Responses to CEC Data Requests Set Three: Nos. 153 through 218

Revised Application for Certification (08-AFC-8)

for

HYDROGEN ENERGY CALIFORNIA

Kern County, California

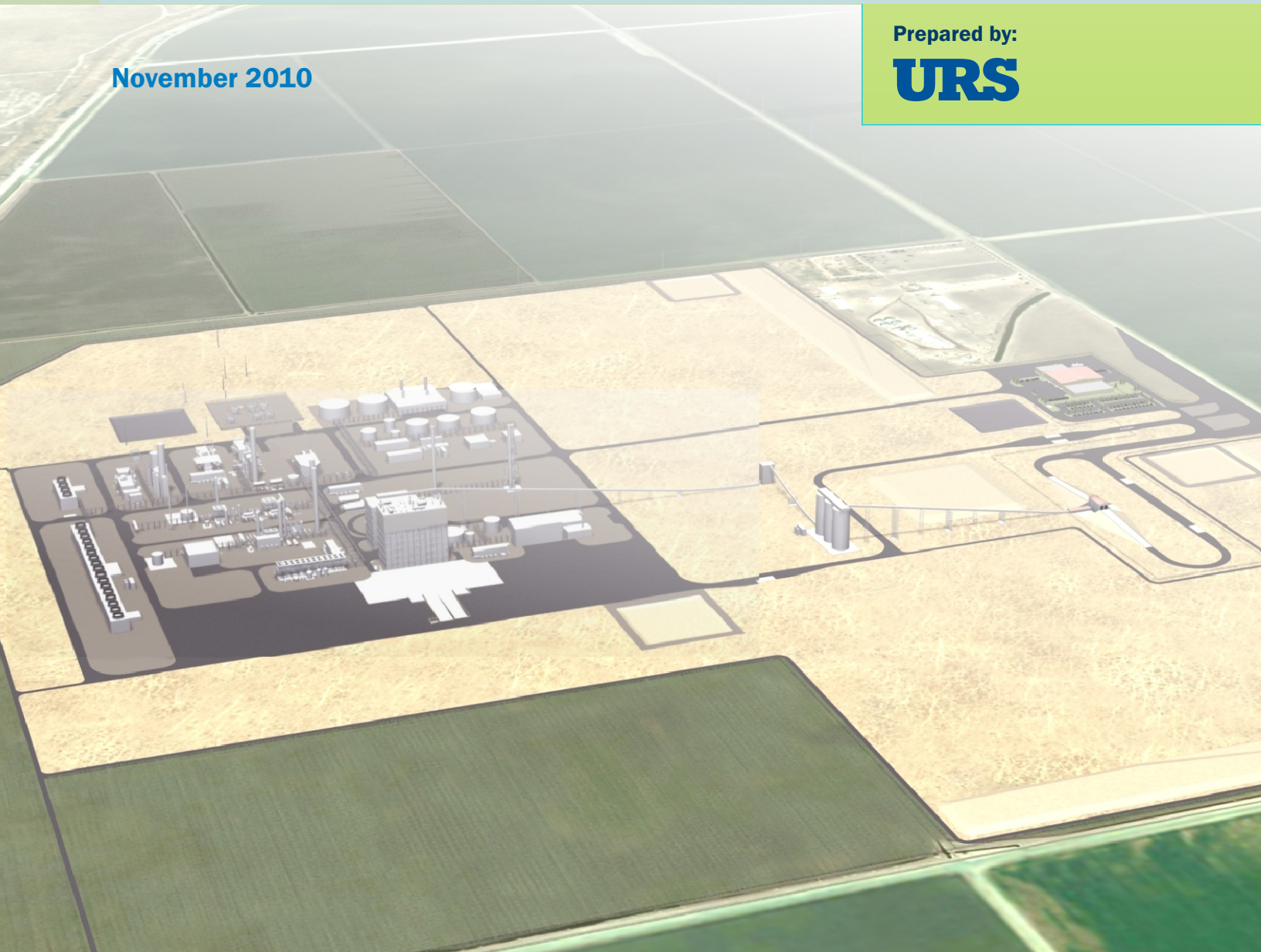
November 2010

Prepared for:
Hydrogen Energy California LLC

hydrogen energy

Submitted to:
California Energy Commission

Prepared by:
URS



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ATTACHMENTS

TABLES

FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS USED IN RESPONSES

AFC	Application for Certification
afy	acre-feet per year
BGRP	Brackish Groundwater Remediation Project
BVWSD	Buena Vista Water Storage District
CEC	California Energy Commission
CO_2	carbon dioxide
COC	chemical of concern
CPUC	California Public Utilities Commission
CTG	combustion turbine generator
DESCP	Drainage Erosion and Sediment Control Plan
DOE	Department of Energy
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EC	electrical conductivity
EDR	Environmental Data Resources, Inc.
EOR	Enhanced Oil Recovery
EPS	emission performance standard
FEIR	Final Environmental Impact Report
GE	General Electric
GHG	greenhouse gas
HDAR	Hydrogeologic Data Acquisition Report
HDPE	high-density polyethylene
HECA	Hydrogen Energy California
HRSG	heat recovery steam generator
IGCC	Integrated Gasification Combined Cycle
KCWA	Kern County Water Agency
lb/hr	pounds per hour
lb/MMBtu	pounds per million British thermal units per hour
LSE	Load Serving Entity
mg/L	milligrams per liter
MMBtu/hr	million British thermal units per hour
MRV Plan	Measuring, Reporting, and Verification Plan
MW	megawatts
MWh	megawatt hour
OEHI	Occidental of Elk Hills, Inc.
RCRA	Resource Conservation and Recovery Act
SB	State Bill
SSJVIC	Southern San Joaquin Valley Information Center
TCLP	Toxic Characteristic Leaching Procedure
TDS	total dissolved solids
tonne/yr	tonnes per year
WET	Waste Extraction Test
ZLD	zero liquid discharge

Technical Area: Biological Resources
Author: Amy Golden

BACKGROUND – VEGETATION COMMUNITY IMPACT CALCULATIONS

Based on the recently submitted "Linear Modifications to the Revised Application for Certification biological staff needs updated vegetation community impact calculations and survey results in order to complete the Biological Resources section of the PSA, Part 2.

DATA REQUEST

153. Please update and provide the following impact tables that were included in the April 12, 2010 workshop data response package that was docketed during June 2010, to reflect the recent linear modifications and change to transmission line (changed from 60 structures to 70):

- ***Table 9-1, Acreages of Temporary and Permanent Disturbance by Facility Type within the Biological Resources Study Area***
- ***Table 9-2, Acreages of Habitat Types by Facility Type within the Biological Buffer Area***
- ***Revised Table 134-1, Habitat Acreages within the Biological Resources Study Area***

RESPONSE

Table 9-1, Table 9-2, and Revised Table 134-1 have been updated and are provided under confidential cover.

