in the AFC.

3.7.2 Environmental Consequences

The proposed CPP modifications will not increase noise-producing activities at the site. Furthermore, the increased electrical production and slight increase in fuel use will not result in significant noise or vibration impacts.

3.7.3 Mitigation Measures

The proposed CPP modifications will not create a significant impact to noise and vibration that requires additional mitigation measures.

3.7.4 Consistency with LORS

The project conforms to applicable laws related to noise and vibration.

3.7.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for noise and vibration.

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3.8 Paleontological Resources

3.8.1 Environmental Baseline Information

This Petition to Amend does not require changes to the paleontological resources environmental baseline information as described in the AFC.

3.8.2 Environmental Consequences

No excavations or earth moving are expected due to the proposed increase in CPP electrical production. Therefore, no impacts to paleontological resources are expected.

3.8.3 Mitigation Measures

The proposed CPP modifications will not create a significant paleontological resource impact and will not require additional mitigation measures.

3.8.4 Consistency with LORS

The proposed increase in electrical production at CPP is consistent with applicable paleontological LORS. Therefore, the project conforms to applicable laws related to paleontological resources.

3.8.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for paleontological resources.

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3.9 Public Health

3.9.1 Environmental Baseline Information

This Petition to Amend does not require changes to the Public Health environmental baseline information as described in the AFC.

3.9.2 Environmental Consequences

The proposed CPP modifications will result in a slight increase in fuel consumption, which will increase TAC emissions. TAC emissions were estimated using EPA AP-42 TAC emission factors in order to update the CPP health risk assessment. To determine whether the proposed modification to CPP results in a significant public health impact, a HRA was performed for total CPP TAC emissions resulting from the increased fuel consumption. The HRA was performed using EPA's AERMOD dispersion modeling software together with ARB's Hotspots Analysis and Reporting Program (HARP2) computer model Risk Assessment Standalone Tool (Version 17320, November 16, 2017). The HARP2 model was used to assess cancer risk as well as chronic and acute risk impacts. A risk of less than 10 x 10^{-6} for cancer and a Health Hazard Index of less than 1 for chronic or acute exposures are considered to be insignificant. The results of the HRA are summarized in Table 3.9-1, and the detailed HARP2 modeling results are presented in Attachment 3.1, Appendix E.

Table 3.9-1 shows that the HRA results for the proposed CPP modification are below the significance thresholds for cancer, acute, and chronic impacts. Therefore, the TAC emission impacts for the proposed CPP modification will not be significant, and the project is not expected to create a nuisance due to health risk.

TABLE 3.9-1
CPP Health Risk Screening Results

Risk Component	Total Risk
Cancer Risk - Residential	0.3 x 10-6
Cancer Risk – Workplace	0.004 x 10-6
Acute Hazard Index	0.03
8-Hour Chronic Hazard Index	0.0001
Chronic Hazard Index	0.02

3.9.3 Mitigation Measures

The CPP impacts on public health are less than significant, and, therefore, will not require additional mitigation measures.

3.9.4 Consistency with LORS

The project conforms to applicable laws related to public health.

3.9.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for public health.

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3.10 Socioeconomics

3.10.1 Environmental Baseline Information

This Petition to Amend does not require changes to the socioeconomic environmental baseline information as described in the AFC.

3.10.2 Environmental Consequences

CPP was licensed as a 1,000 MW project consisting of two power blocks of 500 MWs each. To date, SFA has only constructed one of the power blocks, therefore the proposed increase in electrical output is well within the electrical generation envisioned for the site. Therefore, no significant, negative socioeconomic impacts are expected.

3.10.3 Mitigation Measures

The proposed CPP modifications will not create a significant, negative impact to socioeconomics that requires additional mitigation measures.

3.10.4 Consistency with LORS

The project conforms to applicable laws related to socioeconomics.

3.10.5 Conditions of Certification

The Commission Decision did not include COCs for socioeconomics.

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3.11 Soils and Agriculture

3.11.1 Environmental Baseline Information

This Petition to Amend does not require changes to the soils and agricultural environmental baseline information as described in the AFC.

3.11.2 Environmental Consequences

The proposed CPP modifications do not result in any ground disturbance or excavations and occur entirely within the developed project site. Therefore, no impacts to soils or agriculture are expected.

3.11.3 Mitigation Measures

The proposed CPP modifications will not create a significant impact to soils or agriculture that requires additional mitigation measures.

3.11.4 Consistency with LORS

The project conforms to applicable laws related to soils and agriculture.

3.11.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for soils and agriculture.

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3.12 Traffic and Transportation

3.12.1 Environmental Baseline Information

Due to the changes in the project area, the following updated environmental baseline is provided for completeness.

This Petition to Amend does not require changes to the traffic and transportation environmental baseline information as described in the AFC. However, due to the age of the baseline environmental information provided, SFA provides the following update to the traffic and transportation systems surrounding the CPP site.

The proposed CPP modification will occur entirely on the existing CPP site in Sacramento County, approximately 25 miles southeast of the City of Sacramento. Clay East Road borders the site to the south. Twin Cities Road is the closest road to the north and west of the site. The CPP site is in a rural undeveloped area and no major changes to the existing transportation infrastructure have occurred since preparation of the AFC.

Two state highways serve the project area, including State Route (SR) 104 (Twin Cities Road) and SR 99. These highways are maintained by the California Department of Transportation (Caltrans). Clay East Road is a two-lane local road serving local traffic and residential access. The CPP site will continue be accessed from Clay East Road.

The annual average daily and peak hour traffic for the local highways was reviewed to assess whether traffic conditions in the study area have changed significantly since the preparation of the AFC. The existing daily and peak hour traffic is summarized in Table 3.12-1. Although traffic volumes have generally increased, they remain within acceptable levels of service (LOS) (C or better) based on volume thresholds and LOS standards identified in Caltrans Measures of Effectiveness by Facility Type (Caltrans, 2002) and the County of Sacramento Traffic Impact Analysis Guidelines (Sacramento County, 2004). The overall operational assessment is still consistent with the assessment performed when the CPP was licensed.

TABLE 3.12-1
Existing Traffic Characteristics of Highways in the Project Area

Highway/ Milepost	Location	Annual Average Daily Traffic[1]	Annual Average Peak Hour Traffic[1]	Annual Average Daily Truck Traffic[1]	Percent of Truck Traffic[1]	LOS Standard[2]	LOS
			State Route 99				
3.53	Twin Cities, Jct. Rte. 104 East	78,800	6,300	11,330	14.4	D	C
State Route 104							
0	Twin Cities, Jct. Rte. 99	10,500	1,150	840	8	D	A
9.22	Clay East Road	5,600	665	N/A	N/A	D	B

[1]Caltrans Traffic Management Branch, 2016.

[2]Caltrans Guide for the Preparation of Traffic Impact Studies, 2002.

Note:

N/A not available

3.12.2 Environmental Consequences

The proposed CPP modifications will not require any additional worker or delivery trips to the site. Therefore, no impacts to traffic or transportation are expected.

3.12.3 Mitigation Measures

The proposed CPP modifications will not create a significant impact to traffic or transportation that requires additional mitigation measures.

3.12.4 Consistency with LORS

The project conforms to applicable laws related to traffic and transportation.

3.12.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for traffic and transportation.

3.13 Visual Resources

3.13.1 Environmental Baseline Information

This Petition to Amend does not require changes to the visual resources environmental baseline information as described in the AFC.

3.13.2 Environmental Consequences

The proposed CPP modifications will not result in the physical alteration of the CPP appearance. The replaced combustion turbine and HRSG components are internal to these pieces of equipment and cannot be seen. Therefore, no impacts to visual resources are expected.

3.13.3 Mitigation Measures

The proposed CPP modifications will not create a significant impact to visual resources that requires additional mitigation measures.

3.13.4 Consistency with LORS

The project conforms to applicable laws related to visual resources.

3.13.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for visual resources.

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3.14 Waste Management

3.14.1 Environmental Baseline Information

This Petition to Amend does not require changes to the waste management environmental baseline information as described in the AFC.

3.14.2 Environmental Consequences

The proposed CPP modifications will not result in an increase in hazardous material use or waste generation at the site. Therefore, no impacts to waste management are expected.

3.14.3 Mitigation Measures

The proposed CPP modifications will not create a significant waste management impact and will not require additional mitigation measures.

3.14.4 Consistency with LORS

The project conforms to applicable laws related to waste management.

3.14.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for waste management.

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3.15 Water Resources

3.15.1 Environmental Baseline Information

This Petition to Amend does not require changes to the water resources environmental baseline information as described in the Commission Decision and Amendments.

3.15.2 Environmental Consequences

The proposed CPP modifications will not result in an increase in water use or alter storm water drainage onsite. The increased electrical production results in a slight increase in steam turbine electrical production, which increases the heat rejection requirements. However, this increase is well within the operating parameters of the CPP cooling system and will not require additional water supplies or consumption. Therefore, this Petition to Amend will not result in water resources impacts different than those analyzed by the CEC during the licensing of the project.

3.15.3 Mitigation Measures

The CPP impacts on water resources with the proposed modifications are less than significant, and therefore, will not require additional mitigation measures.

3.15.4 Consistency with LORS

The project conforms to applicable laws related to water resources.

3.15.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for water resources.

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4. Potential Effects on the Public

This section discusses the potential effects on the public that may result from the modifications proposed in this Petition to Amend, in accordance with CEC Siting Regulations (Title 20, CCR, Section 1769(a)(1)(G)).

With the implementation of the modifications proposed, the project would have no adverse effect on the public. As previously mentioned, the operation of CPP will increase electrical production with only slightly higher fuel consumption from the installation of upgraded original equipment. Therefore, no adverse effects on the public will occur because of the changes to the project as proposed in this Petition to Amend.

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5. List of Property Owners

A list of the property owners in accordance with the CEC Siting Regulations (Title 20, CCR, Section 1769(a)(1)(H)) whose property is located within 1,000 feet of CPP is provided under separate cover.

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6. Potential Effects on Property Owners, the Public, and Parties in the Proceeding

This section addresses potential effects of the project changes proposed in this Petition to Amend on nearby property owners, the public, and parties in the application proceeding, in accordance with CEC Siting Regulations (Title 20, CCR, Section 1769 (a)(1)(I)).

The project as modified will not differ significantly in potential effects on adjacent land owners, compared with the project as previously certified. Operation of the CPP utilizing the enhanced capabilities as proposed will have no adverse effect on nearby property owners, the public, or other parties in the application proceeding. Operation of CPP will increase electrical production with slightly higher fuel consumption from the installation of upgraded original manufacturer's equipment. The project, therefore, would have no adverse effects on nearby property owners, the public, or other parties in the application proceeding.

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Attachment 3.1
CPP Air Permit Application

APPLICATION FOR AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE

Cosumnes Power Plant – Herald, California
SMAQMD Permit No. TV2012-19-01

Gas Turbine Performance Upgrade Project

Prepared By:

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June 2018
Rev. 1

Project 170506.0100

Trinity Consultants

Environmental solutions delivered uncommonly well

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1. EXECUTIVE SUMMARY

The Sacramento Municipal Utility District Financing Authority (SFA) operates an electric generating station, referred to as the Cosumnes Power Plant (CPP), located at 14295 Clay East Road in Herald, California (the Facility). SFA operates the Facility under the Title V Permit (the Permit) issued by the Sacramento Metropolitan Air Quality Management District (SMAQMD) on December 24, 2013. CPP's Application for Certification was approved by the California Energy Commission on September 9, 2003.

SFA operates two GE Model 7FA combined cycle combustion turbines (CT No. 2 and CT No. 3), each equipped with dry low-NOx (DLN) combustors and a selective catalytic reduction (SCR) system with ammonia injection for NOx control. Each gas turbine combusts natural gas and digester gas with no emergency backup fuel, and each includes an unfired heat recovery steam generator (HRSG). Each combustion turbine produces up to 170 megawatts of electrical power. The steam produced by the two HRSGs drives a single steam turbine (ST No. 1), which produces up to 190 megawatts of electrical power. The total electrical power produced by the facility is approximately 530 MW and is delivered into the Sacramento Municipal Utility District's (SMUD's) electric grid.

SFA is proposing to upgrade the existing GE Model 7FA combustion turbines with the GE "Power FlexEfficiency Package" consisting of Advanced Gas Path (AGP) and Dry-Low-NOx2.6+ (DLN2.6+) equipment; this project is referred to as the Gas Turbine Performance Upgrade Project (the Project). These proposed performance upgrades include increased MW output and improved efficiency due to higher gas turbine firing temperatures made possible by improved cooling, coatings, and sealing of the power turbine. In addition, the DLN2.6+ performance upgrades include the use of improved turbine blade aerodynamic shape for increased airflow and efficiency.

SFA's overall goal for this Project is to increase the efficiency and firing rate of each turbine such that the overall CPP generating capacity increases.

- The CT maximum heat input rate will increase from its current rating of 1865 MMBtu/scf to 2200 MMBtu/scf (18% increase).
- CPP's overall rating will increase to approximately 603.2 MW (from 530 MW).
- The individual CT name plate rating will increase approximately by 28.1 MW to 198.1 MW (from 170 MW).
- The 2-on-1 steam generator rating will increase approximately by 17 MW to 207 MW (from 190 MW).

The economics and timing of the Project required that installation of the upgraded components commence in April 2018 for CT No. 3. Therefore, in order to assure adequate permit processing time, SFA is permitting the Project in two phases.

- Phase 1: Submit application to allow the installation of the turbine upgrade components at CT No. 2 and CT No. 3 without increasing turbine emissions or firing rate, and restricting emission rates such that BACT and offsets are not triggered (i.e., operating the turbine in a reduced fire or governed state). This phase is complete and Authorities to Construct have been issued for the turbine upgrades (A/Cs 25510 and 25511) and new CO oxidation catalysts (A/Cs 25634 and 25635) for CT Nos. 2 and 3, respectively.
- Phase 2: Submit a subsequent set of applications that will propose an increase in CT No. 2 and CT No. 3's firing rate and emissions. This phase of the application process is being implemented by this submittal.

As required by SMAQMD Rule 201, SFA is submitting this Authority to Construct (ATC) Application (the Application) to SMAQMD in order to obtain SMAQMD approval to construct the proposed firing rate and emissions increase Project. All information required under SMAQMD Form G101 and associated "Lists and Criteria Identifying Information Required of Applicants Seeking a Permit to Construct from the Sacramento Metropolitan Air Quality Management District" is included in this Application. Appendix A of this Application includes all required SMAQMD forms.

SFA has enclosed a check in the amount of $18,447 made payable to the SMAQMD to cover the filing fee for the requested permit change.

This Application is organized as follows:

- Section 1: Executive Summary
- Section 2: Emission Calculations
- Section 3: Regulatory Analysis

2.1. OPERATING CONDITIONS

It is anticipated that the operating schedule for CT No. 2 and CT No. 3 will not be affected following completion of the Project, including the number of actual turbine startup (SU) and shutdown (SD) events. Any change in operating schedule will be the result of market demand and not a result of the Project. SFA proposes to use the existing CT No. 2 and CT No. 3 continuous emission monitoring systems (CEMS), data acquisition and handling system (DAHS), and balance of plant controls to monitor and document that the modified turbines are in compliance with the new permitted emissions and operating limits.

2.2. EMISSION ESTIMATES

2.2.1. Regulated Pollutants

As discussed above, for this second permitting phase of the Project there will be an increase in the potential to emit (PTE) of CT No. 2 and CT No. 3 for NOx, CO, VOC, SOx, PM_{10}, and $PM_{2.5}$. The hourly, daily, quarterly, and annual emissions from the existing CTs as reported in A/Cs 25510 and 25511 are presented in Table 2-1 below.

Table 2-1. Current Emission Limits for CT No.2 and CT No. 3
(Emissions are per turbine except for annual, which is facility total)

Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Annual tons/year
VOC	3.30	117.3	7,403	7,479	7,555	7,555	30.0
NOx	13.51	523.7	31,010	31,321	31,632	31,632	96.0
SO_2	1.67	40.1	3,095	3,130	3,164	3,164	12.6
PM_{10}	9.00	216.0	19,440	19,656	19,872	19,872	80.6
$PM_{2.5}$	--	--	19,401	19,617	19,832	19,832	79.3
CO	16.46	3,051.7	73,965	74,343	74,722	74,722	123.1
CO_{2e} (tons)	--	--	467,351	472,544	477,737	477,737	1,895,368

Proposed emissions are summarized in Table 2-2. Hourly and daily emissions are based on increasing the turbine firing rate from 1,865 MMBtu/hr to 2,200 MMBtu/hr and include 3 hours of startup per day. Quarterly emissions for VOC, NOx, PM_{10}/$PM_{2.5}$, and CO are based on current permit limits. SO_2 and greenhouse gas (GHG) CO_2 equivalent (CO_{2e}) emissions are based on operating 8,760 hours per year at full load. Table 2-2 also shows the proposed annual emission limits, which are less than the sum of the quarterly emissions totals for NOx, PM_{10}, $PM_{2.5}$, and CO. These annual emission limits are proposed in order to remain under the SMAQMD major modification and Prevention of Significant Deterioration (PSD) major source thresholds, as discussed below. Detailed emission calculations are included in Appendix B.

Table 2-2. Proposed Emission Limits for CT No.2 and CT No. 3
(Emissions are per turbine except for annual, which is facility total)

Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Sum of Quarters tons/year	Proposed Annual tons/yr
VOC	3.95	131.0	7,403	7,479	7,555	7,555	30.0	30.0
NOx	16.21	580.4	31,010	31,321	31,632	31,632	125.6	96.0
SO_2	1.91	45.8	4,126	4,171	4,217	4,217	16.7	16.7
PM_{10}	10.63	255.1	19,440	19,656	19,872	19,872	78.8	80.6
$PM_{2.5}$	--	--	19,401	19,617	19,832	19,832	78.7	79.3
CO	19.73	3,120.3	73,965	74,343	74,722	74,722	297.8	99.4
CO_{2e} (tons)	--	--	556,450	562,633	568,816	568,816	2,256,714	2,256,714

The corresponding maximum potential emission changes (comparison of pre- and post-Project maximum potential emissions) for the Project are summarized in Table 2-3.

Table 2-3. Proposed Emission Changes for CT No.2 and CT No. 3
(Emissions are per turbine except for annual, which is facility total)

Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Proposed Annual tons/yr
VOC	0.65	13.7	0	0	0	0	0.0
NOx	2.70	56.7	0	0	0	0	0.0
SO_2	0.24	5.7	1,031	1,041	1,053	1,053	4.1
PM_{10}	1.63	39.1	0	0	0	0	0.0
$PM_{2.5}$	--	--	0	0	0	0	0.0
CO	3.27	68.6	0	0	0	0	-23.7
CO_{2e} (tons)	--	--	89,099	90,089	91,079	91,079	361,346

2.2.2. Prevention of Significant Deterioration (PSD) Emission Calculations

CPP is located in an attainment area for NO_2, CO, PM_{10}, and SO_2. The proposed project does not trigger PSD applicability for these PSD pollutants. PSD applicability is based on whether there is a significant emissions increase at a PSD major source (maximum potential emissions are greater than 100 tons per year for a regulated pollutant). However, SFA is proposing to accept annual permit limits at CPP which restrict emissions to less than 100 tons per year for each regulated pollutant. Consequently, there is no need to check for a significant emissions increase under federal PSD regulations or SMAQMD Rule 203.

Additional details on the applicability of the PSD permitting program are provided in Section 3.1.1.3; detailed emissions calculations are included in Appendix B.

The Facility is subject to federal and SMAQMD air regulations. This section summarizes the air permitting requirements and the key air quality regulations that apply to the emission units impacted by the Project.

3.1. SMAQMD REQUIREMENTS

3.1.1. Regulation 2 – Permits

3.1.1.1. Rule 201 – General Permit Requirements

Rule 201 states that any facility building, erecting, installing, altering, or replacing non-exempt equipment that causes or controls the emission of air pollutants must first obtain an authority to construct from the SMAQMD. Because CT No. 2 and CT No. 3 will be altered as a result of this Project, SFA is submitting this application for an authority to construct.

3.1.1.2. Rule 202 – New Source Review

The SMAQMD adopted Rule 202 to provide for preconstruction review of new or modified facilities, to ensure that affected sources do not interfere with the attainment of ambient air quality standards. In general, Rule 202 contains three separate elements as part of a New Source Review (NSR) analysis:

- Best Available Control Technology (BACT);
- Emission Offsets; and
- Air Quality Impact Analysis.

In order to determine which of these NSR elements are applicable to the project, we must first determine if CPP is a "major stationary source" and then whether the project is a "major modification."

CPP is a "major stationary source" per Rule 202, section 228 for NOx, VOC, $PM_{2.5}$, and CO per the information presented in Table 3-1.

Table 3-1. SMAQMD Major Stationary Source Applicability Determination (tpy)

Pollutant	Major Source Threshold	Proposed Permit Limit	Major Source?
VOC	25	30.0	**YES**
NOx	25 (or 100 tpy as $PM_{2.5}$ precursor)	96.0	**YES**
SO_2	100	16.7	**NO**
PM_{10}	100	41.3	**NO**
$PM_{2.5}$	100	40.5	**NO**
CO	100	99.4	**NO**

For the pollutants CO, SO_2, PM_{10}, and $PM_{2.5}$, which do not result in a "major stationary source" determination, emission increases are calculated pursuant to Rule 202, Sections 411 and 225 based on a comparison of "historic potential emissions" to future potential emissions.

For the pollutants VOC and NOx, which result in a major stationary source determination, it must be determined whether the project is a "major modification" for these pollutants. Emission increases are determined by the calculation method in Rule 202, Section 411.5:

> *The sum of the Potential to Emit for the project minus the Historic Actual Emissions, as defined in Section 224.1, for the project. However, the potential to emit, instead of historic actual emissions, can be used for emissions units if either of the following conditions applies:*
>
> *a. Actual emissions are at least 80% of the potential to emit limit, or*
>
> *b. The emissions unit was fully offset for any emissions increase during the 5 year period prior to the date that the application is deemed complete.*

CPP has not had a permitted project at the site that required offsets in the last five years. Therefore, the next step is to check whether "actual emissions are at least 80% of the potential to emit limit." SMAQMD regulations do not specify how this "actual emissions" value is calculated. "Actual emissions" are defined as follows in Rule 202 and do not include a time period reference:

> *201* ***ACTUAL EMISSIONS:*** *Measured or estimated emissions which most accurately represent the emissions from an emissions unit.*

Nonetheless, despite this broad definition, SMAQMD staff have required that "actual emissions" are determined the same way as "historic actual emissions." "Historic Actual Emissions" are defined in Section 224 as follows for existing emissions units:

> *224.1* ***Existing emissions units****: Historic actual emissions for the existing emissions unit averaged over the two year period immediately preceding the date of application for an Authority to Construct.*
>
> *a. If the last two years are unrepresentative of normal source operations as determined by the Air Pollution Control Officer, then any two consecutive years of the last five years that represent normal source operation may be used.*

Therefore, the Project must first compare the two-year (24-consecutive month) average actual emission rates for the "major" pollutants to the CPP annual emission limits. If the total annual (12-month average) emission rate is less than 80% of the CPP annual permit limit, the Project must then use these baseline "historic actual emissions" to determine whether a "major modification" has occurred.

A "major modification" is defined in Rule 202, Section 227 as any physical change, change in method of operation, or addition to any stationary source classified as a "major source" that results in emission increases above the levels specified in Section 227. The emission increase calculation is based on the same Section 411.5 procedure described above for determining the 80% of potential to emit value.

Appendix C includes the two-year baseline calculation. The SMAQMD determines "normal source operations" based on the electrical output of the turbines, not on emissions. As noted in Appendix C, the previous two-year period beginning April 2018 results in an average 12-month baseline of 2,308,875

MW. The average 12-month baseline for the previous 60-month (five-year) period beginning April 2018 is 2,555,530 MW. In fact, the baseline of 2,308,875 MW for the previous two-year period beginning April 2018 results in the lowest baseline value of the entire 60-month period. Therefore, the previous two-year period is "unrepresentative of normal source operations" pursuant to Rule 202, Section 224.1, and consequently the Project may use "any two consecutive years of the last 5-years that represent normal source operation."

We note that the 24-month period prior to application includes the record-breaking rainfall and snowpack in the region that led to a significant increase in SMUD's hydroelectric generation and external power purchases. This conversely lowered demand for CPP's electrical production during the winter (Q1) and spring (Q2) of 2017. This period also ended California's record breaking drought where SMUD's thermal generation assets augmented the reduced hydroelectricity capacity.

The two-year period in the last five years that is most representative of normal operation is the two-year period ending February 2017, when 12-month average MW production was 2,604,892 MW, which is the same baseline used in the CPP Phase 1 project implemented in April of this year. This baseline will be used in Phase 2 for consistency between the two projects. This baseline year is close to the 60-month average of 2,555,530 MW.

Table 3-2 compares the historic actual emission values for the two-year period ending February 2017 to the potential to emit for the facility for comparison to the 80% threshold.

Table 3-2. SMAQMD Rule 202 80% of Potential to Emit Comparison

Pollutant	CPP Actual Emissions Baseline (tpy)	CPP Potential to Emit Permit Limit (tpy)	Percent of Potential to Emit	Actual at Least 80% of PTE?
VOC	5.2	30.0	**17.3%**	**NO**
NOx	71.1	96.0	**74.1%**	**NO**

As indicated in Table 3-2, no emissions are greater than 80% of the CPP facility potential to emit during the baseline period; therefore, none of these pollutants can use the potential to emit of the existing turbines to determine if there is an emissions increase.

The next step is to compare the "emission increase" (calculated by subtracting the historic actual emissions from the potential (permitted) emissions) to the "major modification" emission increase thresholds in Rule 202, Section 227. 3. Table 3-3 shows this comparison.

Table 3-3. SMAQMD Major Modification Applicability Determination (tpy)

Pollutant	CPP Actual Emissions	CPP Future Potential to Emit	Actual to Potential Increase	Major Modification Threshold	Major Modification?
NOx	71.1	96.0	24.9	25	**NO**
VOC	5.2	30.0	24.8	25	**NO**

As indicated in Table 3-3, the project is not a major modification for NOx or VOC.

3.1.1.2.1 Best Available Control Technology

Rule 202, Section 301 requires that an applicant apply Best Available Control Technology (BACT) to a new emissions unit or modification of an existing emissions unit, except cargo carriers, for each emissions change of a regulated air pollutant, if the change would result in any emission increase (except for CO, which requires a 550 lb/day increase). Emission increases are calculated pursuant to Section 411.1. If the modification is a major modification, then the applicant must apply BACT for each regulated pollutant that triggers major modification requirements. The Project does not result in a major modification for any regulated pollutant; therefore no pollutants trigger BACT as major modifications.

For all pollutants that do not result in a major modification, Section 411.1 requires a comparison of historic potential emissions to future potential emissions on a daily basis. As indicated in Table 2-3, the Project will result in an increase in daily potential emissions for all pollutants. However, the increase in CO emissions is below 550 lb/day; therefore, BACT is triggered for all pollutants except CO.