DATA REQUEST

154. In an email from URS on August 25, 2010, it was indicated that a blunt-nosed leopard lizard (BNLL) was found during surveys performed along the new natural gas alignment; however, this result was not included in Section 3.2.1.2 or Table 3.2-1. Please update this section and table with 2010 BNLL survey results.

RESPONSE

Section 3.2.1.2 and Table 3.2-1 of the *Linear Modifications to the Revised Application for Certification* (AFC) document have been updated and provided under confidential cover.

Technical Area: Cultural Resources
Author: Elizabeth A. Bagwell and Beverly Bastian

All responses to these Data Requests should be submitted under a request for confidentiality.

BACKGROUND

Literature Search

In the Archaeological Reconnaissance for the Revised Application for Certification (AFC) (App. H3, May 2009) and Archaeological Survey Report Addendum of the Linear Modifications to the Revised AFC (App. B, August 2010), Hydrogen Energy California's (HECA's) consultant reports that two information searches at the Southern San Joaquin Information Center (SSJVIC) of the California Historical Resources Information System (CHRIS) were conducted for this Addendum. However, the information from these CHRIS searches is not sufficient to enable staff to complete its analysis of the potential impacts to cultural resources of the newly proposed alternative natural gas pipeline route.

According to the maps provided in the consultant's *Archaeological Survey Report Addendum* (App. B, pp. 57-59, Sheets 1-3), multiple alternatives for the natural gas pipeline are still being considered. Energy Commission Siting Regulations [CCR Title 20, App. B(g)(2)(B)] require the applicant to provide the results of a literature search to identify cultural resources within an area not less than one-quarter (0.25) mile on either side of all proposed linear facilities. The CHRIS search data provided by the applicant's consultant did not include that coverage. Staff will need the results of this expanded record search to complete its analysis. This search data should include copies of site forms for all known resources (prehistoric and historic-period archaeological sites and built-environment structures) and copies of reports from all previous cultural resources studies for these newly identified pipeline corridors.

App. B(g)(2)(B) also requires a copy of the USGS 7.5' quadrangle map(s) for the literature search area(s), delineating the areas of all past surveys and noting the California Historical Resources Information System (CHRIS) identifying number. Also required are copies of all technical reports whose survey coverage is wholly or partly within 0.25 mile of the area surveyed for the HECA project under Section (g)(2)(C) or which report on any archaeological excavations or architectural surveys within the literature search area. Staff will also need this information to complete its analysis. This new CHRIS and project survey data should be merged with previous project data and provided in no more than two updated, comprehensive maps showing site locations, past, present, and future survey coverage, and an updated project footprint.

In addition, all requested information should encompass a search area that includes all newly proposed pipeline alternative routes and buffer areas (not less than a 1.0-mile radius around the project site and not less than 0.25 mile on either side of the linear facilities).

DATA REQUEST

155. Please provide copies of the Department of Parks and Recreation (DPR) 523 forms, as recorded in the CHRIS database, for the identified cultural resources (prehistoric and historic-period archaeological sites and built-environment structures).

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

DATA REQUEST

156. Please provide copies of all technical reports, available through the CHRIS, whose survey coverage is wholly or partly within 0.25 mile of any newly proposed natural gas pipeline alternative route or which report on any archaeological excavations or architectural surveys within 1.0 mile of the project site or proposed linear facilities.

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

DATA REQUEST

157. Please provide an updated, comprehensive summary table of all cultural resources within the identified search areas. The table should include all types of resources (prehistoric and historic-period archaeological sites and built-environment structures). Each resource should be identified by the appropriate number assigned by the CHRIS (if available), site type, project component potentially affecting the resource, and California Register of Historic Resources (CRHR) eligibility determination or recommendation.

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

DATA REQUEST

158. Using App. H3-Fig. 1 as a base map, please provide a map (1:24,000—U.S. Geological Survey quadrangle scale) of the entire, combined record search area, showing the locations of all previously and newly identified cultural resources within a 1.0-mile radius of the project site and within 0.25 mile on either side of all linear facilities and their alternative routes. This should not be an aerial representation. Please include the resource location data (prehistoric and historic-period archaeological sites and built-environment structures) for all alternative routes of the new natural gas pipeline and the coverage boundaries for all pedestrian surveys conducted by the HECA applicant. Please indicate on the map those areas still needing archaeological pedestrian survey, as of September, 2010. Provide: 1) a printed copy; 2) a basic high resolution digital copy which will work on any staff computer (.jpeg); and 3) a copy of the GIS shape files for that map, which can be used and manipulated by staff. The digital version should be provided as a single graphic image (.JPG or similar), not as a scanned PDF of hard-copy pages.

RESPONSE

The requested map is provided under confidential cover, as Figure 158-1. The map includes prehistoric and historic-period archaeological sites and built-environment structures identified during the record search, as well as during field inventory efforts (archaeological and built-environment). The record search data include all cultural resources listed by the Southern San Joaquin Valley Information Center (SSJVIC) that occur within a 1-mile radius of the Project Site and one-quarter (0.25) mile on each side of the Project linear facilities.

Per Data Requests 160 and 161, cultural resources (prehistoric and historic-period archaeological sites and built-environment structures) identified during inventory efforts have also been included on this map. These cultural resources are identified on the map as newly recorded to differentiate from those identified during the record search efforts.

DATA REQUEST

159. Please provide a single map (1:24,000—U.S. Geological Survey quadrangle scale) showing the footprints of the project and all its linear alternatives (including all of the newly proposed natural gas pipeline alternative routes shown in Archaeological Survey Report Addendum, App. B, pp. 57-59, Sheets 1-3) in relation to the CHRIS record search boundaries, the boundaries of all pedestrian surveys conducted by the HECA applicant, and the boundaries of all other past pedestrian archaeological reconnaissance coverage, each marked with the CHRIS number identifying the associated reports. This should not be an aerial representation. Please provide the GIS shape-files for this map, as well as digital and hard copies. The digital version shall be a single graphic image (.jpg or similar) and not a scanned .pdf of hard-copy pages.

RESPONSE

The requested map is provided under confidential cover, as Figure 159-1. The map includes the boundaries of all pedestrian surveys conducted by the Applicant, and the relevant boundaries of all other past pedestrian archaeological reconnaissance coverage, each marked with the California Historical Resources Information System number identifying the associated reports. The locations of past cultural resources studies are derived from the record search base maps held by the SSJVIC, depicting the studies that occur within a 1-mile radius around the Project Site and one-quarter (0.25) mile on each side of the Project linear facilities.