BACT for VOC and $PM_{10}/PM_{2.5}$ for gas turbines includes good combustion practices and natural gas fuel. BACT for SOx is the use of Public Utilities Commission (PUC) pipeline quality natural gas. BACT for NOx is proposed at 2.0 ppm corrected to 15% oxygen, averaged over a 1-hour period utilizing the existing selective catalytic reduction systems at these units, which is the current requirement in the CPP air permit. This is the lowest achieved in practice BACT level found after reviewing the South Coast AQMD, San Joaquin Valley APCD, Bay Area AQMD, and California Air Pollution Control Officers Association (CAPCOA) BACT guidance documents. CAPCOA lists the IDC Bellingham (Massachusetts) project as permitted at 1.5 ppm NOx at 15% oxygen, but it does not appear that this project was ever built.

Table 3-4 summarizes the BACT guidelines for NOx emissions from combined cycle gas turbines in the Bay Area AQMD, San Joaquin Valley APCD, and South Coast AQMD, as well as the CAPCOA guidance. The SMAQMD BACT Clearinghouse does not include a BACT determination for gas turbines.

Table 3-4. BACT Determinations for NOx from Combined-Cycle Gas Turbines

District	Source Description	Achieved in Practice	Technologically Feasible	Date	Reference Number
CAPCOA	170 MW Gas Turbine	2 ppmvd @ 15% O_2, 1 hr avg	1.5 ppmvd @15%O_2, 1 hr avg	12/12/03 9/11/00	SJVAPCD, IDC Bellingham
SJVAPCD	Gas Turbine ≥50 MW, with heat recovery	2.5 ppmvd @ 15% O_2, 1 hr avg	2.0 ppmvd @15%O_2, 1 hr avg	10/01/02	Guideline 3.4.2
BAAQMD	Combined Cycle Gas Turbine ≥40 MW	2.5 ppmvd @ 15% O_2, 1 hr avg	2.0 ppmvd @15%O_2, 1 hr avg	07/18/03	Document 89.1.6
SCAQMD	Combined Cycle Gas Turbine, 328 MW	2.0 ppmvd @ 15% O_2, 3-hr avg		01/30/04	Application 386305

3.1.1.2.2 Emission Offsets

Rule 201, Section 302 requires that emission offsets be provided on a per-pollutant basis for increases in quarterly emissions from a new or modified emissions unit if the stationary source's post-project potential to emit exceeds the levels specified in Rule 202, Section 302.1. The CPP facility exceeds the offset trigger levels in Section 302.1 for all pollutants except SOx.

Table 3-5. Offsets Applicability

Pollutant	Maximum Emissions (lb/quarter) [1]	Offsets Threshold (lb/quarter)	Above Offsets Threshold?
NOx	63,264	5,000	Yes
CO[2]	149,444	49,500	Yes
PM_{10}	39,744	7,300	Yes
$PM_{2.5}$	79.3 tpy	15 tpy	Yes
VOC/ROC	15,110	5,000	Yes
SOx	8,434	13,650	No

Notes:
1. Presented previously in Table 2-3 for each turbine.
2. CO emissions offsets are not required pursuant to Rule 202, Section 302.7 if the modeled increase in ambient CO concentration does not exceed 500 micrograms per cubic meter, 8 hour average, at and beyond the property line of the stationary source.

The quantities of offsets required are determined using the calculation procedures specified in Rule 202, Section 411.4, which calculates emission increases as the potential to emit minus the Historic Potential Emissions for the emissions units associated with a project. Historic Potential Emissions for pollutants not part of a major modification are based on permitted quarterly emission limits, except for $PM_{2.5}$ which is calculated on an annual basis. Therefore, since all regulated pollutants (except SOx which does not exceed the offsets threshold) do not result in a major modification per Table 3-3, offsets will be based on a comparison historic potential to future potential emissions.

Table 3-6 shows the calculation of emissions increases for determining emission offsets requirements. As indicated in Table 3.6, no offsets are required for the Project because there are no increases in emissions of NOx, VOC, PM_{10} or $PM_{2.5}$ above the historic potential to emit for these pollutants. .

Table 3-6. Calculation of Offsets Emission Increase

Pollutant	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Annual tons/year
Offsets Baseline (2 turbines)					
VOC	14,806	14,958	15,110	15,110	30.0
NOx	62,020	62,642	63,264	63,264	125.6
PM_{10}	38,880	39,312	39,744	39,744	78.8
$PM_{2.5}$	--	--	--	--	78.7
Proposed Emissions (2 turbines)					
VOC	14,806	14,958	15,110	15,110	30.0
NOx	62,020	62,642	63,264	63,264	125.6
PM_{10}	38,880	39,312	39,744	39,744	78.8
$PM_{2.5}$	--	--	--	--	78.7
Offsets Increase (2 turbines)					
VOC	0	0	0	0	0.0
NOx	0	0	0	0	0.0
PM_{10}	0	0	0	0	0.0
$PM_{2.5}$	--	--	--	--	0.0

3.1.1.2.3 Ambient Air Quality Impact Analysis

Rule 202, Section 305 prohibits a new or modified stationary source from interfering with the attainment or maintenance of an applicable ambient air quality standard. An ambient air quality impact analysis is required for a new major source or major modification, but the proposed CPP AGP Project is neither a new major source nor a major modification as indicated above in Table 3-3. Nonetheless, Table 3-7 shows the maximum ambient impacts for the CPP AGP Project including the increases in hourly and daily emissions. The detailed modeling outputs, operating scenarios, and background air quality data used in calculating these impacts are included in Appendix D.

As shown in Table 3-7, the maximum ambient impacts remain either below ambient air quality standards or below the significant impact levels for the particular pollutant. Only the 24-hour and annual California PM_{10} impacts equal or exceed the respective standards due to high background concentrations, but in these cases the project impacts are less than EPA's significant impact levels (SILs) for this pollutant. Consequently, there are no new significant ambient air quality impacts associated with the proposed CPP AGP Project.

Table 3-7. Ambient Air Quality Impacts

Pollutant	Averaging Period	Maximum Facility Impact (µg/m³)	Background (µg/m³)	Total Impact (µg/m³)	State Standard (µg/m³)	Federal Standard (µg/m³)	Significant Impact Level (µg/m³)
NO_2	1-hour (CA)	43.40	112.80	156.17	339	–	7.5
	1-hour (Fed)	43.40	41.36	84.73	–	188	7.5
	Annual (CA)	0.27	20.68	20.95	57	–	1
	Annual (Fed)	0.27	24.44	24.71	–	100	1
SO_2	1-hour (CA)	1.46	25.41	26.87	655	–	7.8
	1-hour (Fed)	1.46	18.34	19.80	–	196	7.8
	24-hour (CA)	0.35	23.32	23.67	105	–	5
CO	1-hour	690	2,748	3,438	23,000	40,000	500
	8-hour	114	1,947	2,061	10,000	10,000	2,000
PM_{10}	24-hour (Fed)	2.14	44.67	46.81	–	150	5
	24-hour (CA)	2.14	46.00	48.14	50	–	5
	Annual (CA)	0.29	19.50	19.79	20	–	1
$PM_{2.5}$	24-hour (Fed)	1.47	31.00	32.47	–	35	1.2
	Annual (Fed)	0.26	9.30	9.56	–	12.0	0.3
	Annual (CA)	0.26	6.00	6.26	12	–	0.3

3.1.1.3. Rule 203 – Prevention of Significant Deterioration

Rule 203 incorporates the Federal Prevention of Significant Deterioration (PSD) Program by reference (40 CFR 52.21). The PSD program requires pre-construction review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies to pollutants for which ambient concentrations do not exceed the corresponding National Ambient Air Quality Standards (i.e., attainment pollutants). For the proposed Turbine Upgrade Project, the emitted pollutants are NOx, SOx, CO, VOC, and $PM_{10}/PM_{2.5}$ (greenhouse gas emissions have also been added to PSD per the Tailoring Rule discussed below). While the SMAQMD is classified as an attainment area for NOx, SOx, CO, and PM_{10}, the SMAQMD is a nonattainment area with respect to the $PM_{2.5}$ and ozone (VOC) National Ambient Air Quality Standards. Consequently, the PSD regulations do not apply to VOC and $PM_{2.5}$ emissions from the project.

The federal PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source (these terms are defined in the PSD regulations at 40 CFR 52.21). CPP no longer is an existing major source because its emissions are proposed to be permitted to less than 100 tons per year for all regulated pollutants. Additionally, since the facility is no longer a PSD major stationary source, the Project does not need to assess whether there is a significant emissions increase associated with any PSD pollutants. Finally, since PSD is not triggered by non-GHG pollutants, PSD does not apply to the project solely due to any GHG emissions increases based on a June 2014 decision by the U.S. Supreme Court regarding the EPA's PSD GHG Tailoring regulation. Consequently, the proposed Project is not subject to PSD review.

3.1.1.4. Rule 207 – Title V Federal Operating Permit Program

CPP is an existing Title V facility with Permit No. TV2012-19-01. The proposed Turbine Upgrade Project will require a significant modification to CPP's Title V permit. In order to expedite the Title V permit modification process, SFA requests that the SMAQMD process this application and Title V permit modification under the Enhanced New Source Review process allowed pursuant to Rule 202 (Sections 101 and 404). This permit application package includes the SMAQMD application forms necessary for this modification to the CPP Title V permit (see Appendix A).

3.1.1.5. Rule 217 – Public Notification Requirements for Permits

Rule 217, Section 102 notes that notification requirements shall not apply if the application is for any new or modified emissions unit where the combined PTE from the project would have an increase in PTE less than the amounts listed below (and provided that offsets are not triggered).

Volatile organic compounds	5,000 pounds per quarter
Nitrogen oxides	5,000 pounds per quarter
Sulfur oxides	9,200 pounds per quarter
PM_{10}	7,300 pounds per quarter
$PM_{2.5}$	10 tons per year
Carbon monoxide	49,500 pounds per quarter

Because there will not be an increase in potential to emit from the CPP Turbine Upgrade Project and offsets are not triggered by the Project, the CPP Turbine Upgrade project does not trigger the Rule 217 public notice requirements. However, publication and public notification are required under Rule 207, the Title V Federal Operating Permit Program, for this significant Title V permit modification.

In addition to the notification requirements of Rule 217, California Health and Safety Code Section 42301.6 requires that an additional public notice be distributed whenever an Authority to Construct is issued that would allow increased toxic air contaminant emissions within 1,000 feet of the outer boundary of a school site. However, the Project is not within 1,000 feet of the outer boundary of a school site; therefore, notification is not required under Section 42301.6.

3.1.2. Regulation 3 – Fees

3.1.2.1. Rule 301 – Stationary Source Permit Fees

The Turbine Upgrade Project permit application is subject to the permit fees established by Rule 301. The initial permit fee was determined in accordance with SMAQMD Rule 301 based on Sections 301 and 308.2 as follows:

> *301* ***AUTHORITY TO CONSTRUCT FEE:*** *Every applicant for an authority to construct shall pay one half of the estimated initial permit fee in Section 308 of this rule upon filing the application.*

Section 308.3 requires $3,728 per application as one half of the initial permit fee. Additionally, Section 313 requires a $1,423 filing fee for a Title V permit application, $3,772 for each significant Title V permit that is modified, and $1,012 for each Enhanced New Source Review permit. Therefore, a check for two turbine sources payable to the SMAQMD is included as part of this permit application package in the amount of $18,447, based on the calculation below.

($3,728 + $3,772 + $1,012) x 2 + $1,423 = $18,447

SFA understands that the SMAQMD may charge additional fees based on actual review hours spent by District staff and for modification of the Title V Permit to Operate.

3.1.3. Regulation 4 – Prohibitions

3.1.3.1. Rule 401 – Rule 401: Ringelmann Chart/Opacity

Rule 401 prohibits the emission of air contaminants darker than Ringelmann No. 1 or 20% opacity for more than 3 minutes in a one-hour period. Water vapor is not included in an opacity determination. The gas-fired turbines will not create visible emissions in excess of the limits of this rule.

3.1.3.2. Rule 402 – Nuisance

This rule prohibits the discharge of air contaminants in quantities that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public. The SMAQMD regulates new and modified sources of toxic air contaminants (TACs) under this rule by implementing the California Air Resources Board (CARB)/CAPCOA "Risk Management Guidance for Stationary Sources of Air Toxics," dated July 23, 2015. These guidelines implement what is commonly known as "Toxics New Source Review."

For the CPP turbines, there are TAC emissions associated with the combustion of natural gas and digester gas. EPA AP-42 TAC emission factors for the combustion of natural gas and digester gas by turbines were used to calculate the TAC emission increase associated with the Project. Detailed TAC emission calculations are included in Appendix B. Some of these compounds have both carcinogenic and non-cancer health effects.

Under the SMAQMD's toxics policy, modified projects with TAC emission increases are required to perform a health risk assessment (HRA). To determine whether the proposed Project will result in a significant increase in either the carcinogenic or non-cancer health impacts for the CPP facility, an HRA was performed for the total TAC emissions associated with the CPP Turbines. This conservative analysis using total TAC emissions from the turbines, rather than the emissions increase, was prepared using EPA's AERMOD dispersion modeling software together with ARB's Hotspots Analysis and Reporting Program (HARP2) computer model Risk Assessment Standalone Tool (Version 17320, November 16, 2017). The HARP2 model was used to assess cancer risk as well as chronic and acute risk impacts. A risk of less than 1×10^{-6} for cancer and a Health Hazard Index of less than 1 for chronic or acute exposures are considered to be insignificant. The results of the HRA are summarized in Table 3-8, and the detailed HARP2 modeling results are enclosed as Appendix E.

Table 3-8 shows that the HRA results for the Project are below the significance thresholds for cancer, acute, and chronic impacts. Therefore, the TAC emission impacts for the proposed CPP Turbine Upgrade Project will not be significant, and the project is not expected to create a nuisance due to health risk.

Table 3-8. Health Risk Screening Results

Risk Component	Total Risk
Cancer Risk - Residential	0.3×10^{-6}
Cancer Risk – Workplace	0.004×10^{-6}
Acute Hazard Index	0.03
8-Hour Chronic Hazard Index	0.0001
Chronic Hazard Index	0.02

3.1.3.3. Rule 404 – Particulate Matter

Rule 404 prohibits emissions of PM in excess of 0.1 gr/dscf. The exhaust PM concentration from the gas turbines has been measured on multiple occasions during annual source tests, with the results demonstrating compliance with this requirement. The Turbine Upgrade Project is not expected to change turbine PM emission concentrations. Therefore, the Project will comply with Rule 404.

3.1.3.4. Rule 406 – Specific Contaminants

Rule 406 prohibits emissions of combustion contaminants in excess of 0.1 gr/dscf @ 12% CO_2. As noted above, the exhaust PM concentration from the turbines has been measured on multiple occasions during annual source tests and has demonstrated compliance with this requirement.

Rule 406 also prohibits emissions of sulfur compounds in excess of 0.2% by volume, or 2,000 ppmv. The exhaust SOx concentration from the turbines is significantly less than 2,000 ppmv and has been measured during annual source tests and demonstrated compliance with this requirement. The Turbine Upgrade Project will not change turbine SOx emission concentrations. Therefore, the Project will comply with the Rule 406 PM and sulfur compound emission limits.

3.1.3.5. Rule 413 – Stationary Gas Turbines

Rule 413 prohibits NOx emissions in excess of 9 ppmv @ 15% O_2 based on a 15-min average, with exceptions for excursions, from gaseous fuel-fired turbines with a maximum electrical output rating of 10 MW or greater operating 877 hours or more per year. Rule 413 is applicable to the CPP turbines, which have a maximum electrical output rating of 170 MW (increasing to 192.6 MW) and operate up to 8760 hours/year. At a permitted NOx concentration of 2 ppmv @ 15% O_2 averaged over one hour, the CPP turbines comply with the Rule 413 NOx limit.

3.1.4. Regulation 8 – Standards of Performance for New Stationary Sources (NSPS)

Rule 801 incorporates, by reference, the federal Standards of Performance for New Stationary Sources (NSPS). NSPS applies to certain types of equipment that are newly constructed, modified, or reconstructed after specified applicability dates. Only the NSPS subparts that may be potentially applicable to CT No. 2 and CT No. 3 are addressed in this section.

3.1.4.1. 40 CFR 60 Subpart A – General Provisions

All affected sources are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification and performance testing, recordkeeping, monitoring; provides reference methods; and mandates general control device requirements for all other

subparts as applicable. SFA will continue to meet all applicable requirements of the general provisions outlined in 40 CFR 60 Subpart A.

3.1.4.2. 40 CFR Part 60 Subpart KKKK – NSPS for Stationary Combustion Turbines

NSPS Subpart KKKK, *Standards of Performance for Stationary Combustion Turbines*, applies to stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the lower heating value of the fuel fired. Based on the modification date for the CPP Turbine Upgrade Project (after February 18, 2005) and the heat input at peak loads, the combustion turbines at CPP are subject to NSPS Subpart KKKK. The project is a "modification" under NSPS because it results in an increase in hourly emissions of a regulated NSPS pollutant per 40 CFR 60.14. SFA will comply with all applicable NSPS Subpart KKKK requirements as outlined in its revised Title V permit.

3.1.4.3. 40 CFR Part 60 Subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

NSPS TTTT, *Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units*, applies to electric generating units that commenced construction after January 8, 2014, and/or commenced modification or reconstruction after June 18, 2014. The combustion turbines at CPP will undergo an NSPS modification as a result of the project. As such, NSPS Subpart TTTT now applies to the modified units at CPP because they have a baseload rating greater than 250 MMBtu/hr and serve generators greater than 25 MW.

Section 60.5520(d)(1) specifies that stationary combustion turbines that are permitted to burn only fuels with a consistent chemical composition (i.e., uniform fuels) that result in a consistent emission rate of 160 lb CO_2 per MMBtu or less are not subject to any monitoring or reporting requirements under this subpart. These fuels include, but are not limited to, natural gas, methane, butane, butylene, ethane, ethylene, propane, naphtha, propylene, jet fuel kerosene, No. 1 fuel oil, No. 2 fuel oil, and biodiesel. Stationary combustion turbines qualifying under this paragraph are only required to maintain purchase records for permitted fuels. The CPP turbines should qualify for the exemption in Section 60.5520(d)(1) because they burn biogas and natural gas, resulting in a consistent CO_2 emission rate below 120 lb/MMBtu based on EPA emission factors.

Even if the CPP turbines did not qualify for the exemption in Section 60.5520(d)(1), the CPP turbines would be subject to a unit-specific GHG emission limit determined by the unit's best historical annual CO_2 emission rate (from 2002 to the date of the modification) and this emission limit would be no lower than 1,800 lb CO_2/MWh-gross for units with a base load rating greater than 2,000 MMBtu/hr. At a heat input of 2,200 MMBtu/hr and a gross output of 192.6 MWh, and using EPA's standard CO_2 emission factor of 117 lb/MMBtu for natural gas, the resulting CO_2 emission rate of 1,336 lb CO_2/MWh is well below the minimum of 1,800 lb CO_2/MWh.

3.1.5. California Environmental Quality Act (CEQA)

Under Rule 202, Section 307, the Air Pollution Control Officer shall deny an Authority to Construct or Permit to Operate if the Air Pollution Control Officer finds that the project which is the subject of an application would not comply with CEQA. Because CPP underwent review/approval by the CEC as an Application for Certification (AFC), and this project will require amendment to this AFC, we expect that CEC staff will determine that this project will require CEC review, and this review will satisfy CEQA. Therefore, the SMAQMD will be required to issue a preliminary or a final determination of compliance (PDOC/FDOC) prior to issuing the final Authority to Construct permit for the Project.

APPENDIX A: SMAQMD APPLICATION FORMS

APPENDIX B: EMISSION CALCULATIONS

Current Permit (per turbine)

							2 turbines
Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Annual tons/year
VOC	3.30	117.3	7,403	7,479	7,555	7,555	30.0
NOx	13.51	523.7	31,010	31,321	31,632	31,632	96.0
SO_2	1.67	40.1	3,095	3,130	3,164	3,164	12.6
PM_{10}	9.00	216.0	19,440	19,656	19,872	19,872	78.8
$PM_{2.5}$	--	--	19,401	19,617	19,832	19,832	78.7
CO	16.46	3,051.7	73,965	74,343	74,722	74,722	123.1
CO_{2e} (tons)	--	--	467,351	472,544	477,737	477,737	1,895,368

Proposed Emissions (per turbine)

							2 turbines	
Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Sum of Qtrs tons/year	Proposed tons/yr
VOC	3.95	131.0	7,403	7,479	7,555	7,555	30.0	30.0
NOx	16.21	580.4	31,010	31,321	31,632	31,632	125.6	96.0
SO_2	1.91	45.8	4,126	4,171	4,217	4,217	16.7	16.7
PM_{10}	10.63	255.1	19,440	19,656	19,872	19,872	78.8	78.8
$PM_{2.5}$	--	--	19,401	19,617	19,832	19,832	78.7	78.7
CO	19.73	3,120.3	73,965	74,343	74,722	74,722	297.8	99.4
CO_{2e} (tons)	--	--	556,450	562,633	568,816	568,816	2,256,714	2,256,714

Emissions Increase (per turbine)

							2 turbines
Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Proposed tons/yr
VOC	0.65	13.7	0	0	0	0	0.0
NOx	2.70	56.7	0	0	0	0	0.0
SO_2	0.24	5.7	1,031	1,041	1,053	1,053	4.1
PM_{10}	1.63	39.1	0	0	0	0	0.0
$PM_{2.5}$	--	--	0	0	0	0	0.0
CO	3.27	68.6	0	0	0	0	-23.7
CO_{2e} (tons)	--	--	89,099	90,089	91,079	91,079	361,346

Offsets

Pollutant	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Annual tons/year	
Offsets Baseline (2 turbines)						
VOC	14,806	14,958	15,110	15,110	30.0	PTE
NOx	62,020	62,642	63,264	63,264	125.6	PTE
PM_{10}	38,880	39,312	39,744	39,744	78.8	PTE
$PM_{2.5}$	--	--	--	--	78.7	PTE
Proposed Emissions (2 turbines)						
VOC	14,806	14,958	15,110	15,110	30.0	No increase
NOx	62,020	62,642	63,264	63,264	125.6	No increase
PM_{10}	38,880	39,312	39,744	39,744	78.8	No increase
$PM_{2.5}$	--	--	--	--	78.7	
Offsets Increase (2 turbines)						
VOC	0	0	0	0	0.0	
NOx	0	0	0	0	0.0	
PM_{10}	0	0	0	0	0.0	
$PM_{2.5}$	--	--	--	--	0.0	

Hourly Emissions - per turbine

Pollutant	MW	Permit MMBtu/hr	Permit ppmc	Method 19 dscf/MMBtu	Ideal gas scf/lbmol	Permit lb/MMBtu	lb/hr	
NOx	46	2200	2	8710	385.3		16.21	
VOC	16	2200	1.4	8710	385.3		3.95	
CO	28	2200	4	8710	385.3		19.73	
PM10		2200				0.004830	10.63	
SO2 DG		92.63				0.004626577	0.43	DG is limited to 2500 scfm/92.63 MMBtu/hr
SO2 NG		2107.37				0.000700967	1.48	
SO2 Total						SO2 Total =	1.91	

Daily Emissions (per turbine)

Pollutant	Base load lb/hr	hr	Startup lb/hr	hr	lb/day	
NOx	16.21	21	80	3	580.4	
VOC	3.95	21	16	3	131.0	
CO	19.73	21	902	3	3120.3	
PM10	10.63	24			255.1	
Perlite					0.2	Permit
C Tower					9.4	Permit
SO2	1.91	24			45.8	DG/NG Mixed
	1.54	24			37.0	NG only
					82.8	Two turbines facility total

Reduce quarterly op hours = 0 hours

Q1 Emissions (per turbine)

Pollutant	Base load lb/hr	Q1 hr	Startup lb/hr	Startup hr	lb/qtr	2 Turbines	
NOx	16.21	2160	80	0	35,014	70,027	
VOC	3.95	2160	16	0	8,532		
CO	19.73	2160	902	0	42,617		
PM10	10.63	2160			22,961		
PM2.5					22,915		0.998 factor per permit
SO2	1.91	2160			4,126		DG/NG Mixed
	1.54	2160			3,331		NG only
					7,457		Two turbines facility total
					3,728		Average per turbine for 2 turbines operating with DG limited to 2500 scfm/92.63 MMBtu/hr

Reduce quarterly op hours = 0 hours

Q2 Emissions (per turbine)

Pollutant	Base load lb/hr	Q2 hr	Startup lb/hr	Startup hr	lb/qtr	2 Turbines	
NOx	16.21	2184	80	0	35,403	70,805	
VOC	3.95	2184	16	0	8,627		
CO	19.73	2184	902	0	43,090		
PM10	10.63	2184			23,216		
PM2.5					23,170		0.998 factor per permit
SO2	1.91	2184			4,171		DG/NG Mixed
	1.54	2184			3,368		NG only
					7,539		Two turbines facility total
					3,770		Average per turbine for 2 turbines operating with DG limited to 2500 scfm/92.63 MMBtu/hr

Reduce quarterly op hours = 0 hours

Q3 Emissions (per turbine)

	Base load	Q3/Q4	Startup			
Pollutant	lb/hr	hr	lb/hr	hr	lb/qtr	2 Turbines
NOx	16.21	2208	80	0	35,792	71,583
VOC	3.95	2208	16	0	8,722	
CO	19.73	2208	902	0	43,564	
PM10	10.63	2208			23,471	
PM2.5					23,424	0.998 factor per permit
SO2	1.91	2208			4,217	DG/NG Mixed
	1.54	2208			3,405	NG only
					7,622	Two turbines facility total
					3,811	Average per turbine for 2 turbines operating with DG limited to 2500 scfm/92.63 MMBtu/hr

Reduce quarterly op hours = 0 hours

Q4 Emissions (per turbine)

	Base load	Q3/Q4	Startup			
Pollutant	lb/hr	hr	lb/hr	hr	lb/qtr	2 Turbines
NOx	16.21	2208	80	0	35,792	71,583
VOC	3.95	2208	16	0	8,722	
CO	19.73	2208	902	0	43,564	
PM10	10.63	2208			23,471	
PM2.5					23,424	0.998 factor per permit
SO2	1.91	2208			4,217	DG/NG Mixed
	1.54	2208			3,405	NG only
					7,622	Two turbines facility total
					3,811	Average per turbine for 2 turbines operating with DG limited to 2500 scfm/92.63 MMBtu/hr

PM10 Annual Emissions

	lb/yr	tons/yr
Turbines	186,238	93.1
Perlite Silo	73	0.04
C Tower	3,431	1.7
Total	189,742	94.9

PM2.5 Annual Emissions

	lb/yr	tons/yr	
Turbines	185,866	92.9	
Perlite Silo	73	0.04	Perlite = 100% PM2.5 per permit
C Tower	1,348	0.7	67.7% of PM = PM10, 26.6% of PM = PM2.5 per permit support docs
Total	187,287	93.6	

GHG Factors

2013 Biogas	kg/MMBtu	GWP	CO2e kg/MMBtu	CO2e lb/MMBtu
CO2	52.07	1	52.07	114.795
CH4	0.0032	25	0.08	0.176
N2O	0.00063	298	0.18774	0.414
		Total	52.33774	115.385