BACKGROUND

Summary of Cultural Resources

Energy Commission siting regulations require that any cultural resources listed pursuant to ordinance by a city or county, or recognized by any local historical or archaeological society or museum must be identified by the applicant. Cultural resources materials provided to date (revised AFC, May, 2009, Vol. 2, App. H3; Data Response 65; *Archaeological Survey Report Addendum*, August, 2010, App. B) do not indicate if there are any cultural resources identified by county ordinance within the project area or if local governments, historical or archaeological societies or groups, or area museums have been contacted. If a local data search has been completed or these contacts have occurred, no information has been provided to indicate the results of these inquiries. Staff needs a complete summary of all cultural resources in the HECA vicinity to complete its analysis.

DATA REQUEST

160. Please provide a list of local governments contacted or research conducted to obtain information on any cultural resources listed pursuant to any city or county ordinance and the results of those inquiries. Please plot the locations and identify any new resources on the map requested in Data Request #158.

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

DATA REQUEST

161. Please provide a list of local museums, historical societies, or other relevant organizations contacted to obtain information on any locally important cultural resources, and the results of those inquiries. Please plot the locations and identify any new resources on the map requested in Data Request #158.

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

BACKGROUND

Archaeological Pedestrian Survey

The archaeological pedestrian survey of the proposed project site and linear facilities, including the newly proposed natural gas pipeline route, as identified in the August 2010 *Addendum*, App. B, is incomplete. Staff needs complete, comprehensive survey results covering all areas and all types of cultural resources (prehistoric and historic-period archaeological sites and built-environment structures) that could be impacted by the project in order to complete its analysis.

DATA REQUEST

162. Please discuss the efforts made to identify possible historic-period archaeological sites along the routes of all project linear facilities, listing the map and literature sources reviewed and the field methods employed to identify/verify such sites. If maps and literature sources were not consulted, for all the project's proposed pipelines please follow the protocol as requested in Data Requests #163 and #164.

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

DATA REQUEST

163. Please review historic maps and aerial photographs to identify potential historic-period archaeological sites that may be present along the alternative routes of the proposed natural gas pipeline. Please, ground-truth these locations, if any, when you conduct (or complete) archaeological pedestrian surveys, covering no less than 50 feet on both sides of the right-of-way for all project linear facility routes. Include areas shown in Data Response 65 Figure 65-1-1(2); Addendum, App. B, Figure 1, and all newly proposed alternative natural gas pipeline routes, as shown in App. B, Map Sheets 1-3, pp. 57-59.

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

DATA REQUEST

164. Please provide the results of these surveys in a technical report conforming to the Archaeological Resource Management Report format (California Office of Historic Preservation February 1990). The report should include a version of the map described in Data Request 158, updated to show the newly completed archaeological pedestrian survey coverage. This report may be combined with the report requested in Data Request #167.

RESPONSE

A response to this data request has been prepared and submitted under confidential cover.

BACKGROUND

Historical Architecture Survey

The historical architecture windshield survey in the cultural resources materials provided to date (revised AFC May 2009, Vol. 2, App. H4, Maps 1-3; August 2010, App. B) is incomplete for the newly proposed natural gas pipeline routes. Staff needs complete survey results covering all areas that could be impacted by the project in order to complete its analysis.

DATA REQUEST

165. Please discuss the efforts made to identify possible extant historic-period structures, particularly canals and canal systems, along the routes of all project linear facilities, listing the map and literature sources reviewed and the field methods employed to identify/verify such sites. If maps and literature sources were not consulted, for all the project's proposed linear facilities please follow the protocol as requested in Data Requests #166 and #167.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

166. Please review historic maps and aerial photographs to identify potential canals and canal systems that may be present along the alternative routes of the proposed natural gas pipeline. Please ground-truth these, if any, when you conduct a built-environment windshield survey covering no less than 0.5 mile to either side of the newly proposed natural gas pipeline alternative routes, shown in Archaeological Survey Report Addendum, App. B, pp. 57-59, Sheets 1-3. The survey must be conducted by an architectural historian who meets the U.S. Secretary of the Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

167. Please provide a technical report, written by the qualified architectural historian indicated above, presenting the results of this survey. A resume, demonstrating the architectural historian's qualifications, should be included as an appendix to the report. The report should also include a version of the map described in Data Request 158, updated to show the newly completed built-environment survey coverage. This report may be combined with the report requested in Data Request #164.

RESPONSE

A response to this data request has been provided under confidential cover.

BACKGROUND

Archaeological Study

The applicant proposes to avoid all cultural resources (Linear Modifications to the Revised AFC, August, 2010, p. 3-5). However, staff's initial analysis indicates that, except in the case of one archaeological site (CA-Ker-125), the proposed linear facilities would have direct impacts on several cultural resources. The CO_2 line would impact CA-Ker-5392, a site listed on the National Register of Historic Places. The process water line and associated wells would impact HECA-2008-1, HECA-2009-9, HECA-2009-10, and possibly CA-Riv-171. Transmission Line 1-A would impact HECA-2009-1, HECA-2009-8 and possibly CA-Ker-325. Finally, the new natural gas line may impact HECA-2010-1 (May, 2009 Vol. 1, Section 5.3, pp. 50-54; Vol. 2, App. H3, pp. 49-50; August, 2010, Section 3, pp. 5-6).

Siting regulations App. B (g) (2) (E) (i) require the applicant to discuss the measures proposed to mitigate project impacts to known cultural resources. However, the information provided by the applicant (App. H3, pp. 49-50) was too general, did not support the expressed intent to avoid all cultural resources, or provide feasible and enforceable mitigation options. Because of the project's evident potential to impact known cultural resources, archaeological testing of these potential resource areas would be needed before staff can complete its analysis. Eligibility recommendations for each resource and evidence to support these recommendations would also be required.

In the case of CA-Ker-5392, this site has already been determined eligible for, and has been listed on, the National Register of Historic Places (NRHP). The applicant has expressed the intent to avoid this site. Staff requested additional information regarding the Applicant's plans for avoidance in Data Request 68. However, the information provided by the applicant in their Data Response was too general to support the expressed intent to avoid this important resource. Because of the sensitivity of this resource, staff needs a more detailed avoidance plan in order to complete their analysis.

In the absence of the above archaeological testing and detailed avoidance plan, staff may need to recommend conditions of certification that require these plans post-certification and pre-construction.

DATA REQUEST

168. Please submit a detailed plan for how the applicant proposes to avoid impacts to site CA-Ker-5392, which is listed on the NRHP, for staff review and approval. The plan should closely reflect the site boundaries, deposit depth, and location of artifact concentrations established during the most recent testing and data recovery projects at this site (Pacific Legacy 1998), as well as the conclusions and recommendations of previous researchers who have worked there. The plan should include a location map of the proposed CO_2 pipeline route, access road, construction laydown areas, and any other ground disturbance planned in association with construction of the pipeline, depicting their relation to site CA-Ker-5392, its site boundaries, artifact concentrations, and any areas where archaeological excavation took place. This map shall use as its base the detailed site map showing all excavation unit locations produced for the original Pacific Legacy excavation. The plan must be prepared by a prehistoric archaeologist who meets the U.S. Secretary of the Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61. Please provide a resume demonstrating the prehistoric archaeologist's qualifications.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant objects to this data request.

DATA REQUEST

169. Please submit, for staff review and approval, a subsurface testing plan for the seven known prehistoric sites that the project could impact. The subsurface testing plan should be prepared by a prehistoric archaeologist who meets the U.S. Secretary of the Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61. Please provide a resume demonstrating the prehistoric archaeologist's qualifications. This plan should use limited test excavations to determine if any subsurface deposits exist at: HECA-2008-1, HECA-2009-1, HECA-2009-8, HECA-2009-9, HECA-2009-10, CA-Ker-171, and CA-Ker-325. In the case of CA-Ker-171, which may have been destroyed by the construction of the California Aqueduct, the plan should include explorations near its location, as identified by CHRIS, to determine if portions of the site still exist subsurface. Similarly, DPR 523 forms show multiple locations for CA-Ker-325 in the vicinity of HECA 2009-1. The testing plan for these two sites should include a field visit and possible testing at all three locations to resolve these issues.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant objects to this data request.

DATA REQUEST

170. After staff approves the subsurface testing plan, please initiate the text excavations, as specified in the approved plan. A qualified prehistoric archaeologist, as identified in Data Request #169 above, shall carry out the test excavations. If deposits are found, please recover a sample of materials sufficient to support recommendations of significance for these sites. Evaluate the recovered data for its potential to address the research questions posed in the confidential cultural resources technical report.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant objects to this data request.

DATA REQUEST

171. Please provide a report, written by the qualified prehistoric archaeologist conducting the excavations, on the testing and findings at these sites. The report should present an analysis of the recovered data, recommendations regarding the significance of the sites, and justifications for the recommendations, based on the recovered data. Please complete or update and file DPR 523 "Archaeological Site" detail forms for these sites, including dating and significance recommendations, and submit copies to staff.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant objects to this data request.

BACKGROUND

Geoarchaeological Field Sampling

The detailed geoarchaeological study provided as Data Response #77 convincingly argues that much of the proposed project is to be located in areas with high sensitivity for buried cultural resources. The project footprint, process water pipeline, and transmission line are all planned for Quaternary Alluvium (Qb), which has high cultural resources sensitivity. The CO_2 pipeline would cross three soil types (Qb, Qa, and QTt), which have high, medium, and low sensitivity, respectively. The new natural gas pipeline route would also extend across multiple soil types (Qb and Qoa), resulting in one-third of the route crossing areas of high sensitivity and the remainder in areas of low sensitivity (Data Response 77, Table 77-1 and Fig. 77-5). Based on previous archaeological survey and excavation in the HECA project vicinity, it is clear that as-yet-unidentified buried sites are likely to be prehistoric village sites with human remains.

Staff assumes parts of the project site and project linear facilities rights-of-way (ROWs) have been disturbed by agriculture to a depth of three feet, but considerable proposed project ground disturbance would exceed that depth. The ground disturbance resulting from the construction of equipment installations at the plant site would be likely to extend as deep as 12 feet below the surface. The CO_2, natural gas, and process water pipelines would be installed at least five feet below grade. The amount of relatively deep ground disturbance proposed in an area sensitive for archaeological resources is considerable.

Because of the high archaeological sensitivity through much of the project site and along project linear facilities rights-of-way (ROWs), staff expects that archaeological monitoring will be required during construction. During the April, 2010 Workshop, staff proposed selected geoarchaeological field sampling (shovel testing) within the project area in order to obtain more project-specific information. Energy Commission staff believes this would help focus the monitoring effort and would result in better historic preservation (per the State Historic Preservation Office).

The applicant should also be aware that once geoarchaeological field sampling has refined our understanding of the parts of the project area with the highest archaeological sensitivity, a subsurface inventory survey employing backhoe trenches may need to be employed in some of these areas to identify extremely sensitive resources.

The applicant agreed to design a plan and conduct geoarchaeological field sampling "once a development plan has been finalized for the Project Site" (April, 2010 Workshop Response 23). As of late September, 2010, staff has not received this plan. While staff understands that some of the project elements are still being refined, staff considers most of the project elements to be sufficiently developed for a plan to be prepared and field sampling to take place. Staff must establish a factual basis for the assessment of potential effects to buried deposits within the project impact areas. In the absence of such information, needed to appropriately configure the cultural resources monitoring for this project, staff may need to recommend conditions of certification providing that a subsurface study be conducted post-certification and pre-construction.

DATA REQUEST

172. Please design a primary geoarchaeological field study of the project plant site and linear facility corridors. The plan shall be prepared by a prehistoric archaeologist who, at a minimum, meets the U.S. Secretary of Interior's Professional Qualifications Standards for prehistoric archaeology, as published in Title 36,

Code of Federal Regulations, part 61, and whose resume includes the completion of graduate-level coursework in geoarchaeology, physical geography, geomorphology, or Quaternary science, or education and experience acceptable to cultural resources staff. A resume demonstrating the geoarchaeologist's qualifications should be included with the proposed plan. The plan shall include soil profiling within the Project Site where the deepest trenching would occur, and along the linear facilities at old stream or water crossings. Submit the research plan for staff approval.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant objects to this data request.

DATA REQUEST

173. Once staff has approved the plan, please have the qualified geoarchaeologist conduct the field study and prepare a report of the results. The primary study and resulting report should, at a minimum, include the following elements:

A. A map of the present landforms in the project area at a scale of not less than 1:24,000; the data sources for the map may be any combination of published maps, satellite or aerial imagery that has been subject to field verification, and the result of field mapping efforts;

B. A sampling strategy to document the stratigraphy of the portions of the landforms in the project impact areas where the construction of the proposed project will involve disturbance at depths greater than 3 feet;

C. Data collection necessary for determinations of the physical character, the ages, and the depositional rates of the various sedimentary deposits and paleosols that may be beneath the surface of the project impact areas to the proposed maximum depth of ground disturbance. Each landform must be sampled. Data collection at each sampling locale should include a measured profile drawing and a profile photograph with a metric scale, and the screening of a small sample (three 5-gallon buckets) of sediment from the major sedimentary deposits in each profile through ¼-inch hardware cloth. Data collection should also include the collection and assaying of enough soil humate samples to reliably radiocarbon-date a master stratigraphic column for each sampled landform; and

D. An analysis of the collected field data and an assessment, based on those data, of the likelihood of the presence of buried archaeological deposits in the project impact areas, and, to the extent possible, the likely age and character of such deposits.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant objects to this data request.