GHG Factors

2013 Nat Gas	kg/MMBtu	GWP	CO2e kg/MMBtu	CO2e lb/MMBtu
CO2	53.06	1	53.06	116.977
CH4	0.001	25	0.025	0.055
N2O	0.0001	298	0.0298	0.066
		Total	53.1148	117.098

GHG Hourly

	GHG lb/hr	MMBtu/hr	CO2 lb/hr	CH4 CO2e lb/hr	N2O CO2e lb/hr
Project	NG	2107.37	246,514	116	138
	DG	92.63	10,633	16	38
	NG	2200	257,350	121	145
Pre-project	NG	1772.37	207,327	98	116
	DG	92.63	10,633	16	38
	NG	1865	218,163	103	123

GHG Daily

	tons/day		tons/day	tons/day	tons/day
Project	NG		2,958	1.4	1.7
	DG		128	0.2	0.5
	NG		3,088	1.5	1.7
Pre-project	NG		2,488	1.2	1.4
	DG		128	0.2	0.5
	NG		2,618	1.2	1.5

GHG tons/quarter (Assume all NG)

Q1	Project	NG	555,876	262	312
	Pre-project	NG	471,231	222	265
Q2	Project	NG	562,052	265	316
	Pre-project	NG	476,467	224	268
Q3	Project	NG	568,229	268	319
	Pre-project	NG	481,703	227	271
Q4	Project	NG	568,229	268	319
	Pre-project	NG	481,703	227	271

APPENDIX C: BASELINE EMISSION CALCULATIONS

Date/Hour	UNIT2 UNITLOAD (MW)	UNIT3 UNITLOAD (MW)	Combined MW			
Oct-2012	58,992	58,375	117,367	Partial month		
Nov-2012	121,617	7,639	129,256			
Dec-2012	119,836	78,044	197,880			
Jan-2013	127,335	127,451	254,786			
Feb-2013	109,282	108,042	217,324			
Mar-2013	115,460	115,710	231,170			
Apr-2013	1	50,152	50,153			
May-2013	117,314	100,258	217,572			
Jun-2013	115,321	114,069	229,390			
Jul-2013	106,235	116,219	222,454			
Aug-2013	123,619	114,769	238,388			
Sep-2013	119,127	118,133	237,260			
Oct-2013	124,797	114,510	239,307			
Nov-2013	102,693	95,225	197,918			
Dec-2013	130,378	129,350	259,728			
Jan-2014	128,569	127,289	255,858			
Feb-2014	108,727	107,199	215,926			
Mar-2014	124,231	123,072	247,303			
Apr-2014	117,347	116,499	233,846			
May-2014	111,772	90,756	202,528			
Jun-2014	114,099	113,215	227,314			
Jul-2014	120,265	117,119	237,384			
Aug-2014	119,239	115,997	235,236	Sum 24 mos	Sum - Avg	
Sep-2014	117,266	116,452	233,718	5,129,066	18,007	Partial mo
Oct-2014	124,803	123,889	248,692	5,260,391	149,332	pre-5 year
Nov-2014	49,583	50,179	99,762	5,230,897	119,838	pre-5 year
Dec-2014	126,867	126,247	253,114	5,286,131	175,072	pre-5 year
Jan-2015	127,102	125,915	253,017	5,284,362	173,303	pre-5 year
Feb-2015	109,146	108,695	217,841	5,284,879	173,820	pre-5 year
Mar-2015	105,539	101,172	206,711	5,260,420	149,361	pre-5 year
Apr-2015	70,171	65,602	135,773	5,346,040	234,981	
May-2015	124,718	123,923	248,641	5,377,109	266,050	
Jun-2015	117,346	116,071	233,417	5,381,136	270,077	
Jul-2015	109,746	112,700	222,446	5,381,128	270,069	
Aug-2015	121,832	119,081	240,913	5,383,653	272,594	
Sep-2015	117,797	116,915	234,712	5,381,105	270,046	
Oct-2015	116,711	122,798	239,509	5,381,307	270,248	
Nov-2015	125,048	50,971	176,019	5,359,408	248,349	
Dec-2015	128,372	128,195	256,567	5,356,247	245,188	
Jan-2016	128,610	128,509	257,119	5,357,508	246,449	
Feb-2016	120,175	119,656	239,831	5,381,413	270,354	
Mar-2016	94,669	110,618	205,287	5,339,397	228,338	
Apr-2016	40,931	45,717	86,648	5,192,199	81,140	
May-2016	92,903	85,365	178,268	5,167,939	56,880	
Jun-2016	97,593	109,816	207,409	5,148,034	36,975	
Jul-2016	113,466	111,858	225,324	5,135,974	24,915	
Aug-2016	120,760	120,947	241,707	5,142,445	31,386	
Sep-2016	118,271	118,820	237,091	5,145,818	34,759	
Oct-2016	115,046	122,677	237,723	5,134,849	23,790	
Nov-2016	122,303	122,654	244,957	5,280,044	168,985	
Dec-2016	127,753	128,296	256,049	5,282,979	171,920	
Jan-2017	114,214	114,305	228,519	5,258,481	147,422	
Feb-2017	84,456	84,688	169,144	5,209,784	98,725	
Mar-2017	95,163	93,207	188,370	5,191,443	80,384	
Apr-2017	28,074	23,462	51,536	5,107,206	(3,853)	
May-2017	72,534	50,605	123,139	4,981,704	(129,355)	
Jun-2017	47,013	65,140	112,153	4,860,440	(250,619)	
Jul-2017	98,875	105,668	204,543	4,842,537	(268,522)	
Aug-2017	108,219	116,691	224,910	4,826,534	(284,525)	
Sep-2017	87,650	106,263	193,913	4,785,735	(325,324)	
Oct-2017	108,519	108,080	216,599	4,762,825	(348,234)	
Nov-2017	76,991	83,236	160,227	4,747,033	(364,026)	
Dec-2017	119,923	119,964	239,887	4,730,353	(380,706)	
Jan-2018	124,836	124,832	249,668	4,722,902	(388,157)	
Feb-2018	110,611	110,657	221,268	4,704,339	(406,720)	
Mar-2018	106,250	99,096	205,346	4,704,398	(406,661)	
Apr-2018	-	-	-	4,617,750	(493,309)	
May-2018	-	-	-	4,439,482	(671,577)	
Jun-2018						
			24 mo avg	5,111,059		

APPENDIX D: MODELING DATA

1. AIR DISPERSION MODELING ANALYSIS

The air dispersion modeling analysis used for this project was conducted in a manner that conforms to the applicable guidance and requirements of the dispersion modeling as given below:

- USEPA: *Guideline on Air Quality Models* (the Guideline).[1]

1.1. MODEL SELECTION

The modeling analysis addresses the expected pollutant impacts of the Cosumnes Power Plant (the Facility) as compared to the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (CAAQS). Air dispersion modeling of the Facility was conducted using the American Meteorological Society/ Environmental Protection Agency Regulatory Model, AERMOD (Version 18081). AERMOD is the default model for evaluating impacts attributable to industrial facilities in the near-field (i.e., source receptor distances of less than 50 km), and is the recommended model in the Guideline.

The AERMOD modeling system is composed of three modular components:

- AERMAP - The terrain preprocessor
- AERMET – The meteorological preprocessor
- AERMOD – The control module and modeling processor

AERMAP is the terrain preprocessor that is used to import terrain elevations for selected model objects and generate the receptor hill height scale data that are used by AERMOD to drive advanced terrain processing algorithms. National Elevation Dataset (NED) at 1/3-arc second resolution will be used to interpolate surveyed elevations for user specified receptor grids as well as the critical hill heights as required for terrain processing in AERMOD.

AERMET generates surface file and vertical profile file to pass meteorological observations and turbulence parameters to AERMOD. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the particular facility and/or meteorological site.

The Guideline requires the evaluation of the potential for physical structures to affect the dispersion of emissions from point sources. The exhaust from point sources that are located within specified distances of buildings may be subject to "aerodynamic building downwash" under certain meteorological conditions. This determination is made by comparing actual stack height to the GEP stack height. The modeled emission units and associated stacks and vents at the Facility will be evaluated in terms of their proximity to nearby structures. The locations and dimensions of the buildings that are used in the modeling analysis will be provided in the modeling report.

The Facility stacks were assumed to be subject to the effects of downwash according to a comparison between stack heights and nearby building dimensions, wherein the relationship between them is defined by the following formula:

[1] Code of Federal Regulation, Title 40 – Protection of Environment, Part 51, Appendix W – *Guideline on Air Quality Models*, Appendix A.1 – AMS/EPA Regulatory Model (AERMOD).

$$H_{GEP} = H + 1.5L$$

Where,

H_{GEP} = EPA formula height,

H = structure height, and

L = lesser dimension of the structure (height or maximum projected width).

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to wake effects of the structure.

Direction-specific equivalent building dimensions are calculated using the *BREEZE*®-AERMOD software developed by Trinity and used as input to the AERMOD model to simulate impacts of downwash. This software incorporates the algorithms of the USEPA – sanctioned Building Profile Input Program (BPIP-PRIME). Using the building coordinates and dimensions, a GEP analysis of the stack in relation to each building for each of the 36 wind directions was performed to evaluate which building heights and dimensions have the greatest influence in terms of building downwash (enhanced dispersion) on the dispersion of the turbine stack. The complete results of the GEP analysis and building downwash input and output files are included in the electronic modeling files.

1.2. POLLUTANTS AND STANDARDS

The applicable NAAQS and CAAQS standards for which modeling was performed are summarized below in Table 1-1.

Table 1-1. NAAQS and CAAQS

Pollutant	Averaging Period	NAAQS Standard[1]	Units	CAAQS Standard[2]	Units
CO	1 Hour	35	ppm	20	ppm
	8 Hour	9	ppm	9	ppm
NO_2	1 Hour	100	ppb	0.18	ppm
	Annual	53	ppb	0.03	ppm
$PM_{2.5}$	24 Hour	35	$\mu g/m^3$	--	--
	Annual	12	$\mu g/m^3$	12	$\mu g/m^3$
PM_{10}	24 Hour	150	$\mu g/m^3$	50	$\mu g/m^3$
	Annual	--	--	20	$\mu g/m^3$
SO_2	1 Hour	75	ppb	0.25	ppm
	3 Hour	0.5	ppm	--	--
	24 Hour	--	--	0.04	ppm
1. NAAQS Standards come from https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed 6/8/2018					
2. CAAQS Standards come from https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed 6/8/2018					

1.3. BACKGROUND CONCENTRATIONS

Background values for the NAAQS and CAAQS were obtained from the EPA Air Data Air Quality Design Values website[2], calculated using the EPA Air Data Monitor Values Report[3]and obtained from the California Air Resources Board (CARB) iADAM Air Quality Data Statistics[4]. A summary of background values are shown in Table 1-2.

Table 1-2. Background Concentrations

Pollutant	Averaging Period	NAAQS		CAAQS	
		2016 Design Value	Units	2016 Design Value	Units
CO	1 Hour	2.4	ppm	2.4	ppm
	8 Hour	1.7	ppm	1.7	ppm
NO_2	1 Hour	22	ppb	60	ppb
	Annual	13	ppb	11	ppb
$PM_{2.5}$	24 Hour	31	$\mu g/m^3$	--	--
	Annual	9.3	$\mu g/m^3$	6	$\mu g/m^3$
PM_{10}	24 Hour	44.67	$\mu g/m^3$	46	$\mu g/m^3$
	Annual	--	--	19.5	$\mu g/m^3$
SO_2	1 Hour	7	ppb	9.7	ppb
	3 Hour	No Data Available	--	No Data Available	--
	24 Hour	8.9	ppb	8.9	ppb

1. NAAQS design values were obtained from the EPA Air Data Air Quality Design Values website
2. CAAQS design values were obtained from the CARB iADAM Air Quality Data Statistics website
3. iAdam was used for PM_{10} NAAQS because the EPA Air Data site did not designate PM_{10} design values.
4. No data is available for the SO_2 3 hour standard because the standard is exclusive to secondary formation.

1.4. FACILITY LAYOUT

Figure 1 shows the facility layout as it appears in AERMOD. The facility boundary is outlined in purple, the stacks are represented by teal dots, and the buildings/structures are outlined in dark blue. The yellow crosses indicate receptor locations.

[2] https://www.epa.gov/air-trends/air-quality-design-values
[3] https://www.epa.gov/outdoor-air-quality-data/monitor-values-report
[4] https://arb.ca.gov/adam

Figure 1. CPP as it appears in AERMOD

1.5. MODELED EMISSION SOURCES

The turbine stacks and cooling tower fans were modeled as a point sources with the parameters listed below in Table 1-3. There are a total of two turbine stacks and eight cooling tower fans modeled as point sources. The stack parameters for each turbine are identical and all of the cooling tower fans are identical to one another. As such, the stack parameters in Table 1-3 are only listed for each unique source. Each stack location is provided in Table 1-4. All coordinates provided in this section are Universal Transverse Mercator (UTM), 1983 North American Datum (NAD83) coordinates, located in UTM Grid Zone 10S.

Table 1-3. Modeled Stack Parameters

Description	Elevation (m)	Stack Height (ft)	Stack Temperature (°F)	Stack Diameter (ft)	Stack Velocity (m/s)
Each Turbine	45.94	160	156	12.1	160
Each Cooling Tower Fan	46.41	56	68	11.6	9.1

Table 1-4. Modeled Stack Locations

Stack	UTMX (m)	UTMY (m)
TURB01	663,986.8	4,245,040.2
TURB02	663,988.7	4,244,997.2
CT01	664,078.7	4,245,086.1
CT02	664,078.7	4,245,069.8
CT03	664,077.8	4,245,052.7
CT04	664,077.8	4,245,036.7
CT05	664,077.8	4,245,019.7
CT06	664,077.8	4,245,003.7
CT07	664,076.9	4,244,987.4
CT08	664,076.9	4,244,970.6

1.6. MODELED EMISSION RATES

Modeled emission rates for each pollutant and averaging period are provided in Table 1-5 for each turbine and Table 1-6 for each cooling tower fan.

Table 1-5. Turbine Emission Rate

Pollutant	Averaging Period	Emission Rate (per turbine)	Units
CO	1 Hour	902	lb/hr
	8 Hour	350.6	lb/hr
NO_2	1 Hour	80	lb/hr
	Annual	10.96	lb/hr
$PM_{2.5}$	24 Hour	10.60	lb/hr
	Annual	8.98	lb/hr
PM_{10}	24 Hour	10.63	lb/hr
	Annual	9.00	lb/hr
SO_2	1 Hour	1.91	lb/hr
	3 Hour	1.91	lb/hr
	24 Hour	1.91	lb/hr

Table 1-6. Cooling Tower Emission Rate

Pollutant	Averaging Period	Emission Rate (per cooling tower fan)	Units
CO	1 Hour	0	lb/hr
	8 Hour	0	lb/hr
NO_2	1 Hour	0	lb/hr
	Annual	0	lb/hr
$PM_{2.5}$	24 Hour	0.0024	lb/hr
	Annual	0.0024	lb/hr
PM_{10}	24 Hour	0.0062	lb/hr
	Annual	0.0062	lb/hr
SO_2	1 Hour	0	lb/hr
	3 Hour	0	lb/hr
	24 Hour	0	lb/hr

1.7. RECEPTOR GRIDS AND TERRAIN ELEVATIONS

In an effort to assure maximum modeled impacts were captured by the modeling demonstration, a receptor grid extending 10 km from the facility center was used. The receptor grids proposed for this modeling analysis include:

- Fence Line Receptors: Fence line receptors were arranged along the Facility's fence-line boundary at 20-meter intervals.
- 100-meter Cartesian Grid: A grid arranged around the Facility at a 100-meter spacing extending 1 km from the facility center.
- 250-meter Cartesian Grid: A grid arranged around the Facility at a 250-meter spacing extending from 1 km to 2.5 km from the facility center, exclusive of the receptors in the 100-meter grid.
- 500-meter Cartesian Grid: A grid arranged around the Facility at a 500 meter spacing extending from 2.5 km to 5 km from the facility center, exclusive of the receptors in the 250 meter grid.
- 1,000 meter Cartesian Grid: A grid arranged around the Facility at a 1,000 meter spacing extending from 5 km to 10 km from the facility center, exclusive of the receptors in the 500 meter grid.

Elevations for receptors, and base elevations for sources and structures, required by AERMOD, were determined using the AERMAP terrain preprocessor (v18081). Terrain elevations from the USGS 1/3 arc-second NED database[5] were used for the AERMAP processing of receptors and sources.

AERMAP also calculated the hill height scale which is required for each receptor to allow AERMOD's terrain algorithm to property determine the impact of each source at each receptor. AERMOD computes the impact at a receptor as a weighted interpolation between horizontal (plume goes around a terrain feature) and terrain-following states (plume goes over a terrain feature) using a critical dividing streamline approach. This scheme assumes that part of the plume mass will have enough energy to ascend and traverse over a terrain feature and the remainder will impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale is computed by the AERMAP terrain pre-processor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor. The hill height scale does not represent the critical dividing streamline height itself, but supplies the

[5] https://www.mrlc.gov/viewerjs/

computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

1.8. METEOROLOGICAL DATA AND SURFACE CHARACTERISTICS

Site-specific dispersion models require a sequential hourly record of dispersion meteorology representative of the regions within which the source is located. The California Air Resources Board (CARB) provides pre-processed Meteorological Data for a 5 year range (2009-2013) for use in the air dispersion modeling exercise.[6] The surface readings are from the Sacramento Mather Airport in Sacramento, California and the upper air readings are from the Oakland International Airport in Oakland, California.

The anemometer base elevation for the Sacramento Executive Airport is 30.2 meters as confirmed by the CARB Meteorological Files website.

[6] https://www.arb.ca.gov/toxics/harp/metfiles2.htm

A summary of the modeling results are presented in Tables 2-1. The results show that the Facility is not expected to violate any NAAQS or CAAQS.

Table 2-1. NAAQS and CAAQS Modeling Results

Pollutant	Averaging Period	NAAQS Standard[1]	Units	CAAQS Standard[2]	Units	Modeled Impacts[3]		NAAQS Cumulative Impacts[5]	Units	CAAQS Cumulative Impacts[5]	Units	Passing NAAQS?	Passing CAAQS?
						µg/m³	ppm[4]						
CO	1 Hour	35	ppm	20	ppm	690.06	0.60	3.00	ppm	3.00	ppm	YES	YES
	8 Hour	9	ppm	9	ppm	114.35	0.10	1.80	ppm	1.80	ppm	YES	YES
NO_2	1 Hour	100	ppb	0.18	ppm	43.40	0.02	45.07	ppb	0.08	ppm	YES	YES
	Annual	53	ppb	0.03	ppm	0.27	0.0001	13.14	ppb	0.01	ppm	YES	YES
$PM_{2.5}$	24 Hour	35	µg/m³	--	--	1.47	--	32.47	µg/m³	--	--	YES	--
	Annual	12	µg/m³	12	µg/m³	0.26	--	9.56	µg/m³	6.26	µg/m³	YES	YES
PM_{10}	24 Hour	150	µg/m³	50	µg/m³	2.14	--	46.81	µg/m³	48.14	µg/m³	YES	YES
	Annual	--	--	20	µg/m³	0.29	--	--	--	19.79	µg/m³	--	YES
SO_2	1 Hour	75	ppb	0.25	ppm	1.46	0.0006	7.56	ppb	0.01	ppm	YES	YES
	3 Hour	0.5	ppm	--	--	0.72	0.0003	0.0003	ppm	--	ppm	YES	--
	24 Hour	--	--	0.04	ppm	0.35	0.0001	--	--	0.01	ppm	--	YES

1. NAAQS Standards come from https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed 6/8/2018
2. CAAQS Standards come from https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed 6/8/2018
3. The maximum modeled impacts (i.e. 1st High) were conservatively chosen for this analysis.
4. Modeled Impacts (ppm) = Modeled Impacts (µg/m³) / 1,000 (µg/g) / Molecular Weight (g/mol) x Standard Molar Volume (L/mol) / 1,000 (L/m³) x 10^6

	Molecular Weight (g/mol)	
CO	28.01	
NO_2	46.01	
SO_2	64.07	
Standard Molar Volume	24.45	L/mol
Volume Conversion	1,000	L/m³

5. Cumulative Impacts = Modeled Impacts + Background

Turbine Stack Data (from ST reports)

Height	165	feet
Area	267.59	ft2
Diameter	221.5	in
Diameter	18.46	ft

Cooling Tower

Height	56.125	feet
Diameter	36	feet
Exhaust Temp	68	F
Exhaust flow	1,436,258	acfm per cell
Cells	8	

Full Load (Per turbine)

Firing Rate	2200	MMBtu/hr	
O2%	12.80	Client email (1% drop as a result of project)	
F Factor	8710	dscf/MMBtu	Method 19 default
dscfm	824,045	at 68F	
Temp F	215	deg F	ST data
Moisture	7.50%	ST data	
acfm	1,132,476		
velocity	71	ft/sec	
velocity	21	m/sec	
velocity	48.1	mph	

Startup (Per turbine)

Firing Rate	1100	MMBtu/hr (50% firing rate)	
O2%	15.00	Client email (1% drop as a result of project)	
F Factor	8710	dscf/MMBtu	Method 19 default
dscfm	565,658	at 68F	
Temp F	215	deg F	ST data
Moisture	7.50%	ST data	
acfm	777,378		
velocity	48	ft/sec	
velocity	15	m/sec	
velocity	33.0	mph	

Per Turbine					
	Startup 1 hr NOx, SOx, CO lb/hr	**Base load 1 hr NOx, SOx, CO lb/hr**	**8 hr CO lb/hr**	**24 hr SO2, PM10 lb/hr**	**Annual Average NOx, PM10 lb/hr**
NOx	80	16.21	--	--	10.96
CO	902	19.73	350.6	--	--
SOx	1.91	1.91	--	1.91	--
PM10	--	--	--	10.63	9.00
PM2.5	--	--	--	10.60	8.98
Cooling Tower					
PM10	--	--	--	0.39	0.39
PM2.5	--	--	--	0.15	0.15

APPENDIX E: HEALTH RISK ASSESSMENT DATA

The health risk assessment (HRA) analysis used for this project was conducted in a manner that conforms to the applicable guidance and requirements of the dispersion modeling as given below:

- SMAQMD: Health Risk Assessment Modeling Guidelines (HRA Guideline).

1.1. MODELING

All modeling was performed using the same model setup as described in Appendix D of this application. Please refer to Appendix D for a discussion of specific model setup information. The following sections describe HRA specific model setup information along with information related to emissions calculations.

1.2. HARP2

This HRA analysis utilized the latest version of HARP2 – Air Dispersion and Risk Tool (dated 17320). HARP input and output files are provided at the end of this appendix.

1.3. MODELED EMISSION RATES

Table 1-1 provides the annual and maximum hourly emissions of each emission source.

Table 1-1. Turbine Emission Rate

Stack Name	CAS Number	Pollutant Abbreviation	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)
TURB01	106990	1,3-Butadiene	12.3	0.0014
TURB01	75070	Acetaldehyde	792	0.0905
TURB01	107028	Acrolein	123	0.0141
TURB01	71432	Benzene	17.5	0.002
TURB01	100414	Ethyl Benzene	617	0.0704
TURB01	50000	Formaldehyde	462	0.0528
TURB01	91203	Naphthalene	25.1	0.00286
TURB01	1150	PAHs-w/	42.4	0.00484
TURB01	75569	Propylene Oxide	559	0.0638
TURB01	108883	Toluene	2510	0.286
TURB01	1330207	Xylenes	1230	0.141
TURB01	7664417	NH3	1100	0.125
TURB01	106467	p-DiClBenzene	8.11	0.000926
TURB01	56235	CCl4	8.11	0.000926
TURB01	108907	Chlorobenzn	6.49	0.00074
TURB01	67663	Chloroform	6.89	0.000787
TURB01	107062	EDC	6.08	0.000694
TURB01	75092	Methylene Chlor	5.27	0.000602
TURB01	127184	Perc	8.51	0.000972

TURB01	79016	TCE	7.3	0.000833
TURB01	75014	Vinyl Chloride	14.6	0.00167
TURB01	75354	Vinylid Chlorid	6.08	0.000694
TURB01	7440382	Arsenic	0.932	0.000106
TURB01	7440439	Cadmium	0.235	2.68E-05
TURB01	7440473	Chromium	0.486	5.55E-05
TURB01	7439921	Lead	1.38	0.000157
TURB01	7440020	Nickel	0.811	9.26E-05
TURB01	7782492	Selenium	4.46	0.000509
TURB02	106990	1,3-Butadiene	12.3	0.0014
TURB02	75070	Acetaldehyde	792	0.0905
TURB02	107028	Acrolein	123	0.0141
TURB02	71432	Benzene	17.5	0.002
TURB02	100414	Ethyl Benzene	617	0.0704
TURB02	50000	Formaldehyde	462	0.0528
TURB02	91203	Naphthalene	25.1	0.00286
TURB02	1150	PAHs-w/	42.4	0.00484
TURB02	75569	Propylene Oxide	559	0.0638
TURB02	108883	Toluene	2510	0.286
TURB02	1330207	Xylenes	1230	0.141
TURB02	7664417	NH3	1100	0.125
TURB02	106467	p-DiClBenzene	8.11	0.000926
TURB02	56235	CCl4	8.11	0.000926
TURB02	108907	Chlorobenzn	6.49	0.00074
TURB02	67663	Chloroform	6.89	0.000787
TURB02	107062	EDC	6.08	0.000694
TURB02	75092	Methylene Chlor	5.27	0.000602
TURB02	127184	Perc	8.51	0.000972
TURB02	79016	TCE	7.3	0.000833
TURB02	75014	Vinyl Chloride	14.6	0.00167
TURB02	75354	Vinylid Chlorid	6.08	0.000694
TURB02	7440382	Arsenic	0.932	0.000106
TURB02	7440439	Cadmium	0.235	2.68E-05
TURB02	7440473	Chromium	0.486	5.55E-05
TURB02	7439921	Lead	1.38	0.000157
TURB02	7440020	Nickel	0.811	9.26E-05
TURB02	7782492	Selenium	4.46	0.000509
CT[1]	67663	Chloroform	198	0.0226

1. Cooling tower toxic emissions are represented here for the entire cooling tower (all 8 fans). In the model, the unit emission rate is divided evenly between each of the 8 fans.

1.4. RECEPTORS

In addition to the boundary receptors and discrete receptor grid described in Appendix D, the HRA also analyzed the potential health risk impacts on sensitive receptors (e.g. K-12 schools, daycares, and hospitals). The analysis

showed that there are no sensitive receptors within 2 km of the Facility. Therefore, no sensitive receptors were evaluated according to the HRA Guideline.

2. RESULTS

A summary of the HRA results are presented in Tables 2-1 through 2-5. The results show that the Facility does not exceed any SMAQMD Significance Threshold.