Technical Area: Greenhouse Gases
Authors: William Walters

BACKGROUND

Project Fuel Use Bounding Limits

The greenhouse gas (GHG) emissions estimate for the project is very sensitive to the fuel and gasifier feedstock assumptions used. A major finding staff needs to make is whether or not the project would comply with SB 1368 GHG Emission Performance Standard requirements and whether the project would have the ability to reduce system-wide GHG emissions[1]. When the gas turbine is operating on hydrogen-rich fuel derived from the petroleum coke/coal feedstocks the majority of the GHG emissions, in the form of CO_2, from the fuel feedstocks is going to be shipped offsite for injection in an oil field for enhanced oil recovery (EOR) and carbon sequestration; however, there is no sequestration of GHG emissions from natural gas used in the gas turbine or duct burners, so the total amount of natural gas used in the gas turbine/duct burners can potentially have a significant effect on the total GHG emissions and emissions efficiency in terms of CO_2 or CO_2 equivalent emissions per megawatt-hour (MWh) of net generation (CO_2/MWh or CO2E/MWh). Staff needs the applicant to provide bounding fuel assumptions and GHG emissions to fully evaluate the GHG emissions and regulatory compliance issues of the HECA project. Staff notes that we indicated a need for fuel use bounding assumptions during the data response workshop, but this information has yet to be provided by the applicant. These data requests formalize, and provide additional clarification for the applicant, regarding the requests made at the data response workshop.

DATA REQUEST

174. Please describe the maximum amount of natural gas that would be used in the gas turbine, both as the primary gas turbine fuel, as mixed with the hydrogen-rich fuel as the primary gas turbine fuel, and as sole or mixed fuel for the duct burners, and provide the efficiency of its use (CO2E/MWh of net generation with complete calculations and assumptions) in the gas turbine and the duct burners.

RESPONSE

During early operations (i.e., the first 3 years of operation), the Applicant expects to use no more than 30 percent natural gas in the combustion turbine generator (CTG)/heat recovery steam generator (HRSG) on an annual average basis due to lower gasification block availability. For mature operations (i.e., after the third year of operation), the Applicant expects to use no more than 10 percent natural gas in the CTG/HRSG on an annual average basis, although the best-case operations scenario is that no natural gas will be used except during turbine startup (which equates to less than 1 percent of the time). The annual use is based on natural gas use in both the turbine and duct burner, which could occur during combustion of natural gas or a combination of natural gas and hydrogen-rich fuel.

If there is a major process upset and the gasifier is not available to produce hydrogen-rich fuel, natural gas may be used in the turbine and duct burner. Although it is never expected that the facility would operate on only natural gas on an annual basis, the carbon dioxide emissions and

[1] Recent Energy Commission Final Decisions (Decisions) have noted in the Conclusions of Law in the Greenhouse Gas (GHG) Emissions sections that "[a]ny new power plant that we certify must: a) not increase the overall system heat rate; b) not interfere with generation from existing renewables or with the integration of new renewable generation; and c) have the ability to reduce the system-wide GHG emissions."

emissions performance presented in Table 174-1 show that, in this unlikely event, compliance with State Bill (SB) 1368 would easily be met.

Compliance with SB 1368 is shown by following the provisions outlined in the California Energy Commission (CEC) guidance document, *Regulations Establishing and Implementing a Greenhouse Gases Emission Performance Standard For Local Publicly Owned Electric Utilities, Chapter 11, Greenhouse Gases Emission Performance Standard*. The greenhouse gas (GHG) emission performance standard (EPS) outlined in SB 1368 is 1,100 pounds of carbon dioxide per megawatt hour (MWh). Because Data Requests 174 through 178 all refer to compliance with SB 1368, only carbon dioxide emissions from applicable sources are presented.

Section 2904 in the CEC guidance defines annual average carbon dioxide emissions as the amount of carbon dioxide produced on an annual average basis by fuel used in any component directly involved in electricity production. Fuels used in ancillary equipment including but not limited to fire pumps, emergency generators, and vehicles shall not be included. Carbon dioxide emissions from the turbine and duct burner, the only sources directly involved in electricity production, are included in the annual power plant carbon dioxide emissions inventory.

Hydrogen Energy California (HECA) will capture 90 percent of the carbon dioxide from the hydrogen-rich fuel before the fuel is burned in the CTG/HRSG. The captured carbon dioxide stream will be used by Occidental of Elk Hills, Inc. (OEHI) in an area within the Elk Hills Unit for its existing enhanced oil recovery (EOR), which will result in sequestration of the injected CO_2. In the unlikely event that the carbon dioxide may not be sent to OEHI, the stream will be directed to the carbon dioxide vent. Emissions from the carbon dioxide vent are included in the SB 1368 annual carbon dioxide emission inventory. The carbon dioxide stream will be pressurized by a compressor that is powered with electricity produced by the CTG/HRSG; therefore, these emissions are included in the SB 1368 annual carbon dioxide emission inventory.

Net power generation is based on the annual average generation of 251 megawatts (MW) when combusting hydrogen-rich fuel in the CTG/HRSG and 311 MW when combusting natural gas in the CTG/HRSG. The annual MWh is based on a maximum of 8,322 hours of operation split between hydrogen-rich fuel and natural gas, depending on the scenario.

Table 174-1 presents the annual carbon dioxide emissions and annual emissions performance from the best-case mature operations with no natural gas use; the worst-case mature operations with 10 percent natural gas use; early operations with 30 percent natural gas use; and the unlikely operational case of 100 percent natural gas use. The assumptions used in calculating the carbon dioxide emissions for each operating scenario are presented in Table 174-1.

Table 174-1
Estimated Annual Carbon Dioxide Emissions and Emission Performance for Compliance with SB 1368

Operating Parameters	Mature Operations (Best-Case) Zero Natural Gas	Mature Operations (Worst-Case)	Early Operations	100% Natural Gas
Natural Gas Operation Scenario, %	0%	10%	30%	100%
Natural Gas Operation, hours per year	65	832	2,497	8,322
Hydrogen-rich Fuel Operation, hours per year	8,257	7,490	5,825	—
Intermittent CO_2 Venting, hours per year	—	120	504	—
Electricity Generated, MWh	2,092,722	2,138,754	2,238,618	2,588,142
Source	**CO_2 Emissions (Metric Ton/Year)**			
CTG/HRSG Natural Gas	8,257	105,709	317,126	1,057,087
CTG/HRSG Hydrogen-Rich Fuel	255,972	232,188	180,591	—
CO_2 Vent	—	35,717	150,011	—
Fugitives from CO_2 Sequestration	39	39	39	—
SB 1368 CO_2 Annual Emissions	264,267	373,652	647,766	1,057,087
CO_2/MWh for SB 1368 compliance	278.32	385.05	637.75	900.19
Hydrogen-Rich Fuel CO_2 Emission Factor				
CO_2	28.08	lb/MMBtu		
CTG/HRSG Heat Input	2,433	MMBtu/hr		
Net Power	251	MW		
Natural Gas CO_2 Emission Factor				
CO_2	116.36	lb/MMBtu		
CTG/HRSG Heat Input	2,406	MMBtu/hr		
Net Power	311	MW		
Intermittent CO_2 Vent				
CO_2 Emission Rate	656,000	lb/hr		
Fugitives				
CO_2 Emission Rate	39	tonne/yr		

Notes:

During best-case mature operation of the HRSG, the unit will fire only hydrogen-rich fuel, except during periods of startup and shutdown.

The combined CTG and HRSG heat input rate for both hydrogen-rich fuel and natural gas is based on the average operating condition corresponding to an ambient temperature of 65 ºFahrenheit.

Natural gas CO_2 emission factor from Appendix C of the California Climate Action Registry General Reporting Protocol Version 2.2 (March 2007).

The fugitive CO_2 emissions are from all process areas within HECA.

CO_2 = carbon dioxide
CTG = combustion turbine generator
HRSG = heat recovery steam generator
lb/hr = pounds per hour
lb/MMBtu = pounds per million British thermal units per hour
MMBtu/hr = million British thermal units per hour
MWh = megawatt hour
SB = State Bill
tonne/yr = tonnes per year

DATA REQUEST

175. Please describe whether natural gas may be used as the primary gas turbine/duct burner fuel if there are very long periods of gasifier downtime due to major process upsets or accidents, and if so whether the duct burners would or would not be used during these periods when the majority of the parasitic power load from the gasification system would not occur. How long and how often could this mode of operation occur? What would be the basis for this decision?

RESPONSE

When hydrogen-rich fuel is not available due, for example, to a major process upset, natural gas may be used as the primary fuel for power generation to meet power delivery demand. During such an event, HECA would fire the CTG/HRSG on natural gas until the gasification block is online. The duration of operation on natural gas would depend on, among other things, contractual obligations for power delivery from HECA to meet regional power needs.

DATA REQUEST

176. Please provide the GHG emissions performance of the petroleum coke feedstock and coal feedstock, separately (CO2E/MWh of net generation with complete calculations and assumptions).

RESPONSE

The quality of hydrogen-rich fuel produced by the gasification block is not a strong function of feedstock. Hydrogen-rich fuel produced by the gasification block will have similar compositions for either feedstock, including residual carbon content, and will therefore have essentially the same GHG emissions. The carbon dioxide annual emissions and annual emissions performance for the expected operating conditions are provided in the response to Data Request 174.

DATA REQUEST

177. Please provide the range of best-case and worst-case facility annual GHG emissions (CO2E) and annual emissions performance (CO_2/MWh for SB 1368 compliance and CO2E/MWh of net generation) for the potential range of fuel/feedstock use options to which the applicant is willing to stipulate, with calculations and all assumptions on feedstock/fuel use and CO_2 venting provided.

RESPONSE

The best-case annual GHG emissions and annual emissions performance are associated with no natural gas use. The worst-case expected annual GHG emissions and annual emissions performance are associated with 10 percent natural gas use. The annual carbon dioxide emissions and annual emissions performance associated with 100 percent natural gas use are presented in Table 174-1 in the response to Data Request 174; these data are presented to show the most extreme operating case, although HECA never intends to operate the facility in this manner.

DATA REQUEST

178. Please provide the expected annual GHG emissions (CO2E) and annual emissions performance (CO2E/MWh of net generation) during the DOE performance demonstration period, with calculations and all assumptions on feedstock/fuel use and CO_2 venting provided; and confirm the values provided in June 2010 for the long-term mature plant operations after the DOE performance demonstration. Also please identify the minimum, anticipated, and maximum duration of the DOE demonstration phase.

RESPONSE

The Department of Energy (DOE) demonstration period, which will last 2 years, will coincide with the early operation period. During this period, HECA expects to use no more than 30 percent natural gas in the CTG/HRSG on an annual average basis. During mature operations, HECA intends to use between 0 and 10 percent natural gas in the CTG/HRSG on an annual average basis. The annual carbon dioxide emissions and annual performance associated with early operations and mature operation with no natural gas use and up to 10 percent natural gas use are presented in the response to Data Request 174.

BACKGROUND

Sequestration Agreement

Staff needs confirmation of any agreement between Hydrogen Energy International LLC and Occidental Petroleum regarding the enhanced oil recovery (EOR) and CO_2 sequestration in order to complete our findings regarding GHG impacts. Without such an agreement the project's proposed EOR and CO_2 sequestration does not have adequate certainty for staff to include the CO_2 sequestration in the GHG emissions estimate for the project.

DATA REQUEST

179. Please provide a copy of the agreement between Hydrogen Energy International LLC and Occidental Petroleum that provides assurance that the Occidental Petroleum Enhanced Oil Recovery (EOR) project-related action would be completed, that Occidental Petroleum would be contractually required to accept responsibility for and inject/sequester the HECA project's separated CO_2 emissions stream; and that outlines the roles of each party regarding CO_2 sequestration and ownership/liability for this project.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

DATA REQUEST

180. Please discuss whether Hydrogen Energy California, LLC has identified any options that would allow the Energy Commission to adopt conditions of certification for purposes of ensuring compliance with the carbon sequestration component of HECA.

RESPONSE

SB 1368, as codified in Public Utilities Code Sections 8340 et seq., set the GHG EPS for baseload generation of load-serving entities. Public Utility Code Section 8341(d)(5) states that "[c]arbon dioxide that is injected in geological formations, so as to prevent releases into the atmosphere, in compliance with applicable laws and regulations shall not be counted as emissions of the power plant in determining compliance with the greenhouse gases emissions performance standard."