Table 2-1. Summary of Maximum Cancer Health Risk Impacts

Receptor Type	Cancer Risk (in a million)	Significance Threshold	Receptor Number	UTME (m)	UTMN (m)
PMI	1.455	N/A	1,072	664,097	4,245,032
MEIR	0.286	≥ 10	506	665,190	4,246,208
MEIW	0.004	≥ 10	737	666,440	4,244,458

Table 2-2. Summary of Maximum Chronic Non-cancer Health Risk Impacts

Receptor Type	Chronic HI	Significance Threshold	Target Organ(s)	Receptor Number	UTME (m)	UTMN (m)
PMI	0.058	N/A	CV, CNS, KIDNEY, GILV, REPRO/DEV, RESP, SKIN, EYE, ENDO, BLOOD	209	664,240	4,245,458
MEIR	0.017	≥ 1		506	665,190	4,246,208
MEIW	0.002	≥ 1		737	666,440	4,244,458

Table 2-3. Summary of Maximum Acute Non-cancer Health Risk Impacts

Receptor Type	Acute HI	Significance Threshold	Target Organ(s)	Receptor Number	UTME (m)	UTMN (m)
PMI	0.025	N/A	CV, CNS, IMMUN, GILV, REPRO/DEV, RESP, EYE, BLOOD	169	664,040	4,245,258
MEIR	0.006	≥ 1		631	661,940	4,241,958
MEIW	0.004	≥ 1		737	666,440	4,244,458

Table 2-4. Summary of Maximum 8-hour Chronic Non-cancer Health Risk Impacts

Receptor Type	Acute HI	Significance Threshold	Target Organ(s)	Receptor Number	UTME (m)	UTMN (m)
PMI	0.001	N/A	CV, CNS, IMMUN, REPRO/DEV, RESP, SKIN, BLOOD	209	664,240	4,245,458
MEIR	--	--		--	--	--
MEIW	0.0001	≥ 1		737	666,440	4,244,458

Table 2-5. Sensitivie Receptor Health Risk Impacts

Receptor	Cancer Risk	Chronic HI	Acute HI	8-hr Chronic HI	Receptor Number	UTME (m)	UTMN (m)
Sensitive Receptor 1	--	--	--	--	--	--	--
Sensitive Receptor 2	--	--	--	--	--	--	--
Sensitive Receptor 3	--	--	--	--	--	--	--

1. There are no sensitive receptors within 2 km of the facility and none requiring public notice according to Section 42301.6 for the California Health and Safety Code. Therefore, no sensitive receptors are included here.

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HARP2 - HRACalc (dated 17023) 6/5/2018 12:43:36 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Resident
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: -0.25
Total Exposure Duration: 30

Exposure Duration Bin Distribution
3rd Trimester Bin: 0.25
0<2 Years Bin: 2
2<9 Years Bin: 0
2<16 Years Bin: 14
16<30 Years Bin: 14
16 to 70 Years Bin: 0

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: True
Water: False
Fish: False
Homegrown crops: True
Beef: False
Dairy: False
Pig: False
Chicken: True
Egg: True

****
INHALATION

Daily breathing rate: LongTerm24HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: OFF

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.05
Soil mixing depth (m): 0.01
Dermal climate: Mixed

```
**********
HOMEGROWN CROP PATHWAY SETTINGS

Household type: HouseholdsthatFarm
Fraction leafy: 0.235
Fraction exposed: 0.235
Fraction protected: 0.235
Fraction root: 0.235

**********
PIG, CHICKEN, & EGG PATHWAY SETTINGS

Surface area (m^2): 0
Volume (kg): 0
Volume changes per year: 0

Pig
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

Chicken
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

Egg
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

**********
TIER 2 SETTINGS
Tier2 not used.

**********

Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: H:\CLIENTS\SMUD\CA CPP
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CPP AGP CONVERSION HRA\hra\Resident_CancerRisk.csv
Cancer risk total by receptor saved to: H:\CLIENTS\SMUD\CA CPP Herald\All
Projects\170506.0100  CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD CPP AGP
CONVERSION HRA\hra\Resident_CancerRiskSumByRec.csv
Calculating chronic risk
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CPP AGP CONVERSION HRA\hra\Resident_NCAcuteRisk.csv
Acute risk total by receptor saved to: H:\CLIENTS\SMUD\CA CPP Herald\All
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HRA ran successfully

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                <TfOn>N</TfOn><!--Y or N-->
                <Mean>101</Mean>
                <HighEnd>139</HighEnd>
        </MothersMilk>
        <Water>
                <TfOn>N</TfOn><!--Y or N-->
                <Mean>18,113,26,24,18,18</Mean>
                <HighEnd>47,196,66,61,47,45</HighEnd>
        </Water>
        <Fish>
                <TfOn>N</TfOn><!--Y or N-->
                <Mean>0.38,0.18,0.36,0.36,0.38,0.36</Mean>
                <HighEnd>1.22,0.58,1.16,1.16,1.22,1.16</HighEnd>
        </Fish>
        <CropIROn>N</CropIROn><!--Y or N-->
        <BDIROn>N</BDIROn><!--Y or N-->
        <PCEIROn>N</PCEIROn><!--Y or N-->
        <Leafy>
                <Mean>0.9,3.8,2.5,0.9,0.9,1.1</Mean>
                <HighEnd>3.2,10.8,7.9,3.2,3.2,3.4</HighEnd>
        </Leafy>
        <Exposed>
                <Mean>1.9,11.7,7.4,1.9,1.9,1.8</Mean>
                <HighEnd>5.9,30.2,21.7,5.9,5.9,5.6</HighEnd>
        </Exposed>
        <Protected>
```

```
                <Mean>1.7,5.9,4.7,1.7,1.7,1.6</Mean>
                <HighEnd>5.8,17.5,13.3,5.8,5.8,5.2</HighEnd>
        </Protected>
        <Root>
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                <HighEnd>4.6,15.3,10.8,4.6,4.6,4.2</HighEnd>
        </Root>
        <Beef>
                <Mean>2,3.9,3.5,2,2,1.7</Mean>
                <HighEnd>4.8,11.3,8.6,4.8,4.8,4.4</HighEnd>
        </Beef>
        <Dairy>
                <Mean>5.4,50.9,23.3,5.4,5.4,4.3</Mean>
                <HighEnd>15.9,116,61.4,15.9,15.9,13.2</HighEnd>
        </Dairy>
        <Pig>
                <Mean>1.8,4.5,3.7,1.8,1.8,1.5</Mean>
                <HighEnd>4.7,11.4,9,4.7,4.7,3.8</HighEnd>
        </Pig>
        <Chicken>
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                <HighEnd>4.2,15,9.4,4.2,4.2,3.4</HighEnd>
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</Tier2>
</HRA>
```

HARP2 - HRACalc (dated 17023) 6/5/2018 12:44:55 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Worker
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: 16
Total Exposure Duration: 25

Exposure Duration Bin Distribution
3rd Trimester Bin: 0
0<2 Years Bin: 0
2<9 Years Bin: 0
2<16 Years Bin: 0
16<30 Years Bin: 0
16 to 70 Years Bin: 25

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: False
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION

Daily breathing rate: Moderate8HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: OFF

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.05
Soil mixing depth (m): 0.01
Dermal climate: Mixed

```
**********
TIER 2 SETTINGS
Tier2 not used.

**********

Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: H:\CLIENTS\SMUD\CA CPP
Herald\All Projects\170506.0100  CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD
CPP AGP CONVERSION HRA\hra\Worker_CancerRisk.csv
Cancer risk total by receptor saved to: H:\CLIENTS\SMUD\CA CPP Herald\All
Projects\170506.0100  CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD CPP AGP
CONVERSION HRA\hra\Worker_CancerRiskSumByRec.csv
Calculating chronic risk
Chronic risk breakdown by pollutant and receptor saved to: H:\CLIENTS\SMUD\CA CPP
Herald\All Projects\170506.0100  CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD
CPP AGP CONVERSION HRA\hra\Worker_NCChronicRisk.csv
Chronic risk total by receptor saved to: H:\CLIENTS\SMUD\CA CPP Herald\All
Projects\170506.0100  CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD CPP AGP
CONVERSION HRA\hra\Worker_NCChronicRiskSumByRec.csv
Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to: H:\CLIENTS\SMUD\CA CPP
Herald\All Projects\170506.0100  CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD
CPP AGP CONVERSION HRA\hra\Worker_NCAcuteRisk.csv
Acute risk total by receptor saved to: H:\CLIENTS\SMUD\CA CPP Herald\All
Projects\170506.0100  CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD CPP AGP
CONVERSION HRA\hra\Worker_NCAcuteRiskSumByRec.csv
HRA ran successfully
```

```
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<!--Created 2018/06/07 08:40:54-->
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  <HRAVERSION>17320</HRAVERSION>
  <Title>Worker8hr_</Title>
  <AERMODMode>Y</AERMODMode><!--Read AERMOD plot file (Y) or read CSV file (N)-->
  <GLCList>H:\CLIENTS\SMUD\CA CPP Herald\All Projects\170506.0100  CPP AGP
Conversion\09 Modeling\Models\HRA\2018 SMUD CPP AGP CONVERSION
HRA\hra\Worker8hr_GLCList.csv</GLCList>
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HRA\hra\Worker8hr_PolDB.csv</PollutantList>
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HRA\hra\Worker8hr_PathwayRec.csv</PathwayRecConc>
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  <Append>N</Append>
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        <UDEDOn>N</UDEDOn><!--Y or N-->
        <ExposureDuration>25</ExposureDuration><!--years-->
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NCAcute, All-->
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        <WorkerNote>NA</WorkerNote>
        <Tier2On>N</Tier2On>
        <IntakeRatePercentile>Derived</IntakeRatePercentile><!--HighEnd, Mean,
Derived-->
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  <Type>1</Type>
  <PathwaysEnabled><!--Y or N-->
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        <Soil>N</Soil>
        <Dermal>N</Dermal>
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        <Water>N</Water>
        <Fish>N</Fish>
        <HomegrownCrop>N</HomegrownCrop>
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        <Dairy>N</Dairy>
        <Pig>N</Pig>
        <Chicken>N</Chicken>
        <Egg>N</Egg>
  </PathwaysEnabled>
  <Inhalation>
        <FAH3rdTrito16>N</FAH3rdTrito16><!--Y or N-->
        <FAH16to70>N</FAH16to70><!--Y or N-->
        <DBRType>Moderate8HR</DBRType><!--LongTerm24HR, RMP, SedentaryPassive8HR,
Light8HR, or Moderate8HR-->
        <GLCAdjustmentFactor>1</GLCAdjustmentFactor>
        <UseAdj>N</UseAdj><!--Y or N-->
        <USEPOSTFILE8REL>N</USEPOSTFILE8REL><!--Y or N-->
        <USEPOSTFILECAN>N</USEPOSTFILECAN><!--Y or N-->
  </Inhalation>
  <Deposition>0.05</Deposition>
```

```
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        <WaterVolume>0</WaterVolume><!--kg-->
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        <FractionFromContamSource>0</FractionFromContamSource>

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<!--Y or N-->
  </HumanWater>
  <Homegrown>
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        <Protected>0.235</Protected>
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        <WaterVolume>0</WaterVolume><!--kg-->
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  </Fish>
  <AnimalFractions>
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UserDefined-->
        <HouseholdTypePCE>RaiseHunt</HouseholdTypePCE><!--RaiseHunt, Farm, or
UserDefined-->
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        <Pork>0.242</Pork>
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        <FractionFromContamSourceChicken>0</FractionFromContamSourceChicken>
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  </PigChickenEggsWater>
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        <Exposed>0.25</Exposed>
        <Protected>0.25</Protected>
        <Root>0.25</Root>
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```

```
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  <Egg>
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        <Exposed>0.25</Exposed>
        <Protected>0.25</Protected>
        <Root>0.25</Root>
  </Egg>
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                <HighEnd>139</HighEnd>
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        </Water>
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        <Exposed>
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                <HighEnd>5.9,30.2,21.7,5.9,5.9,5.6</HighEnd>
        </Exposed>
```