In California Public Utilities Commission (CPUC) rulemaking *Interim Opinion on Phase 1 Issues: Greenhouse Gas Emissions Performance Standard* (Decision 07-01-39, as amended by Proposed Decision of Commissioner Peevey, dated June 2, 2010), the CPUC specified the finding that must be made for Load Serving Entities (LSEs) complying with the EPS by employing carbon dioxide injection into geologic formations. The *Interim Opinion*, as amended, states in pertinent part (decision text at pages 93 and 94):

> Because of the unique nature of such CO_2 sequestration projects, we will require LSEs to file an application requesting a Commission finding of EPS compliance for any covered procurement that employs a geological formation injection. As part of this filing, the LSE shall provide documentation demonstrating that the CO_2 capture, transportation and geological formation injection project has a reasonable and economically and technically feasible plan that will result in a permanent sequestration of CO_2 once the injection project is operational. The plan must comply with Federal and/or State monitoring, verification and reporting requirements applicable to projects designed to permanently sequester CO_2 by preventing its release from the subsurface. If at the time the application is filed Federal and/or State requirements have not been finalized, the plan must include monitoring activities to detect releases of injected CO_2 from the subsurface, must provide for verification of any detected releases and must include a schedule for reporting any detected releases to the Commission or other Federal and/or State agencies requesting that information. This may mean that the sequestration project might become operational after the powerplant comes on line or the LSE enters into the contract. In implementing §§ 8341(d)(2) and (5), we clarify today that we will determine EPS compliance for such powerplants based on reasonably projected net emission over the life of the plant.

HECA has submitted an application to the CEC for certification to authorize siting of the HECA Project, and proposes to satisfy the EPS by employing injection of captured carbon dioxide into a geologic formation. HECA and OEHI are providing documentation demonstrating that the carbon dioxide capture, transportation, and geologic formation injection project—the OEHI Carbon Dioxide EOR Project—has a reasonable and economically and technically feasible plan that will result in permanent sequestration of carbon dioxide once the HECA Project is operational. The plan contains a Measuring, Reporting, and Verification Plan (MRV Plan) that includes monitoring activities to detect releases of injected carbon dioxide from the subsurface; provides for verification of any detected releases; and includes a schedule for reporting any

detected releases to the Commission or other federal and/or state agencies requesting that information, and a closure plan.

Under the Warren-Alquist Act, the CEC siting process requires the CEC to consider all potential significant environmental impacts of the "whole of the project," which includes potential significant impacts from the OEHI Carbon Dioxide EOR Project. To the extent that the CEC identifies potential significant impacts relating to the OEHI Carbon Dioxide EOR Project, as it relates to the HECA Project, the CEC can specify additional project design features or mitigation measures that should be implemented by other agencies responsible for permitting the OEHI Carbon Dioxide EOR Project. The HECA plan to meet the EPS by employing geologic formation injection of captured carbon dioxide includes an MRV Plan that specifies design features and mitigation measures to mitigate potential GHG impacts. The Warren-Alquist Act empowers the CEC to specify that other agencies responsible for permitting the OEHI Carbon Dioxide EOR Project—such as the Department of Oil, Gas & Geothermal Resources or the San Joaquin Valley Unified Air Pollution Control District—make their permits conditional on implementation of the MRV Plan. This existing authority of the CEC under the Warren-Alquist Act would allow the CEC to adopt conditions of certification sufficient to determine EPS compliance for the HECA Project based on reasonably projected net emission over the life of the plant.

BACKGROUND – SB 1368 EMISSIONS PERFORMANCE STANDARD COMPLIANCE CALCULATIONS

For the purposes of project total greenhouse gas accounting and determining SB 1368 compliance it is necessary to consider the carbon sequestration process, Occidental's Enhanced Oil Recovery (EOR) Project, as part of the overall carbon and energy balance as if it were located onsite to determine the HECA project's total greenhouse gas emissions and the project's net CO_2/MWh emission rate's compliance with the Emission Performance Standard (EPS). Energy Commission staff is currently working to determine an estimate for the long term retention efficiency of the sequestration process, but staff needs additional information for the aboveground EOR facility's GHG emissions and energy consumption.

DATA REQUEST

181. Please provide an estimate, with all assumptions and calculations provided in electronic form (editable Excel spreadsheet), of the EOR processes greenhouse gas emissions and electricity consumption that includes the following:

A. The direct annual CO_2 and CO2E emissions from the EOR facility heaters and other fuel fired equipment.

B. The annual CO2E emissions for the mobile sources (employee vehicles, maintenance delivery vehicles, etc.) required to operate the EOR facility.

C. The annual CO_2 leakage from the EOR process, including the leakage from all of the aboveground piping components starting at the HECA fence line.

D. The annual electricity consumption (in MWh) for the EOR process.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant objects to this data request to the extent that it requests information for purposes of determining SB 1368 compliance, as set forth in the "background" to the Data Request. Emissions associated with OEHI's EOR project are not relevant to a determination of HECA's compliance with SB 1368 performance standards for power plants. However, Applicant agrees that the requested data are relevant to the CEC's CEQA analysis, and OEHI will provide the requested information by approximately December 3, 2010.

Technical Area: Land Use
Authors: Eric Veerkamp

Please be aware that if any responses to the Data Requests contained herein have the potential to reveal proprietary or confidential information, they should be submitted under a request for confidentiality.

BACKGROUND

Controlled Area

Section 2.2 (Water Well), page 2.1, of the August 2010 Linear Modifications to the Revised Application for Certification (AFC) states that Hydrogen Energy International (HEI) has defined two alternatives to supply the project with potable water. Alternative A, the preferred solution, would increase the size of the Controlled Area from 628 acres to 633 acres*. [Alternative B involves developing a new well on the already identified 250-acre permanently disturbed portion of the overall 473-acre Project Site*]. Based on the use of Alternative A for the HECA facility, staff considers this to be part of a revised 478-acre Project Site, as opposed to the Controlled Area. To fully analyze the land use issues associated with Alternative A, please provide the following.

DATA REQUEST

182. Please provide the Assessor's Parcel Number (APN) of the parcel associated with Alternative A.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

183. Please clarify the zoning of the parcel associated with Alternative A.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

184. Please revise acreage of Williamson Act land that will need to be petitioned for cancellation, if any.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

185. Please update the analysis of the proposed Lot Line Adjustment (LLA) stating how it would be affected by the inclusion of Alternative A.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

186. Please update figures reflecting the revised Project Area.

A. Figure 2.7, Project Location Map.

B. Figure 2.4 (Site Plan) of the May 2009 Revised AFC.

C. Figure 5.4-2, Overview, Existing Land Uses.

D. Figure 5.4-2(5), Existing Land Uses.

RESPONSE

A response to this data request has been provided under confidential cover.

BACKGROUND

New Study Area

While Section 3.4.1, page 3-7 of the August 2010 Linear Modifications states that 0.25 mile of the relocated 11 miles of natural gas pipeline would be located primarily on roadways and agricultural land and the remaining 10.75 acres would be located in roadway Right-of-Way or adjacent to agricultural lands, the Section does not provide detailed land use information about the new study area resulting from the relocated natural gas linear.