```
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        </Protected>
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                <Mean>1.7,5.7,3.9,1.7,1.7,1.5</Mean>
                <HighEnd>4.6,15.3,10.8,4.6,4.6,4.2</HighEnd>
        </Root>
        <Beef>
                <Mean>2,3.9,3.5,2,2,1.7</Mean>
                <HighEnd>4.8,11.3,8.6,4.8,4.8,4.4</HighEnd>
        </Beef>
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                <HighEnd>15.9,116,61.4,15.9,15.9,13.2</HighEnd>
        </Dairy>
        <Pig>
                <Mean>1.8,4.5,3.7,1.8,1.8,1.5</Mean>
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        </Chicken>
        <Egg>
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</Tier2>
</HRA>
```

HARP2 - HRACalc (dated 17023) 6/7/2018 8:40:56 AM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Worker
Scenario: NCChronic8HR
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER
Exposure duration are only adjusted for cancer assessments

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: False
Dermal: False
Mother's milk: False
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION

Daily breathing rate: Moderate8HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
NOTE: Exposure duration (i.e., start age, end age, ED, & FAH) are only adjusted for cancer assessments.

****
TIER 2 SETTINGS
Tier2 not used.

****

Calculating chronic 8hr risk
Chronic 8-hr risk breakdown by pollutant and receptor saved to: H:\CLIENTS\SMUD\CA CPP Herald\All Projects\170506.0100 CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD CPP AGP CONVERSION HRA\hra\Worker8hr_NCChronic8HrRisk.csv
Chronic 8-hr risk total by receptor saved to: H:\CLIENTS\SMUD\CA CPP Herald\All Projects\170506.0100 CPP AGP Conversion\09 Modeling\Models\HRA\2018 SMUD CPP AGP CONVERSION HRA\hra\Worker8hr_NCChronic8HrRiskSumByRec.csv
HRA ran successfully

Attachment 3.2A
CNDDB Report

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Imported file selection

Map Index Number:	11986	**EO Index:**	28390
Key Quad:	Goose Creek (3812131)	**Element Code:**	AAAAA01180
Occurrence Number:	75	**Occurrence Last Updated:**	2001-10-24

Scientific Name: *Ambystoma californiense*

Common Name: California tiger salamander

Listing Status: **Federal:** Threatened

State: Threatened

Rare Plant Rank:

Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G2G3

State: S2S3

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed:	1990-04-20	**Occurrence Type:**	Natural/Native occurrence
Last Survey Date:	1990-04-20	**Occurrence Rank:**	Unknown
Owner/Manager:	UNKNOWN	**Trend:**	Unknown
Presence:	Presumed Extant		

Location:

NORTH AND SOUTH SIDES OF HWY 104 AT MILEPOST 11.21 NEAR RANCHO SECO.

Detailed Location:

Ecological:

OBSERVATION ON SOUTH SIDE OF HWY 104 IS FROM A POND.

Threats:

General:

J. BRODE FIELD NOTES #308. 12/23/81: CAS #178429, LARVA. 2/7/82: CAS #178440, ADULT. SHAFFER SITE 53, 20 APR 1990.

PLSS:	T06N, R08E, Sec. 20, SW (M)	**Accuracy:**	1 mile	**Area (acres):**	0
UTM:	Zone-10 N4246766 E663910	**Latitude/Longitude:**	38.35407 / -121.12411	**Elevation (feet):**	130

County Summary:	**Quad Summary:**
Sacramento	Goose Creek (3812131), Clay (3812132)

Sources:

BRO80U0001	BRODE, J. (CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE) - GEOGRAPHIC REFERENCE CARD CATALOG OF SPECIMENS AND FIELD NOTE RECORDS COMPILED BY JOHN BRODE (DFG) 1980-XX-XX
CAS01S0004	CALIFORNIA ACADEMY OF SCIENCES - 1951-1989 CAS HERPETOLOGY HOLDINGS (INCLUDES STANFORD UNIVERSITY COLLECTIONS) FOR AMBYSTOMA CALIFORNIENSE 2001-08-15
SHA93R0001	SHAFFER, H. ET AL. - STATUS REPORT FOR CALIFORNIA TIGER SALAMANDER, AMBYSTOMA CALIFORNIENSE (CONTRACT FG 9422 & FG 1383). 1993-XX-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 17439
EO Index: 12204
Key Quad: Goose Creek (3812131)
Element Code: AAAAA01180
Occurrence Number: 116
Occurrence Last Updated: 1991-02-19

Scientific Name: *Ambystoma californiense*
Common Name: California tiger salamander

Listing Status: **Federal:** Threatened
State: Threatened
Rare Plant Rank:
Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G2G3
State: S2S3

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed: 1990-04-03
Occurrence Type: Natural/Native occurrence
Last Survey Date: 1990-04-03
Occurrence Rank: Good
Owner/Manager: PVT-RANPAC
Trend: Unknown
Presence: Presumed Extant

Location:

BORDEN RANCH, APPROXIMATELY 1.25 MI SOUTH OF RANCHO SECO AND 14 MI NNW OF CLEMENTS.

Detailed Location:

Ecological:

HABITAT IS A VERNAL POOL SURROUNDED BY ANNUAL GRASSLAND.

Threats:

MAIN THREAT IS A PROPOSED DEVELOPMENT; ALSO, CATTLE GRAZING.

General:

5 LARVAE OBSERVED 2 APR 1990.

PLSS: T05N, R08E, Sec. 05, NE (M)
Accuracy: 1/5 mile
Area (acres): 0
UTM: Zone-10 N4242913 E663989
Latitude/Longitude: 38.31935 / -121.12409
Elevation (feet): 220

County Summary:	Quad Summary:
Sacramento	Goose Creek (3812131), Clay (3812132)

Sources:

LAA90F0004 LAABS, D. & M. ALLABACK - FIELD SURVEY FORM FOR AMBYSTOMA (TIGRINUM) CALIFORNIENSE 1990-04-03

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number:	46279	**EO Index:**	46279
Key Quad:	Goose Creek (3812131)	**Element Code:**	AAAAA01180
Occurrence Number:	585	**Occurrence Last Updated:**	2007-02-26

Scientific Name: *Ambystoma californiense*

Common Name: California tiger salamander

Listing Status: **Federal:** Threatened

State: Threatened

CNDDB Element Ranks: **Global:** G2G3

State: S2S3

Rare Plant Rank:

Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed:	2004-02-26	**Occurrence Type:**	Natural/Native occurrence
Last Survey Date:	2004-02-26	**Occurrence Rank:**	Good
Owner/Manager:	UNKNOWN, SMUD	**Trend:**	Unknown
Presence:	Presumed Extant		

Location:

SOUTH AND NORTH OF CLAY EAST ROAD, 1.8 MILES EAST OF THE INTERSECTION WITH HWY 104.

Detailed Location:

MAPPED ACCORDING TO UTM COORDINATES PROVIDED BY SOURCE. 1990 SIGHTING AT POND. 2003 & 2004 CTS CAPTURED AT CONSTRUCTION SITE AND RELEASED AT GROUND SQUIRREL BURROW EAST OF THE CONSTRUCTION ZONE.

Ecological:

DISTURBED NON-NATIVE ANNUAL GRASSLAND WITH ADJACENT VERNAL POOLS AND SWALES. CORNING COMPLEX SOILS. 0-2% SLOPE.

Threats:

SALAMANDERS KILLED BY SCRAPER AT CONSTRUCTION SITE (2003).

General:

SHAFFER SITE 51, NUMBER AND LIFE STAGE UNKNOWN 20 APR 1990. 1 ADULT CAPTURED & RELEASED 22 OCT, 3 DEAD ADULTS OBSERVED BETWEEN 30-31 OCT, 1 DEAD ADULT OBSERVED 6 NOV 2003. 1 INDIVIDUAL CAPTURED & RELEASED 26 FEB 2004.

PLSS:	T06N, R08E, Sec. 32 (M)	**Accuracy:**	nonspecific area	**Area (acres):**	35
UTM:	Zone-10 N4244755 E664015	**Latitude/Longitude:**	38.33593 / -121.12336	**Elevation (feet):**	120

County Summary:	**Quad Summary:**
Sacramento	Goose Creek (3812131), Clay (3812132)

Sources:

HAL03F0006	HALE, J. - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2003-10-22
HAL03F0007	HALE, J. - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2003-10-30
HAL03F0008	HALE, J. - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2003-10-31
HAL03F0009	HALE, J. - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2003-11-06
HAL04F0025	HALE, J. - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2004-02-26
SHA93R0001	SHAFFER, H. ET AL. - STATUS REPORT FOR CALIFORNIA TIGER SALAMANDER, AMBYSTOMA CALIFORNIENSE (CONTRACT FG 9422 & FG 1383). 1993-XX-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 48590
EO Index: 52307
Key Quad: Goose Creek (3812131)
Element Code: AAAAA01180
Occurrence Number: 738
Occurrence Last Updated: 2003-09-03

Scientific Name: *Ambystoma californiense*
Common Name: California tiger salamander

Listing Status: **Federal:** Threatened
State: Threatened
Rare Plant Rank:
Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G2G3
State: S2S3

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed: 2003-04-13
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2003-04-13
Occurrence Rank: Unknown
Owner/Manager: UNKNOWN
Trend: Unknown
Presence: Presumed Extant

Location:

0.7 MILE SE OF RANCHO SECO, ALONG CLAY EAST ROAD.

Detailed Location:

LOCATED 0.5 MILE PAST DRIVEWAY INTO POWERPLANT NEAR THE ENTRANCE OF DRY CREEK RANCH & 2.4 MILES EAST OF HWY 104 / CLAY EAST ROAD JUNCTION. POOL IN ROAD ROW ON THE SOUTH SIDE OF CLAY EAST ROAD.

Ecological:

LARGE VERNAL POOL IN ANNUAL CRASSLAND. SURROUNDING LAND COMPRISED OF A POWERPLAND & AGRICULTURE. LEPIDURUS PACKARDI OBSERVED HERE IN 2002 BUT NOT IN 2003.

Threats:

THREATENED BY PRESENCE OF BULLFROGS.

General:

2 CTS LARVAE OBSERVED 13 APR 2003.

PLSS: T06N, R08E, Sec. 28 (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4244821 E664985
Latitude/Longitude: 38.33635 / -121.11226
Elevation (feet): 187

County Summary:	Quad Summary:
Sacramento	Goose Creek (3812131)

Sources:

JEN03R0001 JENNINGS, M. & G. PADGETT-FLOHR (RANA RESOURCES) - ATTACHMENT 2: COSUMNES POWER PLANT PIPELINE PROJECT, 2003 AQUATIC AMPHIBIAN AND REPTILE SURVEYS 2003-05-04

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 53375
EO Index: 53375
Key Quad: Goose Creek (3812131)
Element Code: AAAAA01180
Occurrence Number: 739
Occurrence Last Updated: 2003-11-19

Scientific Name: *Ambystoma californiense*
Common Name: California tiger salamander

Listing Status: **Federal:** Threatened
State: Threatened
Rare Plant Rank:
Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G2G3
State: S2S3

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed: 2003-04-13
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2003-04-13
Occurrence Rank: Excellent
Owner/Manager: PVT
Trend: Unknown
Presence: Presumed Extant

Location:

SOUTH SIDE OF CLAY EAST ROAD, 2.4 MILES EAST OF HIGHWAY 104, SOUTH OF RANCHO SECO.

Detailed Location:

Ecological:

HABITAT CONSISTS OF A VERNAL POOL SURROUNDED BY ANNUAL GRASSLAND (TYPICAL CENTRAL VALLEY SWALES AND ROLLING HILLS). VERNAL POOL TADPOLE SHRIMP ALSO KNOWN FROM THIS SITE (2002).

Threats:

General:

2 INDIVIDUALS OBSERVED IN AESTIVATION; 1 COLLECTED (MRJ/GEF #1544) AND DEPOSITED AT CAS.

PLSS: T06N, R08E, Sec. 32, NE (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4244751 E664412
Latitude/Longitude: 38.33583 / -121.11882
Elevation (feet): 160

County Summary:

Sacramento

Quad Summary:

Goose Creek (3812131)

Sources:

PAD03F0001 PADGETT-FLOHR, G.E. (RANA RESOURCES) - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2003-04-13

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 72355
Key Quad: Clay (3812132)
Occurrence Number: 1041
EO Index: 73319
Element Code: AAAAA01180
Occurrence Last Updated: 2008-09-23

Scientific Name: *Ambystoma californiense*
Common Name: California tiger salamander

Listing Status: **Federal:** Threatened
State: Threatened
CNDDB Element Ranks: **Global:** G2G3
State: S2S3
Rare Plant Rank:
Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed: 2008-03-21
Last Survey Date: 2008-03-21
Owner/Manager: PVT-BORDEN RANCH
Presence: Presumed Extant
Occurrence Type: Natural/Native occurrence
Occurrence Rank: Excellent
Trend: Unknown

Location:

1.2 MILES SE OF CLAY EAST RD AT KIRKWOOD ST, 1.9 MILES ESE OF CLAY.

Detailed Location:

MAPPED TO PROVIDED COORDINATES.

Ecological:

HABITAT DESCRIBED AS A MURKY VERNAL POOL WITH MAX DEPTH OF 12 INCHES. SURROUNDING LAND USED FOR GRAZING.

Threats:

General:

60 LARVAE OBSERVED ON 21 MAR 2008.

PLSS: T06N, R08E, Sec. 32 (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4243824 E663741
Latitude/Longitude: 38.32760 / -121.12671
Elevation (feet):

County Summary:	Quad Summary:
Sacramento	Goose Creek (3812131), Clay (3812132)

Sources:

BUM08F0013 BUMGARDNER, M. (BUMGARDNER BIOLOGICAL CONSULTING) - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2008-03-21

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 72357
Key Quad: Goose Creek (3812131)
Occurrence Number: 1042
EO Index: 73322
Element Code: AAAAA01180
Occurrence Last Updated: 2008-09-23

Scientific Name: *Ambystoma californiense*
Common Name: California tiger salamander

Listing Status: **Federal:** Threatened
State: Threatened
CNDDB Element Ranks: **Global:** G2G3
State: S2S3
Rare Plant Rank:
Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed: 2008-03-21
Last Survey Date: 2008-03-21
Owner/Manager: PVT-BORDEN RANCH
Presence: Presumed Extant
Occurrence Type: Natural/Native occurrence
Occurrence Rank: Excellent
Trend: Unknown

Location:

1.4 MILES ESE OF CLAY EAST RD AT KIRKWOOD ST, 2.1 MILES ESE OF CLAY.

Detailed Location:

MAPPED TO PROVIDED COORDINATES.

Ecological:

HABITAT DESCRIBED AS A VERNAL POOL W/ MAX DEPTH OF 17 INCHES W/ SUBSTANTIAL AMOUNT OF SUBMERGENT VEGETATION. LAND USED FOR GRAZING.

Threats:

General:

8 LARVAE OBSERVED ON 21 MAR 2008.

PLSS: T06N, R08E, Sec. 32, S (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4243883 E664141
Latitude/Longitude: 38.32806 / -121.12212
Elevation (feet): 212

County Summary:	Quad Summary:
Sacramento	Goose Creek (3812131)

Sources:

BUM08F0014 BUMGARDNER, M. (BUMGARDNER BIOLOGICAL CONSULTING) - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2008-03-21

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 72358
Key Quad: Goose Creek (3812131)
Occurrence Number: 1043
EO Index: 73323
Element Code: AAAAA01180
Occurrence Last Updated: 2008-09-23

Scientific Name: *Ambystoma californiense*
Common Name: California tiger salamander

Listing Status: **Federal:** Threatened
State: Threatened
CNDDB Element Ranks: **Global:** G2G3
State: S2S3
Rare Plant Rank:
Other Lists: CDFW_WL-Watch List
IUCN_VU-Vulnerable

General Habitat:

CENTRAL VALLEY DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.

Micro Habitat:

NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Last Date Observed: 2008-03-21
Last Survey Date: 2008-03-21
Owner/Manager: PVT-BORDEN RANCH
Presence: Presumed Extant
Occurrence Type: Natural/Native occurrence
Occurrence Rank: Excellent
Trend: Unknown

Location:

1.6 MILES SE TO ESE OF CLAY EAST RD AT KIRKWOOD ST, 2.3 MILES ESE OF CLAY.

Detailed Location:

MAPPED TO PROVIDED COORDINATES.

Ecological:

HABITAT DESCRIBED AS A MURKY STOCK POND W/ MAX DEPTH OF 36+ INCHES. LAND USED FOR GRAZING.

Threats:

General:

40 LARVAE OBSERVED ON 21 MAR 2008.

PLSS: T06N, R08E, Sec. 32, SE (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4243357 E664321
Latitude/Longitude: 38.32328 / -121.12019
Elevation (feet): 221

County Summary:	Quad Summary:
Sacramento	Goose Creek (3812131)

Sources:

BUM08F0015 BUMGARDNER, M. (BUMGARDNER BIOLOGICAL CONSULTING) - FIELD SURVEY FORM FOR AMBYSTOMA CALIFORNIENSE 2008-03-21

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 45295
EO Index: 45295
Key Quad: Goose Creek (3812131)
Element Code: ABNSB10010
Occurrence Number: 399
Occurrence Last Updated: 2001-05-01

Scientific Name: *Athene cunicularia*
Common Name: burrowing owl

Listing Status: **Federal:** None
State: None
CNDDB Element Ranks: **Global:** G4
State: S3

Rare Plant Rank:
Other Lists: BLM_S-Sensitive
CDFW_SSC-Species of Special Concern
IUCN_LC-Least Concern
USFWS_BCC-Birds of Conservation Concern

General Habitat:
OPEN, DRY ANNUAL OR PERENNIAL GRASSLANDS, DESERTS, AND SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.

Micro Habitat:
SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Last Date Observed: 2001-03-16
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2001-03-16
Occurrence Rank: Good
Owner/Manager: SMUD
Trend: Unknown
Presence: Presumed Extant

Location:
SOUTH OF THE RANCHO SECO POWER PLANT TOWERS, SOUTHERN SACRAMENTO COUNTY.

Detailed Location:

Ecological:
HABITAT CONSISTS OF PASTURELAND WITH SCATTERED SMALL, DECIDUOUS TREES ADJACENT TO A STREAM.

Threats:
THREATENED BY A PROPOSED POWER PLANT.

General:
PELLET FOUND AT THE BURROW ENTRANCE ON 16 MAR 2001.

PLSS: T06N, R08E, Sec. 29, SW (M)
Accuracy: 1/10 mile
Area (acres): 0
UTM: Zone-10 N4245491 E663814
Latitude/Longitude: 38.34260 / -121.12550
Elevation (feet): 150

County Summary:
Sacramento

Quad Summary:
Goose Creek (3812131), Clay (3812132)

Sources:
BUR01F0002 BURTON, K. (GARCIA AND ASSOCIATES) - FIELD SURVEY FORM FOR ATHENE CUNICULARIA (BURROW SITE) 2001-03-16

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 11948
EO Index: 4373
Key Quad: Clay (3812132)
Element Code: ABPBXB0020
Occurrence Number: 3
Occurrence Last Updated: 2016-12-02

Scientific Name: *Agelaius tricolor*
Common Name: tricolored blackbird

Listing Status: **Federal:** None
State: Candidate Endangered
Rare Plant Rank:

CNDDB Element Ranks: **Global:** G2G3
State: S1S2
Other Lists: BLM_S-Sensitive
CDFW_SSC-Species of Special Concern
IUCN_EN-Endangered
NABCI_RWL-Red Watch List
USFWS_BCC-Birds of Conservation Concern

General Habitat:

HIGHLY COLONIAL SPECIES, MOST NUMEROUS IN CENTRAL VALLEY & VICINITY. LARGELY ENDEMIC TO CALIFORNIA.

Micro Habitat:

REQUIRES OPEN WATER, PROTECTED NESTING SUBSTRATE, AND FORAGING AREA WITH INSECT PREY WITHIN A FEW KM OF THE COLONY.

Last Date Observed: 2008-04-26
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2015-04-18
Occurrence Rank: Good
Owner/Manager: PVT
Trend: Fluctuating
Presence: Presumed Extant

Location:

"RANCHO SECO" COLONY, ALONG HIGHWAY 104, VICINITY OF CLAY AND THE SITE OF THE FORMER RANCHO SECO NUCLEAR POWER PLANT.

Detailed Location:

MAPPED ACCORDING TO PROVIDED LOCATION DESCRIPTIONS AND MAPS. TRICOLOREDS APPEAR TO NEST IN AT LEAST 2 SEPARATE SITES EACH YEAR. COLONY DATA STORED IN THE UC DAVIS TRBL PORTAL. ALL YEARS WITH POSITIVE DETECTIONS WERE CONSIDERED NESTING.

Ecological:

HABITAT AT THE PRIMARY SITE CONSISTED OF BLACKBERRY BUSHES AND WILD ROSE BUSHES BORDERING PASTURE LAND. THE OTHER TWO LOCATIONS ARE PONDS. SURROUNDING/FORAGING LAND WAS GRASSLANDS.

Threats:

POSSIBLE THREAT FROM GRAZING AND HABITAT CONVERSION (TO AGRICULTURE).

General:

1981: 2.6K; EGG LAYING. 1982: 2.5-3K. 1988: 750-1K. 1989: 100-200. 1991: 1K'S. 1992: 500-20K. 1993: 5K. 1994: 7-20K. 1995: 5K. 1996: 1.5-2K. 1997: 700-4K. 1998: 0. 1999: 2.4-5K. 2000: 375. 2008: 100; INCUBATING. 2011: 0. 2014: 0. 2015: 1M.

PLSS: T06N, R07E, Sec. 25 (M)
Accuracy: specific area
Area (acres): 1,965
UTM: Zone-10 N4245232 E661500
Latitude/Longitude: 38.34068 / -121.15203
Elevation (feet): 109

County Summary:

Sacramento

Quad Summary:

Goose Creek (3812131), Clay (3812132)

Sources:

BEE91R0001	BEEDY, E.C., S.D. SANDERS & D. BLOOM - BREEDING STATUS, DISTRIBURTION, AND HABITAT ASSOCIATIONS OF THE TRICOLORED BLACKBIRD (AGELAIUS TRICOLOR), 1850-1989. 1991-06-XX
COO92F0013	COOK, L. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1992-XX-XX
COO97F0003	COOK, L. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR (NESTING COLONY) 1997-06-XX
DEH00F0008	DEHAVEN, R. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 2000-04-26
DFG04U0002	CALIFORNIA DEPARTMENT OF FISH & GAME - TRICOLORED BLACKBIRD BREEDING OBSERVATIONS 1980-2000, BIOS DS20. 2004-XX-XX
HAM99F0032	HAMILTON III, W. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1999-04-29
HOS86R0001	HOSEA, R.C. - A POPULATION CENSUS OF THE TRICOLORED BLACKBIRD, AGELAIUS TRICOLOR (AUDUBON), IN FOUR COUNTIES IN THE NORTHERN CENTRAL VALLEY OF CALIFORNIA. M.A. THESIS, CSU-SACRAMENTO. 1986-08-14
MAN94F0013	MANOLIS, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR (NESTING COLONY) 1994-04-23
MAN95F0007	MANOLIS, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1995-04-22
MAN96F0001	MANOLIS, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1996-04-21
MAN96F0002	MANOLIS, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1996-04-21
MAN97F0021	MANOLIS, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1997-04-26
SCH92F0021	SCHNEIDER, T. & M. BARTLETT - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR (NESTING COLONY) 1992-06-17
SCH92F0087	SCHREIDER, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1992-06-17
SCH92F0090	SCHNEIDER, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1992-06-25
SCH92U0004	SCHNEIDER, T. - TRICOLORED BLACKBIRD NEST COUNT, 1992 1992-08-07
SLO04R0001	SLOAT, T. - SOUTH SACRAMENTO HABITAT CONSERVATION PLAN. APPENDIX A: SPECIES ANAYLYSIS TRICOLORED BLACKBIRD 2004-XX-XX
TRI14D0001	TRICOLORED BLACKBIRD PORTAL - ICE (UNIVERSITY OF CALIFORNIA, DAVIS) - 1907-2014 TRICOLORED BLACKBIRD RECORDS FROM UC DAVIS TRICOLORED BLACKBIRD PORTAL, INFORMATION CENTER FOR THE ENVIRONMENT (ICE) 2014-XX-XX
TRI15D0001	TRICOLORED BLACKBIRD PORTAL - ICE (UNIVERSITY OF CALIFORNIA, DAVIS) - 2015 TRICOLORED BLACKBIRD RECORDS FROM UC DAVIS TRICOLORED BLACKBIRD PORTAL, INFORMATION CENTER FOR THE ENVIRONMENT (ICE) 2015-XX-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 96042
EO Index: 97191
Key Quad: Goose Creek (3812131)
Element Code: ABPBXB0020
Occurrence Number: 503
Occurrence Last Updated: 2016-10-17

Scientific Name: *Agelaius tricolor*
Common Name: tricolored blackbird

Listing Status:
Federal: None
State: Candidate Endangered

Rare Plant Rank:

Other Lists: BLM_S-Sensitive
CDFW_SSC-Species of Special Concern
IUCN_EN-Endangered
NABCI_RWL-Red Watch List
USFWS_BCC-Birds of Conservation Concern

CNDDB Element Ranks:
Global: G2G3
State: S1S2

General Habitat:

HIGHLY COLONIAL SPECIES, MOST NUMEROUS IN CENTRAL VALLEY & VICINITY. LARGELY ENDEMIC TO CALIFORNIA.

Micro Habitat:

REQUIRES OPEN WATER, PROTECTED NESTING SUBSTRATE, AND FORAGING AREA WITH INSECT PREY WITHIN A FEW KM OF THE COLONY.

Last Date Observed: 1996-04-21
Occurrence Type: Natural/Native occurrence
Last Survey Date: 1996-04-21
Occurrence Rank: Unknown
Owner/Manager: SMUD
Trend: Unknown
Presence: Presumed Extant

Location:

ALONG GOOSE CREEK, VICINITY OF RANCHO SECO DAM, 3 MILES E OF TWIN CITIES RD/CA-104 & CLAY STATION RD INTERSECTION, CLAY.

Detailed Location:

PROVIDED LOCATION DESCRIPTION WAS "SOUTHWEST OF ACCESS ROAD TO RESERVOIR IN RANCHO SECO PARK, (GOOSE CREEK T6N, R8E, S33 NE)." MAPPED AS BEST GUESS TO JUST BELOW RANCHO SECO DAM.

Ecological:

OPEN GRASS WITH AREAS OF SHRUBS, VINES, AND A FEW EUCALYPTUS TREES. CREEK MEANDERING THROUGH AREA. COLONY SIZE APPROXIMATELY 1 ACRE. AN ADDITIONAL 600 BIRDS OBSERVED FORAGING IN GRASSLANDS IN 1996.

Threats:

General:

APPROXIMATELY 250 BIRDS OBSERVED ON 22 APR AND 20 MAY 1989 (MUNSON PERSONAL COMMUNICATION); SUCCESSFUL NESTING INDICATED BY OBSERVATION OF FLEDGED YOUNG. ADULTS ALSO OBSERVED CARRYING FOOD ON 20 MAY. 350 OBS NESTING ON 21 APR 1996.

PLSS: T06N, R08E, Sec. 33, NE (M)
Accuracy: 1/5 mile
Area (acres): 0
UTM: Zone-10 N4244565 E665836
Latitude/Longitude: 38.33389 / -121.10258
Elevation (feet): 190

County Summary:

Sacramento

Quad Summary:

Goose Creek (3812131)

Sources:

BEE91R0001 BEEDY, E.C., S.D. SANDERS & D. BLOOM - BREEDING STATUS, DISTRIBURTION, AND HABITAT ASSOCIATIONS OF THE TRICOLORED BLACKBIRD (AGELAIUS TRICOLOR), 1850-1989. 1991-06-XX

MAN96F0003 MANOLIS, T. - FIELD SURVEY FORM FOR AGELAIUS TRICOLOR 1996-04-21

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 45308
EO Index: 45308
Key Quad: Goose Creek (3812131)
Element Code: ARAAD02030
Occurrence Number: 524
Occurrence Last Updated: 2001-08-07

Scientific Name: *Emys marmorata*
Common Name: western pond turtle

Listing Status: **Federal:** None
State: None
CNDDB Element Ranks: **Global:** G3G4
State: S3

Rare Plant Rank:
Other Lists: BLM_S-Sensitive
CDFW_SSC-Species of Special Concern
IUCN_VU-Vulnerable
USFS_S-Sensitive

General Habitat:
A THOROUGHLY AQUATIC TURTLE OF PONDS, MARSHES, RIVERS, STREAMS AND IRRIGATION DITCHES, USUALLY WITH AQUATIC VEGETATION, BELOW 6000 FT ELEVATION.

Micro Habitat:
NEEDS BASKING SITES AND SUITABLE (SANDY BANKS OR GRASSY OPEN FIELDS) UPLAND HABITAT UP TO 0.5 KM FROM WATER FOR EGG-LAYING.

Last Date Observed: 2001-03-16
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2001-03-16
Occurrence Rank: Good
Owner/Manager: SMUD
Trend: Unknown
Presence: Presumed Extant

Location:
SOUTH OF THE RANCHO SECO POWER PLANT TOWERS, SOUTHERN SACRAMENTO COUNTY.

Detailed Location:

Ecological:
HABITAT CONSISTS OF A SMALL STREAM FLOWING THROUGH PASTURELAND.

Threats:
THREATENED BY A PROPOSED POWER PLANT.

General:
1 ADULT OBSERVED ON 16 MAR 2001.

PLSS: T06N, R08E, Sec. 29, SW (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4245490 E663944
Latitude/Longitude: 38.34257 / -121.12401
Elevation (feet): 140

County Summary:	Quad Summary:
Sacramento	Goose Creek (3812131)

Sources:
BUR01F0001 BURTON, K. (GARCIA AND ASSOCIATES) - FIELD SURVEY FORM FOR CLEMMYS MARMORATA MARMORATA 2001-03-16

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 11996
Key Quad: Goose Creek (3812131)
Occurrence Number: 121
EO Index: 26511
Element Code: CTT44110CA
Occurrence Last Updated: 1998-07-15

Scientific Name: *Northern Hardpan Vernal Pool*
Common Name: Northern Hardpan Vernal Pool

Listing Status: **Federal:** None
State: None
Rare Plant Rank:
Other Lists:

CNDDB Element Ranks: **Global:** G3
State: S3.1

General Habitat:

Micro Habitat:

Last Date Observed: 1983-XX-XX
Last Survey Date: 1983-XX-XX
Owner/Manager: UNKNOWN
Presence: Presumed Extant
Occurrence Type: Natural/Native occurrence
Occurrence Rank: Unknown
Trend: Unknown

Location:

NORTH OF HWY 104 NEAR THE SOUTHERN PACIFIC RR TRACKS, NORTH OF RANCHO SECO POWER PLANT.

Detailed Location:

DENSE DISTRIBUTION OF VERNAL POOLS.

Ecological:

ON PENTZ-PARDEE-RED BLUFF ASSOCIATION SOILS. UNABLE TO CONVERT TO FLORISTIC CLASSIFICATION, LACKS SPP. INFO.

Threats:

General:

SEE WWW.DFG.CA.GOV/BIOGEODATA/VEGCAMP/NATURAL_COMM_BACKGROUND.ASP TO INTERPRET AND ADDRESS THE PRESENCE OF RARE COMMUNITIES.

PLSS: T06N, R08E, Sec. 20 (M)
Accuracy: 1 mile
Area (acres): 0
UTM: Zone-10 N4247458 E664575
Latitude/Longitude: 38.36018 / -121.11634
Elevation (feet): 160

County Summary:

Sacramento

Quad Summary:

Goose Creek (3812131), Clay (3812132)

Sources:

HOL86M0005 HOLLAND, R.F. & V. DAINS - VERNAL POOL HABITAT OF SACRAMENTO COUNTY: 1949 AND 1983 COMPARED. 1986-XX-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number:	33684	**EO Index:**	30545
Key Quad:	Goose Creek (3812131)	**Element Code:**	ICBRA03030
Occurrence Number:	165	**Occurrence Last Updated:**	2014-09-15

Scientific Name: *Branchinecta lynchi*

Common Name: vernal pool fairy shrimp

Listing Status: **Federal:** Threatened

State: None

Rare Plant Rank:

Other Lists: IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G3

State: S3

General Habitat:

ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MOUNTAINS, AND SOUTH COAST MOUNTAINS, IN ASTATIC RAIN-FILLED POOLS.

Micro Habitat:

INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Last Date Observed:	1982-01-05	**Occurrence Type:**	Natural/Native occurrence
Last Survey Date:	1982-01-05	**Occurrence Rank:**	Unknown
Owner/Manager:	UNKNOWN	**Trend:**	Unknown
Presence:	Presumed Extant		

Location:

BETWEEN CLAY EAST ROAD AND HIGHWAY 104, VICINITY OF RANCHO SECO, NE OF GALT.

Detailed Location:

DETECTION ON 5 JAN 1982 REPORTED IN SEVERAL SOURCES, LOCATIO DESCRIBED AS T6N R8E SECTION 29 OR "RANCHO SECO, SOUTH OF COOLING TOWERS."

Ecological:

NATURAL, SEASONALLY ASTATIC VERNAL POOLS.

Threats:

General:

OBSERVED 1 FEATURE SURVEYED ON 5 JAN 1982 (SUGNET RECORD #43); 20 COLLECTED (USNM #1156052, BELK #405).

PLSS:	T06N, R08E, Sec. 29 (M)	**Accuracy:**	3/5 mile	**Area (acres):**	0
UTM:	Zone-10 N4245579 E664089	**Latitude/Longitude:**	38.34334 / -121.12233	**Elevation (feet):**	150

County Summary:	**Quad Summary:**
Sacramento	Goose Creek (3812131), Clay (3812132)

Sources:

BEL88D0001	BELK, D. - DELTON BELK'S DATABASE OF CRUSTACEAN COLLECTIONS 1988-09-XX
ENG82S0013	ENG, L. - USNM #1156052, COLLECTED FROM "RANCHO SECO, SOUTH OF TOWERS." 1982-01-05
SUG93U0001	SUGNET & ASSOCIATES - PRINTOUT OF LOCATION (T-R-S) OF FAIRY SHRIMP SAMPLING. (OBTAINED FROM THE U.S. FISH AND WILDLIFE SERVICE) 1993-XX-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number:	93913	**EO Index:**	30812
Key Quad:	Goose Creek (3812131)	**Element Code:**	ICBRA03030
Occurrence Number:	180	**Occurrence Last Updated:**	2014-12-17

Scientific Name: *Branchinecta lynchi* **Common Name:** vernal pool fairy shrimp

Listing Status: **Federal:** Threatened **Rare Plant Rank:**

State: None **Other Lists:** IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G3

State: S3

General Habitat:

ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MOUNTAINS, AND SOUTH COAST MOUNTAINS, IN ASTATIC RAIN-FILLED POOLS.

Micro Habitat:

INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Last Date Observed:	2014-03-03	**Occurrence Type:**	Natural/Native occurrence
Last Survey Date:	2014-03-03	**Occurrence Rank:**	Unknown
Owner/Manager:	SMUD	**Trend:**	Unknown
Presence:	Presumed Extant		

Location:

SMUD NATURE PRESERVE, AROUND RANCHO SECO LAKE, EAST OF RANCHO SECO POWER PLANT.

Detailed Location:

EXACT LOCATION OF 1993 DETECTIONS NOT GIVEN; SPECIES WAS FOUND IN VERNAL POOLS THROUGHOUT THE SITE. 1993 & 1994 COLLECTION LOCALITY GIVEN ONLY AS "RANCHO SECO." MAPPED TO COORDINATES GIVEN FOR OCCUPIED POOLS IN 2008-2014 REPORTS.

Ecological:

1993: ROLLING HILLS OF GRASSLAND W/SEASONAL WETLANDS IN LOW-LYING AREAS & LAKE SURROUNDED BY LANDSCAPED PARK. SITE PROPOSED FOR A GOLF COURSE, BUT WAS LATER PRESERVED. 2007-2014: 1,324-ACRE PRESERVE W/NATURAL & RESTORED/CREATED WETLANDS.

Threats:

General:

DETECTED FEB-MAY 1993. COLLECTED FEB 1993 & JAN 1994. FOUND IN 25 BASINS, 1994 & 1996. FOUND IN 170 BASINS, 2007-2008. FOUND IN 3 OF 47 BASINS, FEB-MAY 2012. IN 15 BASINS, DEC 2012-JAN 2013. IN 36 OF AT LEAST 48 BASINS, 2014.

PLSS:	T06N, R08E, Sec. 27 (M)	**Accuracy:**	specific area	**Area (acres):**	552
UTM:	Zone-10 N4245143 E667526	**Latitude/Longitude:**	38.33878 / -121.08313	**Elevation (feet):**	250

County Summary:	**Quad Summary:**
Sacramento	Goose Creek (3812131)

Sources:

ARE08R0001	AREA WEST ENVIRONMENTAL, INC. - FEDERALLY-LISTED LARGE BRANCHIOPOD SAMPLING AT THE SMUD NATURE PRESERVE 2008-04-XX
AWE14R0001	AREA WEST ENVIRONMENTAL, INC. - 90-DAY REPORT OF FEDERALLY LISTED VERNAL POOL BRANCHIOPOD AND CALIFORNIA TIGER SALAMANDER 2012-2013 WET-SEASON SAMPLING AT SMUD NATURE PRESERVE 2014-01-XX
JSA93R0001	JONES & STOKES ASSOCIATES, INC. - SPECIAL STATUS PLANT AND WILDLIFE SPECIES SURVEYS AND HABITAT ASSESSMENTS FOR THE RANCHO SECO PROJECT SITE. 1993-08-04
ROG04U0002	ROGERS, D. - EMAIL WITH LOCALITY RECORDS FOR LEPIDURUS PACKARDI, BRANCHINECTA CONSERVATIO, B. LONGIANTENNA, B. LYNCHI, B. MESOVALLENSIS, B. SANDIEGONENSIS AND STREPTOCEPHALUS WOOTTONI 2004-10-08
ROZ13R0001	ROZUMOWICZ, B. (AREA WEST ENVIRONMENTAL, INC.) - FEDERALLY LISTED VERNAL POOL BRANCHIOPOD AND CALIFORNIA TIGER SALAMANDER 2012 WET-SEASON SAMPLING 2013-01-XX
ROZ14R0002	ROZUMOWICZ, B. (AREA WEST ENVIRONMENTAL, INC.) - FEDERALLY LISTED VERNAL POOL BRANCHIOPOD AND CALIFORNIA TIGER SALAMANDER 2013-2014 WET-SEASON SAMPLING, SMUD NATURE PRESERVE MITIGATION BANK 2014-08-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 93914
EO Index: 95039
Key Quad: Goose Creek (3812131)
Element Code: ICBRA03030
Occurrence Number: 777
Occurrence Last Updated: 2014-09-22

Scientific Name: *Branchinecta lynchi*
Common Name: vernal pool fairy shrimp

Listing Status: **Federal:** Threatened
State: None
Rare Plant Rank:
Other Lists: IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G3
State: S3

General Habitat:

ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MOUNTAINS, AND SOUTH COAST MOUNTAINS, IN ASTATIC RAIN-FILLED POOLS.

Micro Habitat:

INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Last Date Observed: 2007-03-XX
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2007-03-XX
Occurrence Rank: Unknown
Owner/Manager: SMUD
Trend: Unknown
Presence: Presumed Extant

Location:

SOUTH SIDE OF CLAY EAST ROAD, 1.7 MILES EAST OF KIRKWOOD ROAD, SMUD NATURE PRESERVE, RANCHO SECO, NE OF HERALD.

Detailed Location:

MAPPED TO LOCATION OF OCCUPIED POOL E2-44 FROM 2008 REPORT.

Ecological:

A 0.035 ACRE SEASONAL WETLAND ON A 1,324 ACRE PRESERVE WITH NATURAL AND RESTORED/CREATED VERNAL POOLS.

Threats:

General:

DETECTED DURING SURVEYS CONDUCTED 9 - 15 MAR 2007.

PLSS: T06N, R08E, Sec. 32, NE (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4244667 E664912
Latitude/Longitude: 38.33497 / -121.11313
Elevation (feet): 170

County Summary:	Quad Summary:
Sacramento	Goose Creek (3812131)

Sources:

ARE08R0001 AREA WEST ENVIRONMENTAL, INC. - FEDERALLY-LISTED LARGE BRANCHIOPOD SAMPLING AT THE SMUD NATURE PRESERVE 2008-04-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 93915
EO Index: 95040
Key Quad: Goose Creek (3812131)
Element Code: ICBRA03030
Occurrence Number: 778
Occurrence Last Updated: 2014-09-22

Scientific Name: *Branchinecta lynchi*
Common Name: vernal pool fairy shrimp

Listing Status: **Federal:** Threatened
State: None
Rare Plant Rank:
Other Lists: IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G3
State: S3

General Habitat:

ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MOUNTAINS, AND SOUTH COAST MOUNTAINS, IN ASTATIC RAIN-FILLED POOLS.

Micro Habitat:

INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Last Date Observed: 2007-03-XX
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2007-03-XX
Occurrence Rank: Unknown
Owner/Manager: SMUD
Trend: Unknown
Presence: Presumed Extant

Location:

1.7 MILES ESE OF THE INTERSECTION OF CLAY EAST ROAD AND KIRKWOOD ROAD, SMUD NATURE PRESERVE, RANCHO SECO, NE OF HERALD.

Detailed Location:

MAPPED TO LOCATION OF OCCUPIED POOL F2-19 FROM 2008 REPORT.

Ecological:

A 0.019 ACRE SEASONAL WETLAND ON A 1,324 ACRE PRESERVE WITH NATURAL AND RESTORED/CREATED VERNAL POOLS.

Threats:

General:

DETECTED DURING SURVEYS CONDUCTED 9 - 15 MAR 2007.

PLSS: T06N, R08E, Sec. 32, NE (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4244019 E664773
Latitude/Longitude: 38.32916 / -121.11487
Elevation (feet): 230

County Summary:

Sacramento

Quad Summary:

Goose Creek (3812131)

Sources:

ARE08R0001 AREA WEST ENVIRONMENTAL, INC. - FEDERALLY-LISTED LARGE BRANCHIOPOD SAMPLING AT THE SMUD NATURE PRESERVE 2008-04-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 93916
EO Index: 95041
Key Quad: Goose Creek (3812131)
Element Code: ICBRA03030
Occurrence Number: 779
Occurrence Last Updated: 2014-09-22

Scientific Name: *Branchinecta lynchi*
Common Name: vernal pool fairy shrimp

Listing Status: **Federal:** Threatened
State: None
Rare Plant Rank:
Other Lists: IUCN_VU-Vulnerable

CNDDB Element Ranks: **Global:** G3
State: S3

General Habitat:

ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MOUNTAINS, AND SOUTH COAST MOUNTAINS, IN ASTATIC RAIN-FILLED POOLS.

Micro Habitat:

INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Last Date Observed: 2007-03-XX
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2007-03-XX
Occurrence Rank: Unknown
Owner/Manager: SMUD
Trend: Unknown
Presence: Presumed Extant

Location:

1.3 MILES ESE OF THE INTERSECTION OF CLAY EAST ROAD AND KIRKWOOD ROAD, SMUD NATURE PRESERVE, RANCHO SECO, NE OF HERALD.

Detailed Location:

MAPPED TO LOCATIONS OF OCCUPIED POOLS F1-23 AND F1-24 FROM 2008 REPORT.

Ecological:

0.085 ACRE AND 0.027 ACRE SEASONAL WETLANDS ON A 1,324 ACRE PRESERVE WITH NATURAL AND RESTORED/CREATED VERNAL POOLS.

Threats:

General:

DETECTED DURING SURVEYS CONDUCTED 9 - 15 MAR 2007.

PLSS: T06N, R08E, Sec. 32, N (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4244113 E664122
Latitude/Longitude: 38.33013 / -121.12229
Elevation (feet): 210

County Summary:

Sacramento

Quad Summary:

Goose Creek (3812131)

Sources:

ARE08R0001 AREA WEST ENVIRONMENTAL, INC. - FEDERALLY-LISTED LARGE BRANCHIOPOD SAMPLING AT THE SMUD NATURE PRESERVE 2008-04-XX

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number:	29088	**EO Index:**	30810
Key Quad:	Goose Creek (3812131)	**Element Code:**	ICBRA06010
Occurrence Number:	151	**Occurrence Last Updated:**	1997-03-28

Scientific Name: *Linderiella occidentalis* **Common Name:** California linderiella

Listing Status: **Federal:** None **Rare Plant Rank:**

State: None **Other Lists:** IUCN_NT-Near Threatened

CNDDB Element Ranks: **Global:** G2G3

State: S2S3

General Habitat:

SEASONAL POOLS IN UNPLOWED GRASSLANDS WITH OLD ALLUVIAL SOILS UNDERLAIN BY HARDPAN OR IN SANDSTONE DEPRESSIONS.

Micro Habitat:

WATER IN THE POOLS HAS VERY LOW ALKALINITY, CONDUCTIVITY, AND TOTAL DISSOLVED SOLIDS.

Last Date Observed:	1993-XX-XX	**Occurrence Type:**	Natural/Native occurrence
Last Survey Date:	1993-05-21	**Occurrence Rank:**	Unknown
Owner/Manager:	SMUD	**Trend:**	Unknown
Presence:	Presumed Extant		

Location:

AREA AROUND RANCHO SECO LAKE, EAST OF RANCHO SECO POWER PLANT, NE OF GALT.

Detailed Location:

AREA MAPPED IS THE PROJECT SITE. LINDERIELLA WAS FOUND IN VERNAL POOLS THROUGHOUT THE SITE WHERE MAXIMUM PONDING WAS 4 INCHES OR GREATER.

Ecological:

PROJECT SITE IS CHARACTERIZED BY ROLLING HILLS OF GRASSLAND WITH SEASONAL WETLANDS INTERSPERSED IN LOW-LYING AREAS. THE LAKE IS SURROUNDED BY A LANDSCAPED PARK.

Threats:

SITE IS PROPOSED FOR A GOLF COURSE.

General:

LINDERIELLA WERE OBSERVED IN VERNAL POOLS AND A STOCK POND. SURVEYS CONDUCTED BETWEEN 8 FEBRUARY & 21 MAY 1993.

PLSS:	T06N, R08E, Sec. 28 (M)	**Accuracy:**	nonspecific area	**Area (acres):**	1,689
UTM:	Zone-10 N4245174 E666441	**Latitude/Longitude:**	38.33926 / -121.09553	**Elevation (feet):**	250

County Summary:	**Quad Summary:**
Sacramento	Goose Creek (3812131)

Sources:

JSA93R0001 JONES & STOKES ASSOCIATES, INC. - SPECIAL STATUS PLANT AND WILDLIFE SPECIES SURVEYS AND HABITAT ASSESSMENTS FOR THE RANCHO SECO PROJECT SITE. 1993-08-04

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number:	33679	**EO Index:**	30667
Key Quad:	Clay (3812132)	**Element Code:**	ICBRA10010
Occurrence Number:	83	**Occurrence Last Updated:**	2015-02-09

Scientific Name: *Lepidurus packardi* **Common Name:** vernal pool tadpole shrimp

Listing Status: **Federal:** Endangered **Rare Plant Rank:**

State: None **Other Lists:** IUCN_EN-Endangered

CNDDB Element Ranks: **Global:** G4

State: S3S4

General Habitat:

INHABITS VERNAL POOLS AND SWALES IN THE SACRAMENTO VALLEY CONTAINING CLEAR TO HIGHLY TURBID WATER.

Micro Habitat:

POOLS COMMONLY FOUND IN GRASS-BOTTOMED SWALES OF UNPLOWED GRASSLANDS. SOME POOLS ARE MUD-BOTTOMED AND HIGHLY TURBID.

Last Date Observed:	2014-03-14	**Occurrence Type:**	Natural/Native occurrence
Last Survey Date:	2014-03-14	**Occurrence Rank:**	Good
Owner/Manager:	PVT-AKT DEVELOPMENT	**Trend:**	Unknown
Presence:	Presumed Extant		

Location:

BORDEN RANCH PRESERVE, NORTH AND SOUTH OF BORDEN ROAD, ABOUT 2.5 MILES SOUTHEAST OF CLAY.

Detailed Location:

1993: FOUND IN TRS SEC 7 & 8, EXACT LOCATIONS UNKNOWN. 1997: FOUND THROUGHOUT RANCH. 1999: ONLY DESIGNATED PRESERVES IN SEC 7 & 9 SURVEYED. 2011: FOUND IN TRS SEC 7 & 8. 2012: FOUND IN SEC 7 & 18. 2014: FOUND IN SEC 4, 5, & 8.

Ecological:

VERNAL POOLS DOMINATED BY PLAGIOBOTHRYS STIPITATUS, ELEOCHARIS MACROSTACHYA, AND PSILOCARPHUS BREVISSIMUS; IN NON-NATIVE ANNUAL GRASSLAND SURROUNDED BY AGRICULTURE/VINEYARDS. 1,338-ACRE RANCH IS NOW PRESERVED.

Threats:

LIGHT DISTURBANCE FROM CATTLE NOTED IN 1997.

General:

FOUND IN 5 OF 21 BASINS IN SEC 7 & 1 OF 13 FEATURES IN SEC 8, 1993 (SUGNET ID#S 118 & 119). 1000S FOUND IN OVER 40 POOLS, 1997. 1000S FOUND, 1999. IN 19 OF 20 POOLS, 2011. FOUND IN 2 OF AT LEAST 10 POOLS, 2012. IN 8 OF 10 POOLS, 2014.

PLSS:	T05N, R08E, Sec. 08 (M)	**Accuracy:**	nonspecific area	**Area (acres):**	4,272
UTM:	Zone-10 N4240731 E663524	**Latitude/Longitude:**	38.29978 / -121.12991	**Elevation (feet):**	180

County Summary:	**Quad Summary:**
Sacramento	Goose Creek (3812131), Clay (3812132)

Sources:

LIT11F0002	LITTLE, C. (CENTER FOR NATURAL LANDS MANAGEMENT) - FIELD SURVEY FORM FOR LEPIDURUS PACKARDI 2011-01-25
LIT12F0005	LITTLE, C. (CENTER FOR NATURAL LANDS MANAGEMENT) - FIELD SURVEY FORM FOR LEPIDURUS PACKARDI 2012-03-29
LIT12F0006	LITTLE, C. (CENTER FOR NATURAL LANDS MANAGEMENT) - FIELD SURVEY FORM FOR LEPIDURUS PACKARDI 2012-12-27
LIT14F0005	LITTLE, C. (CENTER FOR NATURAL LANDS MANAGEMENT) - FIELD SURVEY FORM FOR LEPIDURUS PACKARDI 2014-03-14
SUG93U0001	SUGNET & ASSOCIATES - PRINTOUT OF LOCATION (T-R-S) OF FAIRY SHRIMP SAMPLING. (OBTAINED FROM THE U.S. FISH AND WILDLIFE SERVICE) 1993-XX-XX
WHI97F0003	WHITNEY, K. - FIELD SURVEY FORM FOR LEPIDURUS PACKARDI 1997-02-04
WHI99F0005	WHITNEY, K. - FIELD SURVEY FORM FOR LEPIDURUS PACKARDI 1999-02-12

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number:	95134	**EO Index:**	48590
Key Quad:	Goose Creek (3812131)	**Element Code:**	ICBRA10010
Occurrence Number:	174	**Occurrence Last Updated:**	2015-02-04

Scientific Name: *Lepidurus packardi*

Common Name: vernal pool tadpole shrimp

Listing Status: **Federal:** Endangered

State: None

Rare Plant Rank:

Other Lists: IUCN_EN-Endangered

CNDDB Element Ranks: **Global:** G4

State: S3S4

General Habitat:

INHABITS VERNAL POOLS AND SWALES IN THE SACRAMENTO VALLEY CONTAINING CLEAR TO HIGHLY TURBID WATER.

Micro Habitat:

POOLS COMMONLY FOUND IN GRASS-BOTTOMED SWALES OF UNPLOWED GRASSLANDS. SOME POOLS ARE MUD-BOTTOMED AND HIGHLY TURBID.

Last Date Observed:	2007-03-XX	**Occurrence Type:**	Natural/Native occurrence
Last Survey Date:	2007-03-XX	**Occurrence Rank:**	Excellent
Owner/Manager:	SMUD	**Trend:**	Unknown
Presence:	Presumed Extant		

Location:

SOUTH SIDE OF CLAY EAST RD ABOUT 2.0 MI NE OF KIRKWOOD RD AT BESKEEN RD AND 2.4 MI E OF THE TWIN CITIES RD JUNCTION.

Detailed Location:

2002: FOUND IN POOL ON SOUTH SIDE OF CLAY EAST RD, 2.4 MILES EAST OF THE HWY 104/CLAY EAST ROAD JUNCTION. 2007: MAPPED TO COORDINATES GIVEN FOR OCCUPIED POOL D2-14.

Ecological:

2002: LARGE VERNAL POOL IN ANNUAL GRASSLAND, SURROUNDING LAND USED FOR POWERPLANT AND AGRICULTURE. POOL FILLED TO CAPACITY IN 2003 RAINS. 2007: 1,324 ACRES HAVE BEEN PROTECTED AS SMUD NATURE PRESERVE.

Threats:

General:

1 ADULT COLLECTED (GEF #541) AND SENT TO CAS, 5 APR 2002. NONE FOUND DURING 13 APR 2003 HERPTILE SURVEY. FOUND IN 19 OF AT LEAST 215 BASINS DURING SURVEYS 9-15 MAR 2007 (1 MAPPED HERE, SEE ALSO OCCURRENCES #110, 336, 337, 338).

PLSS:	T06N, R08E, Sec. 32, NE (M)	**Accuracy:**	80 meters	**Area (acres):**	0
UTM:	Zone-10 N4244788 E664833	**Latitude/Longitude:**	38.33608 / -121.11400	**Elevation (feet):**	170

County Summary:	**Quad Summary:**
Sacramento	Goose Creek (3812131)

Sources:

ARE08R0001	AREA WEST ENVIRONMENTAL, INC. - FEDERALLY-LISTED LARGE BRANCHIOPOD SAMPLING AT THE SMUD NATURE PRESERVE 2008-04-XX
FLO02F0001	FLOHR, G.E. (RANA RESOURCES) - FIELD SURVEY FORM FOR LEPIDURUS PACKARDI 2002-04-05
JEN03R0001	JENNINGS, M. & G. PADGETT-FLOHR (RANA RESOURCES) - ATTACHMENT 2: COSUMNES POWER PLANT PIPELINE PROJECT, 2003 AQUATIC AMPHIBIAN AND REPTILE SURVEYS 2003-05-04

Occurrence Report

California Department of Fish and Wildlife

California Natural Diversity Database

Map Index Number: 93916
EO Index: 96272
Key Quad: Goose Creek (3812131)
Element Code: ICBRA10010
Occurrence Number: 336
Occurrence Last Updated: 2015-02-04

Scientific Name: *Lepidurus packardi*
Common Name: vernal pool tadpole shrimp

Listing Status: **Federal:** Endangered
State: None
Rare Plant Rank:
Other Lists: IUCN_EN-Endangered

CNDDB Element Ranks: **Global:** G4
State: S3S4

General Habitat:

INHABITS VERNAL POOLS AND SWALES IN THE SACRAMENTO VALLEY CONTAINING CLEAR TO HIGHLY TURBID WATER.

Micro Habitat:

POOLS COMMONLY FOUND IN GRASS-BOTTOMED SWALES OF UNPLOWED GRASSLANDS. SOME POOLS ARE MUD-BOTTOMED AND HIGHLY TURBID.

Last Date Observed: 2007-03-XX
Occurrence Type: Natural/Native occurrence
Last Survey Date: 2007-03-XX
Occurrence Rank: Unknown
Owner/Manager: SMUD
Trend: Unknown
Presence: Presumed Extant

Location:

1.3 MILES ESE OF THE INTERSECTION OF CLAY EAST ROAD AND KIRKWOOD ROAD, SMUD NATURE PRESERVE, RANCHO SECO, NE OF HERALD.

Detailed Location:

2007: MAPPED TO COORDINATES GIVEN FOR OCCUPIED POOL F1-23.

Ecological:

2007: 1,324 ACRES PROTECTED AS SMUD NATURE PRESERVE.

Threats:

General:

FOUND IN 19 OF AT LEAST 215 BASINS DURING SURVEYS 9-15 MAR 2007 (1 MAPPED HERE, SEE ALSO OCCURRENCES #110, 174, 337, 338).

PLSS: T06N, R08E, Sec. 32, N (M)
Accuracy: 80 meters
Area (acres): 0
UTM: Zone-10 N4244113 E664122
Latitude/Longitude: 38.33013 / -121.12229
Elevation (feet): 210

County Summary:

Sacramento

Quad Summary:

Goose Creek (3812131)

Sources:

ARE08R0001 AREA WEST ENVIRONMENTAL, INC. - FEDERALLY-LISTED LARGE BRANCHIOPOD SAMPLING AT THE SMUD NATURE PRESERVE 2008-04-XX

Attachment 3.2B
Biologist Resume

Morgan King
Biologist

Education

B.S., Wildlife, Fish and Conservation Biology, University of California, Davis, CA

Professional Registrations

Desert Tortoise Council, 2013 through present

Distinguishing Qualifications

- Over ten years of biological consulting experience throughout California and southwest, specializing in the Mojave and Sonoran deserts
- California Energy Commission Designated Biologist for Abengoa Mojave Solar Project
- United States Fish and Wildlife Service Authorized Biologist for clearance surveys and handling Mojave desert tortoise for three Biological Opinions
- 9,400 hours supervising and conducting desert tortoise monitoring and surveys
- Environmental compliance for transmission, wind, and solar development for both federal and private lands
- Prepare, consult, implement, oversee, and manage biological resource compliance plans
- Assistant project manager for Ivanpah Solar Electric Generating System (ISEGS), and environmental compliance task lead for special-status plant, noxious weed, revegetation, and mitigation activities
- Manage large field crews, 120 staff at ISEGS and 40 staff at Mojave Solar Project
- Protocol-level and reconnaissance-level survey experience for plants, wildlife, and natural communities
- Strong writing skills in various agency reports: Biological Assessment, Environmental Assessment, Habitat Management Plan, Jurisdictional Wetland Delineation, California Energy Commission Application for Certification and monthly and annual compliance reports, Habitat Quality Evaluation, and biological technical memorandums

Relevant Experience

Morgan King is a biologist with over 10 years of environmental consulting experience and as served as a technical lead on solar, wind, and transmission line projects in California and the desert southwest. Client services include California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) compliance during pre-construction siting and licensing, construction, and operation of the facilities on private and federal lands. Her resource specialties are the federally and state threatened Mojave desert tortoise (*Gopherus agassizii*) and botanical resources including special-status plants and noxious weeds.

Ms. King specializes in California Energy Commission (CEC) biological compliance, and was the Designated Biologist on the Mojave Solar Project. On this project, she oversaw implementation of biological resource management plans; biological resource mitigation implementation and monitoring plan, tamarisk plan, evaporation pond monitoring and adaptive management plan, common raven (*Corvus corax*) plan, burrowing owl (*Athene cunicularia*) plan, avian mortality study, and the desert tortoise Biological Opinion and translocation plan.

Ms. King is currently the assistant project manager on the on the Ivanpah Solar Electric Generating System (ISEGS). She has been involved with this project since its inception in 2007 including on tasks such as, preparer of Application for Certification (AFC) and Biological Assessment, conducted wildlife and special-status plant pre-construction surveys, and construction, operations, and mitigation compliance. She has successfully implemented arid west revegetation efforts on short term disturbance on the facility.

Project Experience

Assistant Project Manager and Authorized Biologist (for Mojave desert tortoise); Revegetation, Weed Management, Special-Status Plant, and Mitigation Activities; Ivanpah Solar Electric Generating System (ISEGS); BrightSource Energy and NRG; San Bernardino County, California; 2007 through present. Ivanpah Solar Electric Generating System (ISEGS) is a 3,600 acre solar electrical generating facility (concentrated solar power) with a combined net capacity of 377 megawatts (MW) located on Bureau of Land Management (BLM) land.

Ms. King is currently the assistant project manager during operations. During construction, she served as lead construction monitor to ensure project compliance with CEQA as well as managing environmental tasks. Onsite task management includes revegetation and restoration, cactus salvage, seed collection, and special-status plant and noxious weed monitoring and management. She was also involved with environmental compliance with mitigation requirements, such as habitat acquisition, unauthorized route closure, and desert tortoise exclusion fence permitting and installation. Ms. King has prepared biological resource sections for special-status plant and wildlife, habitat communities, invasive plant species, for draft Environmental Impact Statement (EIS) and numerous Environmental Assessments (EA) for NEPA compliance. She was also involved with managing additional disturbance calculations to waters of the state for compliance with California Department of Fish and Wildlife (CDFW; formerly California Department of Fish and Game) Streambed Alternation Agreement.

In 2012, Ms. King was permitted by the U.S. Fish and Wildlife Service (USFWS) as a desert tortoise authorized biologist including conducting clearance surveys and handling desert tortoise. Onsite, she has also engaged in various desert tortoise activities such as radio-tracking, transmitter application, clearance surveys, presence/absence surveys, and monitoring. Between 2011 and present, she has logged 5000 hours monitoring and surveying and observed at least 100 tortoises. She conducted USFWS protocol level desert tortoise surveys that were incorporated into a Biological Assessment that was prepared for Section 7 ESA consultation for mitigation requirements for ISEGS site to construct 50 miles of desert tortoise exclusion fence.

Ms. King is the Site-Safety-Coordinator – Construction (SSC-C) which oversees CH2M's health and safety program, including 180 biological monitors during construction.

NEPA Biological Resources Lead; Southern California Edison; San Bernardino County, California; 2017 through present. Ms. King has been leading biological resources NEPA tasks for the replacement of a 15-mile 33 kilovolt (kV) transmission line that spans from Lucerne Valley to Holcomb Valley in San Bernardino County, CA. This includes coordination with lead agency, U.S. Forest Service, in preparation of EA and Biological Assessment/Biological Evaluation. Ms. King was also involved with both the desert tortoise and botanical surveys in support of these documents. This project occurs on two sensitive natural communities, Carbonate Soils and Pebble Plains which provide habitat for several federally listed plant species: Cushenbury oxytheca (*Acanthoscyphus parishhii* var. *goodmaniana*; Federally Endangered [FE]), Cushenbury milkvetch (*Astragalus albens*; FE), Ash-grey paintbrush (*Castilleja cinerea*; federally threatened [FT]), Bear Valley sandwort (*Eremogone ursina*; FT), Parish's daisy (*Erigeron parishii*; FT), Southern mountain wild buckwheat (*Eriogonum kennedyi* var. *austromontanum*; FT), Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*; FE), California taraxacum (*Taraxacum californicum*; FE), and San Bernardino bluegrass (*Poa atropurpurea*; FE). Other listed or sensitive wildlife

species that occur in project vicinity include Mojave desert tortoise (FT and state threatened), Golden Eagle (*Aquilla chrysaetos*), California spotted owl (*Strix occidentalis occidentalis*), and Nelson's bighorn sheep (*Ovis canadensis nelson*).

Project Manager and Biologist; Union Pacific Railroad; Riverside, Imperial, and San Bernardino Counties, California. 2018. Ms. King is project lead for Union Pacific Railroad (UPRR) environmental compliance for issues in southern California. This includes maintenance and emergency responses.

Natural Resources Field Lead; U.S. Army National Training Center and Fort Irwin; U.S. Army; San Bernardino County, California; 2017. Ms. King was field lead for natural resource survey of proposed Multipurpose Range Complex (2,900 acres). The survey focused on eight species of concern: desert tortoise, Mohave ground squirrel (*Xerospermophilus mohavensis*), burrowing owl, Lane Mountain milkvetch (*Astragalus jaegerianus*), Barstow woolly sunflower (*Eriophyllum mohavense*), Clokey's cryptantha (*Cryptantha clokeyi*), desert cymopterus (*Cymopterus deserticola*), and Mojave monkeyflower (*Diplacus [=Mimulus] mohavensis*). This report was used to inform the Environmental Assessment for the proposed project.

Natural Resource Project Manager; Mojave Desert Tortoise, Special-status Plants, and weed management activities; Nellis Air Force Base; Clark County, Nevada. 2017. Ms. King is the natural resources project manager for the Fence to Fence contract implemented between 2016 and 2020 for Nellis Air Force Base (AFB). This includes revisions to the Integrated Natural Resource Management Plan (INRMP), and tasks applying to federally threatened desert tortoise, special-status plants and weeds as the Natural Resource Manager directs.

Authorized Biologist (Mojave Desert tortoise); Edwards Air Force Base; United States Air Force; Rosamund, Los Angeles, California; 2016 – 2017. Ms. King supports natural resource staff as a USFWS approved desert tortoise Authorized biologist.

Designated Biologist, Authorized Biologist (for Mojave Desert tortoise), and Biological Team Lead; Mojave Solar Project; Abengoa Solar; Hinkley, San Bernardino County, California; 2013 - 2016. The 1,800 acre Mojave Solar Project is a solar-thermal electric generating facility (solar trough) with a combined gross electrical output of 280 MW.

Ms. King served as the CEC's lead Designated Biologist which required that she was also permitted as a USFWS Authorized Biologist for desert tortoise. The Designated Biologist acts as the liaison between the CEQA and NEPA agencies and client for compliance with biological resource permits. This required daily interactions with client and agencies. The lead CEQA agency was the CEC followed by the California Department of Fish and Wildlife (CDFW) and the lead NEPA agency was Department of Energy. This included overseeing biological compliance for several species; federally and state threatened Mojave Desert tortoise, state threatened Mojave ground squirrel (*Xerospermophilus mohavensis*), federally and state protected western burrowing owl, and several state protected special-status plants. She also managed and ensured project compliance with other biological resource requirements including invasive weed plan, common raven plan, evaporation pond plan, avian mortality study, and the Biological Resource plan, Biological resource Mitigation Implementation and Monitoring Plan (BRMIMP). She acted as the technical lead for Evaporation Pond Monitoring and Adaptive Management Plan and Bird Monitoring Study (as part of the USFWS Bird and Bat Conservation Strategy) looking at impacts to species protected under the Migratory Bird Treaty Act (MBTA). She also maintained the USFWS MBTA special-purpose utility permit (SPUT) for collecting and managing carcasses and partial remains of birds protected by the MBTA.

During these tasks, she also oversaw a team of 30 biological monitors which requires training on all applicable biological resource compliance plans. Ms. King implemented CH2M's health and safety program as the SSC-C.

Restoration Vegetation Monitoring; Ruby Pipeline; Kinder Morgan (formerly El Paso); Wyoming, Utah, Nevada, and Oregon; 2012. Ruby Pipeline is a 42-inch diameter natural gas pipeline owned and operated by Kinder Morgan. The 680-mile pipeline spans four states; Wyoming, Utah, Nevada, and Oregon. Ms. King was a senior botanist and field lead for vegetation monitoring along Nevada sections of the pipeline right-of-way. She has been involved from the inception including developing project specific protocols, health and safety, conducting vegetation and weed monitoring, and senior review of annual reports.

Special-Status Plant and Vegetation Mapping; Topock; Pacific Gas & Electric (PG&E); Needles, San Bernardino County, California; 2011-2012. Topock Compressor Station is a PG&E operated natural gas compressor station. Performed summer/fall floristic surveys with a focus on potential for special-status plants, indigenous plants, and mature vegetation.

Botanical Resource Survey; Pit River 3, 4, 5; PG&E; Burney and Big Bend, Shasta County, California; 2010. Pit 3, 4, 5 is a hydroelectric system including four dams, four reservoirs, three powerhouses, and other associated features. Combined normal operated capacity is 325 MW. Conducted 2010 botanical resource monitoring for compliance with Federal Energy Regulatory Commission's (FERC) requirements. Pit 3, 4, 5 is located on both private and Shasta Trinity National Forest lands. Ms. King was a co-leader in the botanical surveys of Pit River along Dams 3, 4, 5 which included Lake Britton. Surveys covered approximately 4,000 acres over 37 miles between elevations 1,400 and 2,800 feet. She assisted in preparing the Botanical Resource report (including special-status species and invasive weeds) and the Vegetation Management Strategies for Invasive Weeds report.

Botanical Resource Survey; Alta; Terra-Gen; Tehachapi, Kern County, California; 2010. Terra-Gen operates eleven wind power facilities for a 1,248 MW capacity on approximately 3,000 acres. Ms. King performed spring and summer botanical surveys on the Alta Infill, Alta Phase 2, and Sun Creek project areas between Mojave and Tehachapi. These surveys used the California Native Plant Society (CNPS) and USFWS's 1996 protocols for conducting floristic inventories. During the Infill surveys, she was the field leader and managed crews of 40 field staff. She was also responsible for botanical resource survey report for Alta Infill. She also conducted protocol level botanical surveys for federally and state endangered Bakersfield cactus (*Opuntia basilaris* var. *treleasei*). Reports included vegetation mapping, invasive weed analysis, Joshua tree mapping and occurrences of special-status plants.

Biological Surveys (Special Status Plants and Wildlife, Sensitive Vegetation Communities and Waters of the U.S.); Devers-Palo Verde No. 2 Transmission Line; Southern California Edison; Riverside County, California; 2010 through present. The Southern California Edison (SCE) constructed and operates the 500 kV Devers to Palo Verde No. 2 (DPV2) transmission line. The transmission line is 150 miles long and crosses, BLM and private land. The California Public Utilities Commission (CPUC) is the lead CEQA agency and the BLM is the lead NEPA agency. Ms. King analyzed locations for permanent and temporary construction locations as pertains to state or federally listed plants and wildlife, sensitive vegetation communities, and waters of the U.S. She compiled and prepared technical report of the Devers-Colorado section of DPV2 line including reconnaissance level plant, wildlife, California Desert Native Plant Act (CDNPA), weed, vegetation mapping, and habitat assessments for pre-identified target species. She was also approved by USFWS as a qualified botanist for federally endangered Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*). She also assisted in preparing the project's Coachella Valley Milk-vetch Mitigation and Monitoring Plan, which included protection and salvage guidelines.

Special-Status Plant Survey; Black Rock Energy; CE Obsidian Energy LLC; Salton Sea, Imperial County, California; 2010. Black Rock Energy is a geothermal generating facility with a 159 MW net generating capacity located on 80 acres. Ms. King preformed floristic-level survey focusing on special-status species occurrences for CEQA compliance. This task also included updating vegetation mapping

performed in 2009 due to land use changes. She also prepared sections of the AFC for submittal to the CEC and compliance with CEQA.

Protocol-Level Rare Plant Survey; Trilobite; PG&E; Amboy, California; 2009. The Trilobite solar electric generating project was proposed on 5,300 acres on BLM lands. Ms. King was the crew leader for 40 staff conducting floristic surveys in accordance with the USFWS's 1996 botanical inventories guidelines, CDFW's 2000 guidelines, as well as CNPS's 2001 survey guidelines. These surveys were used for CEQA required AFC preparation for submittal to the CEC. These surveys included rare plants, invasive weed, identify cactus for salvage, and a habitat assessment of the one mile buffer of the project site. She was also responsible for training staff to use and managing data collected on Trimble Global Positioning System (GPS).

Protocol-Level Rare Plant Survey Preparations; Broadwell Solar Energy Generating System; BrightSource Energy; Barstow, California; 2009. The Broadwell solar electric generating project was proposed on 8,600 acres. These surveys Ms. King organized the field effort for this project through developing project instructions, GPS/Global Information System (GIS) protocol, and field schedules.

Reconnaissance-Level Surveys; Renewable Energy Systems (RES); Clark County, Nevada; 2009. Ms. King was involved with the biological constraint analysis of three potential solar facilities (total 300 acres) in the Ivanpah Valley and the Amargosa Valley, Nevada.

Protocol-Level Rare Plant Survey Preparations; Cadiz and Imperial Valley; PPM/Iberderola Energy; Southern California; 2009. The proposed Cadiz solar electric generating project was proposed on 13,300 acres. Ms. King organized the field effort for three rare plant surveys, two in the Cadiz Valley and one in Imperial Valley. This included organizing crews through developing project instructions, GPS/GIS protocol, and field schedules. Due to early special status plant blooming periods, PPM decided to survey in 2010 instead of 2009 and did not hire CH2M to conduct these surveys.

Burrowing Owl Survey and Habitat Assessment; Black Rock Energy; CE Obsidian Energy LLC; Imperial County, California; 2009. In support of the CEQA required AFC, Ms. King assisted in burrowing owl surveys and one mile buffer reconnaissance-level survey.

Special-Status Species Analysis; Hetch Hetchy Water and Power; San Francisco Public Utilities Commission; Multiple Counties in Central & Northern California; 2009. San Francisco Public Utilities Commission initiated an improvement project on the approximately 200 mile water system Right-of-Way (ROW). Prepared the preliminary analysis of special status species for over 200 miles of Right of Way. This project spans from Yosemite National Park to the coastal range, through private and public lands. After California Natural Diversity Database, Forest Service, National Park, USFWS, CDFW and other queries were completed, Ms. King identified species potential to occur with aerial photographs. The resulting species list identified potential of occurrence for over 800 special status species.

Resource Management Plan – Tree Inventory; Travis Air Force Base; United States Air Force; Fairfield, California; 2009. Ms. King conducted initial tree surveys for the Resource Management Plan. This data was used to scope the effort needed to conduct a tree inventory of the base. She also prepared a photographic guide to all the ~350 species present on the base.

Reconnaissance-Level Habitat Assessment for Biological Assessment; California Department of Transportation; Napa County, California; 2009. Ms. King surveyed two bridge expansion projects along State Route (SR) 121 in preparation for the Biological Assessment for Section 7 consultation. This effort involved a constraints analysis for special status plants and wildlife.

Water Quality Sampling; Mare Island; Lennar; Vallejo, California; 2009. Collected groundwater samples through use of various methods and techniques including: micro purge bladder, peristaltic pumping systems, low flow Redi-flow control boxes and Grundflos pumps.

Protocol-Level Rare Plant Surveys; Mormon Mesa Solar Energy Generating System; BrightSource Energy; Overton, Nevada; 2008. BrightSource proposed to build the 800 MW Mormon Mesa solar electric generating facility (concentrated solar power) on 10,000 acres. Ms. King conducted floristic surveys in accordance with USFWS's 1996 botanical inventory guidelines. She was also responsible for managing 40 field staff through developing project instructions, GPS/GIS protocol, schedules, managing crews in the field, analyzing data, and preparing the Rare Plant Report. The requirements for surveying BLM land in Nevada involved mapping barrel cactus for salvage, invasive weed inventory, habitat assessment of the one mile buffer of the site and the rare plant survey. Ms. King was also involved with transmission line and road surveys that access the site.

Protocol-Level Rare Plant Surveys; Ivanpah Solar Energy Generating System; BrightSource Energy; Nipton, San Bernardino County, California; 2007 through 2008. Due to inadequate levels of rain in 2007, the protocol-level rare plant surveys were conducted in both 2007 and 2008. Ms. King served as field lead conducting floristic surveys for incorporation into the AFC, for compliance with CEQA. Surveys were conducted in accordance with the USFWS's 1996 botanical inventories guidelines, CDFW's 2000 guidelines, as well as CNPS's 2001 survey guidelines. Surveys were conducted at 50-foot transect spacing over 3,600 acres on BLM managed lands. In 2007, Ms. King was involved in mapping barrel cactus (*Echinocactus polycephalus* and *Ferocactus cylindraceus*) for salvage, the census of Mojave yucca (*Yucca schidigera*), habitat assessment of the one mile buffer of the project site, and the first comprehensive floristic survey. In 2008, she was a crew lead for 40 staff. This included developing project instructions, GPS/GIS protocol, schedules, analyzing data, and preparing the CEQA required AFC. She was involved with transmission line and road surveys that access the site. She was also involved with the CEC Data Responses regarding botanical, wildlife, invasive weed, barrel cactus, storm water runoff and waters of the U.S. inquiries.

Reconnaissance-Level Surveys; Six Separate Projects; Solar Millennium; California and Nevada; 2008. Preformed six reconnaissance-level surveys on potential solar facility locations to analyze the potential for constraints from special status plants, special status wildlife and waters of the U.S. During each survey, Ms. King worked with botanical and wildlife specialists to analyze the potential species or issues that could affect permitting or construction. Each location had different constraints ranging from a desert dry lake, large drainages (30 feet deep), BLM sensitive communities, migration corridors, restrictions on water rights, etc.

Water Quality Sampling; Beale Air Force Base; United States Air Force; Marysville, California; 2008. Ms. King collected groundwater samples through use of various methods and techniques including: micro purge bladder, peristaltic pumping systems, low flow Redi-flow control boxes and Grundflos pumps.

Reconnaissance-Level Surveys; Seven Separate Projects; PPM/Iberderola Energy; Arizona, New Mexico, Nevada; 2008. Ms. King preformed seven reconnaissance-level surveys for PPM to analyze biological constraints for potential solar facility locations. Biological constraints included special status plants, special status wildlife, and waters of the U.S. During each survey, she worked with a botanical and wildlife specialist to analyze the potential species or issues that could affect permitting or construction. Each location had different constraints ranging from 100 year flood plain, desert wildlife management area, BLM sensitive species, migration corridors, cactus salvage, etc.

Reconnaissance-Level Surveys; Ausra Solar; Nevada; 2008. Ms. King preformed two reconnaissance-level surveys to analyze the potential for constraints from special status plants, special status wildlife and waters of the U.S. on development of solar facilities and respective transmission lines. Ms. King

worked with botanical and wildlife specialists to analyze the potential species or issues that could affect permitting or construction.

Hazardous Debris Survey and Mapping; Santa Susana Field Laboratory; Department of Energy, Boeing, National Aeronautics and Space Administration; Simi Hills, California; 2008 through 2009. According to the CEQA, Department of Toxic Substances Control, CH2M was hired for the environmental investigation and cleanup of chemical contamination at the Santa Susana Field Laboratory. Ms. King was involved with a hazardous waste survey over the 2,850 acre mountainous sandstone terrain. This involved walking transects spaced 50 feet apart and documenting potentially contaminated waste with a Trimble GPS.

Wetland, Rare Plant and Heritage Tree Surveys; Community Reuse Project; Concord Naval Weapons Station; United States Navy; Concord, California; 2007. Due to changing contracts, Ms. King field-verified previously collected data from the Environmental Impact Report (EIR) and Wetland Delineation. This analysis focused on wetlands, vegetation communities and rare plant potential as regards to multiple reuse options being considered by the client. Preformed a heritage tree survey as required by the county and city ordinances.

Wetland Delineation, Wetland Vegetation Monitoring and Construction Monitoring; Geothermal Incorporated; Pacific Gas & Electric; Middletown, California; 2006 through 2008. Ms. King was involved with the five year vegetation monitoring of mitigation wetlands including fieldwork and preparing Wetland Vegetation Monitoring Reports. Fieldwork included percent coverage of vegetation in wetland and upland plots. According to Army Corps of Engineers permit, she also performed and documented an Informal Wetland Delineation.

Botanical, Wetland and Waters of the U.S. Surveys; California Department of Transportation; North and South Bay Area, California; 2006 through 2007. Involved with botanical, wetland and waters of the U.S. fieldwork and document preparation as pertains to California Department of Transportation (Caltrans) projects in the North and South Bay area. Project specific tasks included;

- Jameson Canyon SR 12/29 Interchange Participated in several projects on the Jameson Canyon 12/29 Interchange including fieldwork, data analysis and preparation of the Natural Environmental Study, Biological Assessment, Rare Plant Report, Tree survey, and Wetland Delineation. The tree survey verified and corrected data collected by Caltrans on over 2000 trees along eight miles of SR 12/29. This included an inventory and mapped location of the tree locations within the Right of Way using a Trimble GPS.

- Caldecott Tunnel Hwy 24 Assisted in preparation of the Natural Environmental Study and Tree survey.

- Sonoma Hwy 116 Involvement with the fieldwork and preparation of habitat assessment, Habitat Quality Evaluation, Biological Assessment, and Rare Plant Report.

- Hemet SR 79 Contributed to the Rare Plant Report, habitat assessment, and Wetland Delineation Report.

- Sonoma Hwy 12 Participated in Rare Plant Report and Wetland Delineation verification.

- Stagegulch SR 121 Preformed the Wetland Delineation verification and the 401 and 404 permit applications.

- Duhig SR 121 Involved in the Wetland Delineation, 401 and 404 permit applications.

Rare Plant Survey and Habitat Assessment; Lompoc Wind Energy Project; Acciona Wind Energy USA LLC; Lompoc, Santa Barbara County, California; 2006 Lompoc Wind Energy is a proposed 120 MW output wind farm. Ms. King preformed a species specific rare plant survey along proposed transmission line and wind turbine locations for the federally and state endangered Gaviota Tarplant (*Deinandra increscens* ssp. *villosa*). She also verified habitat suitability for other special status plant species that could not be identified due to the timing of survey.

EXPERIENCE PRIOR TO CH2M

Muscongus Bay Project Coordinator; State of Maine Department of Marine Resources and Quebec Labrador Foundation; Friendship, Knox County, Maine; 2005 Project coordinator in collecting and analyzing maps of animals, plants, and resources in Muscongus Bay as it pertains to user conflict for the Maine State Planning Office - State of Maine Bay Management Study. This plan was later implemented by the State of Maine Department of Marine Resources in March, 2007.

Intern; Atlantic Center for the Environment; Quebec Labrador Foundation; Friendship, Knox County, Maine; 2004 Intern to compile the primary scientific studies on Muscongus Bay and annotated the *Environmental Bibliography of Muscongus Bay.* Ms. King was the primary author when this document was published in 2008.

Wildlife Technician; Bureau of Land Management; Department of the Interior; Arcata, Humboldt County, California; 2003 Wildlife Technician in the King Range and Headwater's Reserve. After training and certification, performed protocol-level corvid surveys for the marbled murrelet (*Brachyramphus marmoratus).* Monitored suitable habitat and did field surveys for the Western Snowy Plover (*Charadris alexandrinus).* Also, collected reproductive data for the Northern Spotted Owl (*Strix occidentalis caurina).*

Wildlife Assistant; University of Auburn, Alabama; Kananaskas Reserve, RB Miller Field Station, Alberta, Canada; 2002 As a wildlife assistant main focus was to collect data on three separate studies for Columbian Ground Squirrels (*Urocitellus columbianus*): effects of failure on reproductive success, mate choice, and spatial memory. Ms. King handled approximately 100 ground squirrels for this effort including placing ear tags and determining status. Also supported other wildlife research on big horned sheep, bats, and bees. This field effort required working in small teams from a remote field station in Canadian Rocky Mountains.

Honors and Awards (CAN employees: Honours and Awards)

Reward and Recognition – Fort Irwin National Training Center
Reward and Recognition – Mojave Solar Project
Reward and Recognition – Kinder Morgan Ruby Pipeline
Reward and Recognition – Kinder Morgan Ruby Pipeline
Reward and Recognition – BrightSource Ivanpah SEGS
Reward and Recognition – BrightSource Ivanpah SEGS
Reward and Recognition – BrightSource Mormon Mesa
Outstanding Senior Leadership Award
Lloyd Swift Foundation Scholarship

Professional Development

40-Hour Basic Wetland Delineation Training, Wetland Training Institute, Sacramento, CA (April 2018)
40-Hour Hazardous Waste Emergency Response and Operations Training (November 2006 through present)

Annual Desert Tortoise Symposium, Desert Tortoise Council, (February 2013 through present)
Desert Tortoise Council Handling Workshop (November 2010)
Desert Tortoise Training, Designated Biologist, Mercy Vaughn (March 2011)
Intermediate GIS/GPS Trimble Training (August 2006)
Site Safety Coordinator – Construction (February 2011)
Site Safety Coordinator – Hazardous Waste (March 2018)
Site Safety Coordinator - Initial (January 2008)

Publications and Presentations

King, M., and M. Walsh. 2008. *Environmental Bibliography of Muscongus Bay.* Quebec Labrador Foundation, Atlantic Center for the Environment. Ipswich, MA. Accessed at: http://www.qlf.org/publication_files/MBP_Bibliogaphy_%2008.pdf

Supplemental Information

Years Experience Prior to CH2M HILL: 3

CH2M HILL Hire Date: June 5, 2006 and rehired January 31, 2011

700 hours of sea-time accrued between 2012 and 2018 in Alaska's inside passage near Ketchikan

Employment History

Garcia and Associates (GANDA), consulting biologist, March 1, 2010-January 30, 2011

CH2M HILL, consulting biologist, June 5, 2006-December 31, 2009

Quebec Labrador Foundation, project coordinator, June 2004-December 2005

Bureau of Land Management, wildlife field technician, 2003

University of Alabama, Auburn, wildlife field technician, 2002

Last Employee Update 05/04/2018

Attachment 3.3
Cultural Resource Staff Resume

Gloriella Cardenas, M.A., RPA

Cultural Resources Specialist

Jacobs Engineering Group Santa Ana, California

Education

M.A., Anthropology, California State University, Fullerton, 2005
B.A., Anthropology, California State University, Los Angeles, 1999

Professional Registrations

Register of Professional Archaeologists (2005, No. 15777)

Riverside County Cultural Register (2007, No. 158)

Distinguishing Qualifications

- 15 years of experience conducting archaeological investigations, with particular expertise in the American Southwest
- Meets Secretary of Interior Professional Qualification Standards (36CFR61)
- Experienced in the National Environmental Policy Act (NEPA) and California Environmental Quality ACT analyses (CEQA)
- Previously Approved Cultural Resources Specialist (CRS) with the California Energy Commission
- Riverside County Cultural Register (2007, No. 158)

Relevant Experience

Ms. Cardenas has over 15 years of archaeological experience. She completed her Masters degree in Anthropology at California State University, Fullerton with an archaeological thesis dealing with Southern California prehistoric architecture and the use of household space. Ms. Cardenas has 11 years of experience specifically in cultural resource management with investigations in support of Section 106 of the National Historic Preservation Act, National Environmental Policy Act, and California Environmental Quality Act. Ms. Cardenas has conducted projects throughout the American Southwest which have involved renewable energies (solar and wind), gas and electric, utilities, private developers, and military installations in cooperation with agencies such as Bureau of Land Management, California Energy Commission, US Army Corps of Engineers, Unites States Forest Service, State Historic Preservation Office, Tribe Historic Preservation Office, National Aeronautics and Space Administration, US Air Force, US Army, Federal Emergency Management Agency, and the US Department of Defence. Archaeological investigations have been conducted in Florida, Georgia, Oklahoma, Texas, New Mexico, Nevada, Arizona, Colorado, and California. Ms. Cardenas meets the Secretary of the Interior's Standards for Qualifications for Archaeologists for Principal Investigator.

Jacobs Engineering Group Santa Ana, California

Professional Positions Held

Cultural Resources Specialist, 2008- Present
Project Archaeologist, 2006-2008
Crew Chief, 2005-2006
Research Assistant, 2004-2005
California State, Fullerton, Laboratory Assistant, 2003-2004
Naval Outlying Field San Nicolas Island, Intern and Field Technician, 1999-2000

Project Experience

Fort Irwin Directorate of Public Works (DPW), Environmental Division, Fort Irwin, California. Cultural Resources Specialist (CRS) for the Multipurpose Range Complex Project. Responsibilities included literature searches both at the appropriate CHRIS center and DPW's cultural database, coordination and weekly reports to the Post Archaeologist, field directed the pedestrian survey of 3,000 acres, documentation, DPR forms, evaluations and authoring the technical report. Work was begun in March 2017 and is ongoing.

Black Rascal Creek Flood Control Project, Merced County, California. Lead Archaeologist and author for the cultural resources inventory for the Project. Work was conducted in compliance with CEQA, PRC Chapter 2.6, Section 21083.2 and 21084.1, and the California Code of Regulations (CCR) Title 14, Chapter 3, Article 5, Section 15064.5 to assess the potential to affect historical resources and historic properties respectively. Work was conducted in January through March 2017.

Mission Rock Energy Center, Ventura County, CA. Archaeologist for the pedestrian survey for cultural resources for the first phase of work and archaeologist and safety coordinator for addendum survey for historic district study of the project vicinity. Duties included contributions to final report. Work was conducted from August through October in 2015 and January through March in 2017.

Summit Wind Repowering Project, Alameda County, California. Lead Archaeologist and author for the cultural resources inventory for the Project. Work was conducted in compliance with Section 5024.1 of the California Public Resources Code (PRC) and Section 106 of the National Historic Preservation Act (NHPA) to assess the potential to affect historical resources and historic properties respectively. Work was conducted from August 2016 through March 2017.

Class III Cultural Resources Inventory Report for Multiple Threat Site Expansion North Range, Nevada Test and Training Range (NTTR), Nye County, Nevada. Lead Archaeologist conducting an assessment of potential effects to historic properties as a result of this undertaking is required in compliance with Section 106 of the National Historic Preservation Act (NHPA). Additionally, Department of Defense Instruction 4715.16 and Air Force Instructions 32-7065, required the assessment of impacts of major actions, such as construction of the proposed improvements for the Project, on cultural resources before the commencement of those actions. Work was conducted from August through October 2016.

Union Pacific Railroad, Valley, Fresno Subdivision (California) and Prime Point (Texas) Permitting Projects. Cultural resources specialist responsible for cultural surveys and technical memorandums for various maintenance and expansion projects. Work was conducted in May and July 2016.

AES-Southland System Repowering Application for Certification. Cultural Lead for three projects, Huntington Beach Generating Station, Redondo Beach Generating Station and Alamitos Generating Station. Lead was responsible for archaeological assessment, pedestrian survey, and report of findings in support of CEQA, PRC Chapter 2.6, Section 21083.2 and 21084.1, and the California Code of Regulations (CCR) Title 14, Chapter 3, Article 5, Section 15064.5, and author for cultural reports for the Application for Certification with the California Energy Commission. Original surveys was conducted in September 2011 and additional work on project expansions took place through July 2016. Ms. Cardenas also authored the Cultural Resources Monitoring and Mitigation Plan. Work was restarted for the construction phase of work in January 2017 and is ongoing.

Fort Irwin Directorate of Public Works, Environmental Division, Fort Irwin, California. Various projects in support of Environmental Assessments. Cultural Resources Specialist responsible for conducting cultural resources assessments to address potential impacts to historic properties as a result of construction and operation of the proposed projects in compliance with Section 106 of the National Historic Preservation Act, additionally, army Regulation 200-1 required the assessment of impacts of major actions on cultural resources before the commencement of those actions. Work began in November 2015 and is ongoing.

Confidential Client. Pipeline Safety Enhancement Plan Project, throughout various counties in California. On call archaeologist for various projects spanning from Imperial and Riverside Counties in Southern California through San Luis Obispo County in Central California. Work to date has included literature searches, Native American consultation, pedestrian surveys, Phase II archaeological testing, cultural resources monitoring during construction, and report writing. Work began in May 2013 and various phases of work have continued to present.

Sacramento Regional County Sanitation District. South Sacramento County Agriculture and Habitat Lands Recycled Water Project. Lead Archaeologist and author for the cultural resources inventory for the Project. Work was conducted in compliance with Section 5024.1 of the California Public Resources Code (PRC) and Section 106 of the National Historic Preservation Act (NHPA) to assess the potential to affect historical resources and historic properties respectively. Work was conducted from May through September 2015.

Siskiyou Telephone. Cultural Resources Specialist responsible for cultural resources assessments for various Telecommunication Projects in Siskiyou County, California for the upgrade of telephone and broadband services to the residents near Happy Camp, California. Portions of the projects were within the United States Forest Service land and therefore were federal undertakings and work done was in compliance with the National Environmental Policy Act and Section 106 of the national Historic Preservation Act. The projects worked to date are: Siskiyou Telephone Improvements Project, conducted in March and April of 2013; Siskiyou Telephone Benjamin Creek to Clear Creek (Milepost [MP] 38.4 to 32.5) Telecommunications Project, work was conducted in May through June 2014; Siskiyou Telephone Clear Creek to Ukonom Mountain (Milepost [MP] 32.41 to 24.00) Project, work conducted in May through June 2014; Siskiyou Telephone Ukonom Mountain to Somes Bar Exchange (Milepost [MP] 24.00 to 14.36) Project, work was conducted from May through August 2014; Siskiyou Telephone T-Bar to Exchange Area Boundary (MP 12.15 to 14.36) Project, work was conducted from May - October 2014; and Siskiyou Telephone Pine B, Highway 3 Telecommunications Project, conducted in July – August 2015; Ida to Crystal/Kellems to Kidder Project started in March 2017 and is ongoing; and Horse Creek to Walker Creek started

in March 2017 and is ongoing. Environmental Impact Reports are in progress and work is ongoing.

Columbia Gulf Transmission Company. Site 7647 Project, Catlettsburg, Boyd County, Kentucky. Cultural Resources Specialist responsible for pedestrian survey, shovel test pits (testing) and technical report per the Kentucky Office of State Archaeology guidelines for the Kentucky State Historic Preservation Office. Work was conducted in July 2015.

Union Pacific Railroad. Albert Lea Subdivision Project, St. Paul, Minnesota and Ellendale Project, Ellendale Minnesota. Lead Archaeologist responsible for literature search with the Minnesota State Historic Preservation Office, pedestrian survey and report for railroad upgrades. Work was conducted in May 2015 and September 2015.

Fort Worth Transportation Authority. TEX Rail Corridor New Equipment Maintenance Facility Project. Lead Archaeologist responsible for cultural resources survey and addendum technical report for the Federal Transit Administration in support of with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470f), Executive Order 11593 on the Protection and Enhancement of the Cultural Environment, and the Texas Administrative Code (Sections 191.002, 191.051 and 191.09 through 191.094) that regulate the potential for adverse effects to historic and archeological resources. Work was conducted in April and May 2015.

Fort Irwin Directorate of Public Works, Environmental Division. Flight Landing Strip Project. Cultural Resources Specialist responsible for cultural resources monitoring of ground disturbing activities and oversight of cultural resource monitors in support of the Integrated Cultural Resources Management Plan for Fort Irwin, California. Work was conducted from December 2014 - March 2015.

Fort Irwin Directorate of Public Works, Environmental Division. W46 and W47 Fire Flow Improvement Project, San Bernardino County, California. Cultural Resources Specialist responsible for conducting a cultural resources assessment to address potential impacts to historic properties as a result of construction and operation of the proposed project in compliance with Section 106 of the National Historic Preservation Act, additionally, army Regulation 200-1 required the assessment of impacts of major actions, such as construction of a water pipeline, on cultural resources before the commencement of those actions. Work was conducted from September 2014 - February 2015.

Rising Tree Wind Farm, LLC., Rising Tree Wind and Energy Project, Kern County, California. Cultural Resources Specialist involved in compliance with the requirements outlined in Mitigation Measure 4.5-1 of the Environmental Impact Report regulated by the Kern County Planning and Community Development Department. The project consists of a plan to construct, operate, and decommission the up to 100-megawatt Project in Kern County, California. Work was conducted from June 2014 – September 2014.

U.S. Army Reserve 63d Regional Support Command. Fresno Chandler Executive Airport Project, Fresno, California. Cultural Resources Specialist responsible for conducting an environmental review to specifically address potential impacts to historic properties for the acquisition of two parcels of land. Work was conducted in April 2013.

Abengoa Solar Inc., Mojave Solar Project. Cultural Resources Specialist responsible for implementing and maintaining a dynamic monitoring program during construction, in support

of the Cultural Resources Monitoring and Mitigation Plan, the California Energy Commission's Conditions of Certification, CUL-1 through CUL-7, and the State Historic Preservation Office's stipulations regarding a Determination of No Adverse Effects. Work conducted from April 2013 – September 2015.

Fort Irwin Directorate of Public Works, Environmental Division. Bicycle Lake Army Airfield Pipeline Project. Conducted a cultural resources assessment to address potential impacts to historic properties for the Fort Irwin pipeline project Environmental Assessment, in support of Section 106 of the National Historic Preservation Act. Work was conducted from April – June 2013.

Ivanpah Solar Generating Station, San Bernardino County, CA. Ms. Cardenas participated in additional field studies of several locations around the Ivanpah SEGS project area, including pedestrian survey and site recordation in September 2008. Approved as an Alternate Cultural Resources Specialist (see the October 2010 Monthly Compliance Report). Co-authored the Cultural Resources Monitoring and Mitigation Plan submitted to the California Energy Commission and BLM in November 2010. Various surveys for Tortoise Pen additions were conducted from September 2008 through March 2013. Fencing of I-40 was conducted on September 2016 in response to mitigation measures and monitoring for cultural resources was conducted, that phase of work came to completion with submittal of the technical report in December 2016.

Union Pacific Railroad Bridge Replacements Projects. Cultural Resources Specialist responsible for literature search, Native American Heritage Commission and tribal consultation for various bridge projects throughout California that have included the following: ME 305.6 Valley Subdivision, Butte Hamlin Slough Bridge, SBAR 291.33 Narlon Bridge, Riverside Industrial Lead Relocation, Bridge 248.93 Valley Subdivision, Bridge 256.10 Valley Subdivision, and Beverly Hills Land Corporation. Work was conducted from October 2011 – April 2013.

Federal Emergency Management Agency (FEMA) for the Hazard Mitigation Grant Program for the Flood Control Projects in Fortuna in Humboldt County and Woodside in San Diego County. Cultural Resources Lead responsible for providing technical assistance and support to FEMA for project reviews for Environmental and Historic Preservation compliance with federal regulations for two Hazard Mitigation Grant Program projects submitted by the State of California. Work was conducted from December 2012 - June 2013.

Federal Emergency Management Agency for the Hazard Mitigation Grant Program East Bay Hills Wildfire Environmental Impact Statement. Conducted a historic properties assessment of 2,059 acres for the federally financed program projects in the East Bay Hills, Alameda and Contra Costa Counties, California. The investigation was in support of Section 106 of the National Historic Preservation Act and the National Environmental Policy Act. Role was of field director and preparation of report. Work was conducted from June 2012 - April 2013.

Colorado Army National Guard – Craig National Guard Training Site. Conducted a Class I and III study in compliance with Section 106 of the National Historic Preservation Act for the Remedial Investigation work. Investigations were conducted under the Colorado State BLM Cultural Resource Use Permit No. C-75484 from the BLM Little Snake Field Office. Prepared the technical report with work conducted in July-August 2012.

Fort Irwin Directorate of Public Works – Fort Irwin Wastewater Treatment Plant Percolation Pond Project. Conducted a cultural resources assessment to address potential impacts to historic properties for the Fort Irwin Percolation Pond No. 4 Environmental Assessment, in support of Section 106 of the National Historic Preservation Act. Work was conducted in April – June 2012.

National Aeronautics and Space Administration (NASA), Santa Susana Field Laboratory, Areas I and II, Ventura County, California. Cultural Lead responsible for survey, evaluations, the cultural section of the Environmental Impact Statement in support of NEPA, and the technical report. Work was conducted from July 2011 – August 2012.

Federal Emergency Management Agency for the City of Moreno Valley, San Timoteo Foothill Neighborhood Flood Protection Project. Cultural Lead of an archaeological investigation and consultation in support of Section 106. Work was conducted from September 2011 – March 2012.

CalEnergy Black Rock 5 and 6 Geothermal Project, Imperial County, California. Cultural Resources Lead responsible for archaeological assessment, pedestrian survey, cultural documents and report of findings in support of CEQA, PRC Chapter 2.6, Section 21083.2 and 21084.1, and the California Code of Regulations (CCR) Title 14, Chapter 3, Article 5, Section 15064.5, and the Application for Certification with the California Energy Commission. Work was conducted from July – August 2011.

Los Angeles World Airports, Los Angeles International Airport, California. Cultural Resources Lead responsible for the monitoring construction activities and personnel for the modernization activities of Taxilane S and Bradley West projects. Author of technical report. Work was conducted from October 2010 – August 2011.

First Wind, LLC, Painted Hills IV Project, Riverside County, California. Field Director responsible for a cultural resources survey of 400 acres in support of CEQA and the County of Riverside's General Plan, for a proposed wind turbine facility on private land. Responsibilities included being permitted with the County of Riverside, leading the intense pedestrian survey, data management and authoring the technical report. Work was conducted in May – August 2011

Solar Reserve, LLC, Rice Solar Energy Project, Riverside County, California. Proposed as the Cultural Resources Specialist and authored the Cultural Resources Monitoring and Mitigation Plan.

TerraGen Power, LLC, Alta Infill II Wind Energy Project, Kern County, California. Field Director responsible for a Class III cultural resources survey of 810 acres for a proposed wind turbine facility and testing and evaluation of a prehistoric lithic site. Responsibilities included producing a cultural survey report and testing report. Work was conducted from April - June, 2011.

TerraGen Power, LLC, Morgan Hills Wind Energy Project, Kern County, California. Field Director responsible for a Class III cultural resources survey of 1,200 acres. This cultural resources inventory was conducted in compliance with the California Environmental Quality Act (CEQA) as part of an application to Kern County for a Conditional Use permit to construct and operate the Morgan Hills project. Work was done in April and May of 2011.

Contra Costa County Generating Station, LLC, Oakley Generating Station Project, Contra Costa County, California. Proposed as a Cultural Resources Specialist Alternate and co-authored the Cultural Resources Monitoring and Mitigation Plan submitted to the California Energy Commission. Work was done in January 2011.

TerraGen Power, LLC, Loma Verde Solar Energy Park, Riverside County, California. Field Director responsible for a Class III cultural resources survey of 1,000 acres for a proposed PV solar energy generation field. Property was comprised of both private and public lands, the latter is administered by the BLM. Work was conducted in December 2010.

NextEra Energy Resources, LLC, North Sky River Wind Project, Kern County, California. Cultural Resources Specialist involved in a Class III cultural resources survey on public lands administered by the BLM under Use Permit No. CA-10-31. Responsibilities for this project included analysis of previous studies, systematic pedestrian survey, documented new discoveries, data management, and contributions to the technical report. Work was conducted between October and November 2010.

Mariposa Energy Project, Alameda County, California. Ms. Cardenas was the Cultural Resources Monitor and co-authored the Cultural Resources Monitoring and Mitigation Plan submitted to the California Energy Commission. Work was done in January 2011.

New River Siphon Project for the All American Canal, Calexico, California. Conducted a cultural resources archival literature search for historic and archaeological resources with the CHRIS center. Work entailed an analysis of findings, evaluation of a bridge for the NRHP listing and a "critical issues" report. Work was done in January 2011.

Turlock Irrigation District, Almond 2 Power Plant, Stanislaus County, California. Cultural Resources Specialist, Alternate and co-authored the Cultural Resources Monitoring and Mitigation Plan submitted to the California Energy Commission. Work was done in January 2011.

Cedar Point Windfarm, Lincoln and Washington Counties, Colorado. A literature search was conducted with the Colorado Historical Society Office of Archaeology and Historic Preservation and the report of findings was written in December 2010.

SNG Suwannee Pipeline Project, Alabama, Georgia and Florida. Ms Cardenas conducted a cultural resources archival literature search for historic and archaeological resources with the cultural resources repositories in each state. Work entailed an analysis of findings and a "critical issues" report. Work was done in November 2010.

Southern California Edison (SCE), Tehachapi Renewable Transmission Project (TRTP) – Segments 4-11 Compliance Monitoring. Environmental Scientist involved in photo documentation of transmission line to support post construction restoration. The TRTP includes construction of new and upgrade of 173 miles of transmission lines, construction of one new substation, major upgrade of one existing substation and upgrade of other ancillary facilities. Work was done from July to October 2010.

Southern California Edison (SCE), Devers Palo Verde No. 2 Transmission Line Project

Environmental Scientist involved in environmental compliance support and development in mitigation plans in support of CPUC requirement. Ms. Cardenas's role on this project involved authoring plans to address CPUC traffic, construction specifications, and cultural resources in response to regulatory requirements, as well as contributions in research for biological restoration, Storm Water Pollution Prevention Plans, construction scheduling and agencies' responsibilities. Work was done from April to July 2010

Phase II Cultural Resources Evaluation of 30 Sites at Edwards, Air Force Base, California. Fiscal Years 2009 and 2010. Ms Cardenas was Principal Archaeologist and Director of Field and Laboratory, responsible for research design and evaluation of 30 sites consisting of historic refuse deposits, homesteads, and prehistoric camp and lithic deposits, in the Western Mojave Desert. Other project duties included setting up the laboratory facilities, creating project specific documentation forms, the implementation of procedures and training of 6 technicians in lab as well as field methods, site updates (DPR forms) for 30 sites, and report writing. The project was conducted in support of Section 106 and 110 of the National Historic Preservation Act of 1966, as amended, and Air Force Instruction 32-7065, Cultural Resource Management. JT3/CH2M HILL conducted the evaluation under Letter of Technical Direction 1B0220000-0001, Environmental Management Support, as part of contract F042650-01-C-7218, under the command of the Base Historic Preservation Office. Work was conducted from February 2009 to March 2010.

2009-K-PLT42 Phase II Cultural Resources Evaluation of Site EAFB-3897, Air Force Plant 42, Los Angeles County, California. FY09. Project and Field Director for the test excavation and evaluation of a Gypsum Period temporary camp site. Responsibilities included, but were not limited to, coordination with Air Force Plant 42 security personnel, training of field technicians, creation and implementation of procedures for project design and methods, and writing the final report of findings. The project was conducted in support of Section 106 and 110 of the National Historic Preservation Act of 1966, as amended, and Air Force Instruction 32-7065, Cultural Resource Management. JT3/CH2M HILL conducted the evaluation under Letter of Technical Direction 1B0220000-0001, Environmental Management Support, as part of contract F042650-01-C-7218. Work was conducted from February through March 2009.

Archaeological Inventory FY09 2009-D, Edwards AFB, California.

Archaeologist involved in Phase I investigation of 2500 Acres on EAFB, in support of the continued base-wide inventory. Work was conducted in accordance with the Integrated Cultural Resources Management Plan, under the command of the Base Historic Preservation Office. Work was conducted from February 2009 to March 2010.

2009-C Protection of Historic Properties, Edwards AFB, California.

Archaeologist involved in support of site preservation to assist the Air Force in complying with the provisions of the National Historic Preservation Act, as amended; the Archaeological Resource Protection Act; Native American Graves Protection and Repatriation Act; American Indian Religious Freedom Act; and Air Force Instruction 32-7065, Cultural Resource Management. Work was conducted for the Site Preservation Program for Fiscal Year 2009, as specified in Letter of Technical Direction 1B022000-0001-R2, Environmental Management Support, as part of Contract F42650-01-C-7218. Work was conducted from February 2009 to March 2010.

Old Ridge Route Project, in the Angeles National Forest, CA. Client Federal High Way Administration. Archaeologist involved in the monitoring of the emergency repair of Federally Owned Roads upon the NHPA listed Old Ridge Route, 8N04. Work was conducted from July 2008 to September 2008

Modesto Irrigation District, 49 MW Power Plant Project, Modesto, CA. Client: Modesto Irrigation District. Archaeologist responsible for a Phase I pedestrian survey for a 49-megawatt power plant, a cultural inventory search, and contributions to the report. Work was conducted in August 2008.

Iberdrola Renewables Biological and Cultural Assessment Support Project. Client: Iberdrola Renewables. Ms. Cardenas was responsible for conducting cultural inventories, fatal flaw reports, and field reconnaissance studies. 10 sites were evaluated for solar power plants for possible acquisitions in California, Nevada, Arizona and New Mexico Five study areas of this overall project are located in Arizona; two are in Maricopa County, two are in La Paz County, and one project is located partially in La Paz and Yuma Counties. Project acreages range from 5,800 acres to 35,000 acres. Three of these study areas are located in California; two areas are in San Bernardino County and one is located in Imperial County.

Project acreages range from 13,000 to 29,000. Three of these study areas are located in Nevada; two are in Nye County and one is located in Clark County. Project acreages range from 7,500 to 12,000. The remaining study area is located in Hidalgo County, New Mexico. Total acreage of this project is 25,000. Work was conducted in July through September of 2008.

Experience Prior to Jacobs

Chocolate Mountains Aerial Gunnery Range, Seal Weapons and Tactics Areas 4 and 5, Imperial and Riverside Counties, California. Client: U.S. Navy, San Diego, CA. January 2008 to April 2008. Archaeologist during a Phase I pedestrian survey of 2 areas encompassing 2,200 acres within the Naval Special Warfare Desert Training Facility. Duties included recordation of transects, GPS, field notes and documentation of discoveries, photography, DPR forms, and report writing in accordance to Section 106 guidelines.

Noble Windpark Project, Great Plains, Texas. Client: Noble Environmental Power.

Archaeologist during a Phase I survey of a transmission right-of-way the length of which was approximately 8 miles. Other duties included report writing in accordance with the National Historic Preservation Act, Section 106 guidelines.

Noble Mitchell County Wind Farm, Mitchell, Coke, and Sterling Counties, Texas. Client: Noble Environmental Power. Researcher responsible for conducting a cultural inventory search with the Texas Historical Commission and the National Register of Historic Places. Duties also included producing the report of findings.

Mid County Parkway, Riverside County, CA. Client: Caltrans District 8. November 16, 2007 to January 4, 2008. Archaeologist and Field Supervisor for a Phase II investigation of 9 Prehistoric sites CA-RIV-1512, 1650, 6989, and 8712, as well as 33-16678, 33-16679, 33-16680, 33-16685, and 33-16687. The nine sites investigated were comprised of milling stations in granite outcrops with surface artifacts, quarries, habitation, and multi-used sites. Evaluations are pending for potential of eligibility for the National Register of Historic Places and the California Register of Historical Resources. Responsibilities changed with the needs of the project and were site specific, but everyday duties included crew management, field direction, data management, documentation, collection and transportation of artifacts, analysis, evaluation of site boundaries and placement of STPs, surface collection grids, test units, surface scrape units, and the write-up of weekly reports, analysis and the report write up for ground stone artifacts.

Planning Area 6, Neighborhood 4A, Phase 2 Residential, Irvine, CA. Client: The Irvine Community Development Company (ICDC). January 1, 2007 – November 16, 2007. Project Archaeologist responsible for archaeological discoveries found during rough grade activities. Duties included, but were not limited to hiring technicians, coordination, site inspections, scheduling, managing documentation and finds, GIS, field direction in securing finds/sites, testing, excavation, collection, laboratory processing and curation of artifacts, weekly discoveries report to Army Corps of Engineers, and technical report writing. Data recovery sites were CA-Ora-244, locus G with twenty three 2-by-2 meter units and PA6-15 with six 2-by-2 meter units. All units at site 15 contained thermal features.

Planning Area 40, Irvine, CA. Client: The Irvine Community Development Company (ICDC).

May 2007. Project archaeologist for on call services for site inspection, resource impact analysis and field monitoring. A complete record search at a CHRIS information center was conducted using the following resources: Historical USGS and other historical maps, National Register of Historic Places, California Register of Historical Resources, California Inventory of Historical Resources, California State Historical landmarks, Directory of Properties in the Historical Resources Inventory, and quad maps showing survey footprints, sites, and isolates.

The Irvine Company, Portola Springs (Planning Area 6 Phase II) Data Recovery Irvine, CA. Client: The Irvine Community Development Company (ICDC). December 2005 to June 2007. Project Archaeologist responsible for the supervision of 6 lab technicians, training new personnel in artifact analysis, database quality control, ground stone analysis and its corresponding chapter for the report, data management, photo archiving, further contributions to the technical report included field, wet screen and analysis methods, and an appendix for the site records which were submitted to the CHRIS information center.

The Irvine Company, Portola Springs (Planning Area 6 Phase II) Data Recovery

Irvine, CA. Client: The Irvine Community Development Company (ICDC). November 2005 to December 2006 Senior Crew Chief responsible for a 13 month long Phase III investigation. Field responsibilities included, but were not limited to: keeping detailed data logs, photography, site documentation, equipment, directing a 20 person crew which included 2 assistant crew chiefs, scheduling, macrobotanical sampling and floatation, pollen sampling, wet screen station, artifact collections, transporting archaeological materials, maintenance of field supplies, purchasing, and general coordination. Sites investigated were: CA-Ora-244, 650, 762, 1297, 1311, 1588, and 1590 with a combined total of four hundred and forty three 2-by-2 meter units.

The Irvine Company, Portola Springs, Center Village and Lomas Valley Phase II Irvine, CA. Client: The Irvine Community Development Company (ICDC). January 2005 to September 2005. Crew Chief responsible for Phase II and III investigations, field supervisions, productivity logs, photography, site documentation, equipment, macrobotanical sampling and floating, wet screen station, artifact collections, pollen sampling, transporting archaeological materials, maintenance of field supplies, purchasing, and general coordination. Duties extended to the laboratory post excavation where responsibilities included supervising and training technicians, analysis, quality assessment, cataloging, DPR forms, scheduling maintenance of equipment, and archiving all archaeological data. All sites were tested to assess their significance per CEQA (California Environmental Quality Act) Guidelines and CRHR (California Register of Historical Resources). Sites investigated were PA6-01, 02, 03, 05, 06, 07, 08, 09, and 10.

Marblehead Coastal Development, in San Clemente, CA. Client: SunCal Company. January 2005 to April 2005. Paleontological and cultural monitor during rough grading activities, mapping, photography, GPS, scheduled and supervised other cultural and paleontological monitors

Pelican Hill in Newport Beach, CA. Client: The Irvine Company. September 2005 to November 2005. Field supervisor for rough grade activities. Duties included coordination with contractors, scheduling of paleontological and cultural monitors, and site inspections and assessment of discoveries.

The Irvine Company, Portola Springs, Center Village and Lomas Valley Phase I- Irvine, CA. Client: The Irvine Community Development Company (ICDC). June 2004 to Septmeber 2005. Crew chief responsible for providing cultural resource monitoring and evaluation services for a large-scale development involving many previously recorded archaeological sites. All sites were tested to assess their significance per CEQA (California Environmental Quality Act) Guidelines and CRHR (California Register of Historical Resources). During Phase II and III investigations, field responsibilities included technician training and supervision, running field excavations and wet screen stations, macrobotanical sampling and floating, as well as lab analysis and management. Ground stone and lithic artifacts were analyzed for use and prepared for residue analysis

County Sanitation Districts of Los Angeles County, Lancaster Water Reclamation Plant Expansion Project. Client: Los Angeles County Sanitation Districts Nos. 14 and 20. August 2005. Crew chief for Phase I and II investigations, responsible for all pre-field preparations and equipment maintenance. Phase II was conducted on three sites discovered during the Phase I pedestrian survey. Excavation responsibilities included site documentation and mapping, surface collection, photography, transporting of data, materials and crew, supervision of field technicians, and collecting specimens for sampling. Laboratory responsibilities included technician supervision, residue analysis preparations, lithic and ground stone analysis, and macrobotanical sampling and floatation.

El Dorado County Department of Transportation, California Tahoe Conservancy, Lake Tahoe Blvd Lane Reduction & Bike Trial Project, South Lake Tahoe, CA. Client: El Dorado County Department of Transportation. July 2005. Researcher responsible for archaeological documentation and organization. Researched historic and prehistoric archaeological sites including prehistoric camps and bedrock mortar sites, and conducted record searches for the

cultural inventory in the project area. A write up of the literature search was produced and submitted in the final report.

Planning area 18 in Irvine, California. Client: The Irvine Community Development Company. September 2005 Crew chief responsible for conducting ten sixty meter trench excavations for Phase II testing. Conducted ground stone and lithic analysis of materials recovered during trenching as well as from previous pedestrian surveys.

Watkins House Historical Evaluation, University of California, Riverside. Client: UC, Riverside. July 2005. Research assistant to the historical archaeologist and was responsible for recording existing room dimensions, including storage rooms, vestibules, offices, chapel, halls, and furnishings. Also recorded were the modern modifications, room elements, and original components of the Watkins house. Responsibilities included photo documentation, and historical research. Contributions were included in the final report.

Shady Canyon Development Project, Irvine, CA. Client: The Irvine Community Development Company. September 2004 to December 2004. Lab technician responsible for floating macrobotanical samples, data entry, archiving and accessioning archaeological collection from sites CA-ORA-383, 730, 732, 733, 806, 1420b, 1422, 1423, 1576, 1582, 1584, 1585, 1586, and 1587

CA-ORA-1589, Irvine, California. Client: The Irvine Community Development Company (ICDC). July 2004 to August 2004. Crew member in a Phase III data recovery of a prehistoric site consisting of thirteen two by two meter units, excavated each in quad units. Responsibilities included producing detailed level forms, soil samples, wall profiling, floating macrobotanical samples, running the wet screen station, data entry, artifact analysis in lab as well as preparing documents and other materials from the project into archival formats.

Espana, CA-RIV-7458, Indio, CA. Client: Regency Homes. August 2004. Crew member of a Phase II investigation of a prehistoric Cahuilla site. Site was surveyed and surface materials were documented prior to beginning excavation. Responsible for training field technicians in excavation, documentation, extracting soil samples, and producing wall profiles, as well as excavating three one by three meter units.

Professional Organizations/Affiliations

Society for American Archaeology
Society for California Archaeology

Professional Development

CEQA Workshop November 2007

Section 106 Essentials Workshop September 2011

Field Lead and Safety Training June 2012

10-Hour OSHA Training September 2010

Languages

English and Spanish

Jacobs Engineering Group Santa Ana, California

Presentations

California State University, Fullerton 23th Annual Anthropology Symposium 2003: A Chronological Synthesis of Southern California

SAA 2007 Conference: Site Structure and Function of Hunter Gatherer Communities of the Tomato Springs Region: A Look at Ground Stone Artifacts

Employment History

Archaeologist May 2008 to June 2008 Applied Biology

Duties: Archaeologist responsible for conducting 7 intense pedestrian surveys in Riverside County, California for transmission lines and telecommunications projects.

Archaeologist January 2008 to April 2008 Ecology and Environment, Inc.

Duties: archaeologists filling various capacities in Phase I investigations as well as conducting record searches, writing fatal flaw reports, and technical reports in accordance with National Historic Preservation Act, Section 106 guidelines.

Archaeologist November 2007 to January 2008 LSA Associates, Inc.

Duties: Field supervisor for projects in compliance with CEQA, 36 Code of Federal Regulations and Section 106 guidelines. Responsibilities included but were not limited to, supervision and directing of crew, artifact collection, creating and managing documentation, GPS, artifact analysis, scheduling, and report writing.

Archaeologist, July 2004 to November 2007 Stantec Consulting, Inc. Irvine, California

Project Archaeologist, December 2006 to November 2007

Director of archaeological investigations that included, but were not limited to, survey, construction monitoring, testing of two prehistoric sites and data recovery of 9 Historic Properties under the jurisdiction of the Unites States Army Corps of Engineers. Responsibilities included conducting cultural inventory searches, producing research designs, artifact analysis, GIS, coordination with Native American consultants and development contractors, scheduling staff, managing documentation (digital and hardcopy), producing 23 DPR site records updates, and report writing in accordance with CEQA and ARMR guidelines.

- Senior Crew Chief, June 2005 to December 2006

Stantec Consulting, Inc. Irvine, California (Formerly The Keith Companies)
Field Supervisor for monitoring, survey, test excavations, and data recovery of Historic Properties under the jurisdiction of the Unites States Army Corps of Engineers. Ms. Cardenas was also responsible for the supervision of lab technicians, artifact analysis, coordinating with development contractors and staff, archiving documentation, GPS, photo documentation, DPR forms, site updates, research, and assisting in report writing.

- Junior Crew Chief and Research Assistant, July 2004 to June 2005

The Keith Companies Irvine, California

Jacobs Engineering Group Santa Ana, California

Responsibilities included supervising field crews for Phase II test excavations and data recovery, assisting in report writing, digitizing documentation, data entry, cataloging, photography, artifact analysis, curation, paleontological monitoring and coordination, mapping, site forms and record updates.

Laboratory Intern, September 2003 to June 2004 California State University, Fullerton

Lab Assistant responsible for inventorying artifactual materials, preparation of collection for instructional use, create information boards, archive maps, and data entry.

Selected Reports

2016 Class III Cultural Resources Inventory Report for Multiple Threat Site Expansion North Range, Nevada Test and Training Range (NTTR), Nye County, Nevada.

2016 Cultural Resources Inventory Report for the South Sacramento County Agriculture and Habitat Lands Recycled Water Project, Sacramento County, California.

2016 Cultural Resources Assessment for Union Pacific Railroad Prime Point I. L., Ennis Subdivision, Dallas County, Texas.

2016 Cultural Resources Inventory Report for the South Sacramento County Agriculture and Habitat Lands Recycled Water Project, Sacramento County, California.

2015 Cultural Resources Assessment for the Union Pacific Railroad Ellendale Project, Ellendale, Minnesota.

2015 Phase I Archaeological Survey for the Columbia's Site 7647 Geotechnical Study Project, Catlettsburg, Boyd County, Kentucky.

2015 Cultural Resources Assessment for the Albert Lea Subdivision Project, St. Paul, Minnesota: Milepost 348.12 to 349.83.

2015 Memorandum: Addendum No. 1 to the Archaeological Resources Intensive Survey of the Fort Worth Transportation Authority TEX Rail Corridor Tarrant County, Texas: new Equipment Maintenance Facility.

2015 Memorandum: Report of Cultural Resources Monitoring Activities for the Fort Irwin Flight Landing Strip Project, Fort Irwin, San Bernardino County, California.

2015 Cultural Resources Inventory Report for the W46 Fire Flow Improvements to the Ammunition Supply Point Project, Fort Irwin, San Bernardino County, California.

2014 Cultural Resources Inventory Report for the Siskiyou Telephone Benjamin Creek to Clear Creek (MP 38.4 to 32.5) Telecommunications Project, Siskiyou County, California.

2014 Cultural Resources Inventory Report for the Siskiyou Telephone Clear Creek to Ukonom Mountain (MP 32.41 to 24.00)Telecommunications Project, Siskiyou County, California.

2014 Cultural Resources Inventory Report for the Siskiyou Telephone T-Bar to Exchange Area Boundary (MP 12.15 to 14.36) Telecommunications Project, Siskiyou County, California.

Jacobs Engineering Group Santa Ana, California

2014 Cultural Resources Inventory Report for the Siskiyou Telephone Ukonom Mountain to Somes Bar Exchange (MP 24.00 to 14.36) Telecommunications Project, Siskiyou County, California.

2013 Cultural Resources Inventory Report for the Bicycle Lake Army Airfield Pipeline Project, Fort Irwin, San Bernardino County, California.

2013 Cultural Resources Inventory Report for the Siskiyou Telephone Improvements Project, Highway 96, Klamath National Forest, Siskiyou County, California.

2013 Historic Properties Inventory Report for the Hazard Mitigation Grant Program Woodside Avenue Flood Control Improvement Project, San Diego County, California.

2013 Historic Properties Inventory Report for the Hazard Mitigation Grant Program Fortuna Wastewater Treatment Plant Flood Protection Project, Humboldt County, California.

2013 Cultural Resources Inventory Report for the Hazardous Fire Risk Reduction Environmental Impact Statement East Bay Hills, California.

2012 Cultural Resources Report for the Craig National Guard Training Site Remedial Investigation Project Moffat County, Colorado. Prepared for the Bureau of Land Management and the Army National Guard.

2012 Class I Cultural Resources Literature Search and Survey Methodology for the Craig National Guard Training Site Remedial Investigation Project Moffat County, Colorado. Prepared for the Bureau of Land Management and the Army National Guard.

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