DATA REQUEST

187. For staff to determine the land use compatibility of the proposed rerouted natural gas line, please provide the zoning and general plan designations, and the Assessor's Parcel Number(s) of the parcel(s) proposed for the relocation of the natural gas linear.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

188. Please provide revised text, tables, and figures reflecting the proposed change in land use associated with the amended study area related to linears. At a minimum, the potable water/natural gas and carbon dioxide portions of the following tables from the May 2009 Revised AFC need to be updated.

A. Table 5.4-4, Important farmlands within the study area according to the State of California Farmlands Mapping and Monitoring Program (FMMP).

B. Table 5.4-5, Williamson Act contract lands within the study area.

C. Table 5.4-3, Existing crop types within the study area.

D. Table 5.4-7, Kern County General Plan Land Use designations within the study area.

E. Table 5.4-2, Existing land uses within the study area.

F. Table 5.4-8, Kern County Zoning designations within the study area.

RESPONSE

A response to this data request has been provided under confidential cover.

BACKGROUND

Natural Gas Linear

Section 2.3 (Relocation of Natural Gas Linear), page 2-3, of the August 2010 Linear Modifications states that the linear would cross I-5 and the East Side Canal; however, no discussion is provided regarding the pipeline crossing at Highway 58 and the Southern Pacific Railroad.

DATA REQUEST

189. Please include a schedule indicating when the required encroachment permits and/or requests for right-of-way (for all crossings) from Cal Trans, the Southern Pacific Railroad, Kern County, and other agencies with jurisdiction, will be obtained and the steps taken to obtain them.

RESPONSE

A response to this data request has been provided under confidential cover.

DATA REQUEST

190. Please clarify whether the Hwy. 58/Southern Pacific Railroad crossing would also use horizontal directional drilling. Please revise Figure 2-8, Project Location Details to indicate the location of any new entry and exit pits.

RESPONSE

A response to this data request has been provided under confidential cover.

Technical Area: Soil and Water Resources (a)
Author: Mike Conway

BACKGROUND

Industrial Water Supply

The proposed project would use an annual average of about 4.2 million gallons of groundwater per day and up to 6 million gallons per day (gpd) in summer. This is equivalent to an average water use of 4,741 acre-feet per year (AFY). The applicant however has arranged to receive up to 7,500 AFY.

The applicant proposes to use Buena Vista Water Storage District (BVWSD) groundwater supply based on economic feasibility, availability, quality, and reliability. The applicant sought water of poor quality with the goal of using the worst available water for cooling at the proposed plant. As part of the BVWSD Brackish Groundwater Remediation Program (BGRP), the HECA project would receive up to 7,500 AFY of groundwater from the BVWSD. The BVWSD would deliver the water via pipeline to the project site located 15 miles southeast of the proposed wellfield. In August of 2008, the applicant and BVWSD signed a "Summary of Proposed Water Transfer Terms" that explains the specific terms of the water supply agreement (FEIR 2009). The will-serve letter signed by Hydrogen Energy International and BVWSD states that the water supply for HECA would vary between 1,000 mg/L to 4,000 mg/L, with an average of 2,000 mg/L. This water is described by BVWSD as having few uses and also as being the cause of low crop yield and low crop quality within the district.

The project's industrial water would be supplied via Component 4 of BVWSD's water management program titled the Brackish Groundwater Remediation Project (BGRP), which is described in the district's 2009 Final Environmental Impact Report. According to district records, the portion of the district south of 7th Standard Road is underlain by groundwater having total dissolved solids (TDS) concentrations ranging from 300 to 1,000 mg/L, whereas areas to the north are underlain by ground water with concentrations ranging from 1,000 to 4,000 mg/L. The purpose of the program would be to remediate shallow perched and brackish groundwater that has adversely impacted plant growth and crop yield within the district. The program would seek to operate two strategic pump zones called Target Area A (north of 7th Standard Road) and Target Area B (mostly south of 7th Standard Road). Combined extraction of the BGRP could total up to 12,000 AFY (FEIR 2009).

The HECA project would receive water from Target Area B, which is located along the west-central edge of the district. Up to ten wells are planned for this area designed to extract brackish groundwater with TDS concentrations ranging from 700 to 4,000 mg/L located within 200 to 700 feet below the ground surface. The water quality produced by the extraction wells is expected to be a mix of water relatively high in TDS concentrations originating west of the well field and low TDS concentrations water from the east. The location of the proposed wells is intended to reduce the lateral inflow of the high TDS concentration groundwater from the west (FEIR 2009).

The Hydrogeologic Data Acquisition Report prepared by the applicant provides data from multiple pump tests and water quality sampling results within the Target Area B vicinity. The report concluded that TDS within the vicinity ranged from 860 mg/L to 4,300 mg/L and that in some instances vertical stratification of TDS concentration occurs. For example, the report describes vertical zones of salinity in well C-8: TDS concentrations of 530 mg/L in the upper 100 feet of the water column in the well, TDS concentrations of 950 mg/L in the 100-140 feet depth interval, and 1,220 mg/L TDS concentrations in the 140 to 213 feet depth interval.

Similarly in Well C-3, the applicant reported the water column has TDS concentrations zones that range from 500 mg/L to 1,500 mg/L between the water surface and a depth of 140 feet below the water surface. Water samples from other wells in the general vicinity of these two wells contain even higher TDS concentrations, such as Well 70A (4,300 mg/L), Well 96 (2,900 mg/L), and Well 98 (2,400 mg/L).

The distribution of salinity varies throughout the proposed target area, but does not appear to provide quantitative evidence that a long-term water supply with average TDS concentrations of 2,000 mg/L could be obtained over the life of the project. Because the quality of the water supply is important to understanding the reasonableness of its use (cooling), it is important for staff to establish, with some degree of confidence, the expected long-term quality of the proposed HECA project water supply.

The proposed array of wells would mix water of two distinct sources, water from the east and water from the west. The approach is intended to shift the interface between westerly groundwater that is reportedly relatively high in TDS concentrations and easterly groundwater reportedly relatively lower in TDS concentrations. The westward migration of relatively low TDS concentration groundwater from the east is intended to improve overall groundwater quality conditions beneath the district. While staff does not disagree that a shift in interface location can increase the area underlain by lower TDS concentrations groundwater, it is not clear why it is necessary to mix the two waters. As proposed, staff cannot conclude that the proposed pumping layout maximizes the capture of poor quality groundwater flowing into the district from the west and minimizes the extraction of higher quality groundwater flowing from the east.

Staff is also having difficulty determining or verifying that the "axial" interface of the water from the east and west is located east of the proposed wellfield. A report published by the California Department of Water Resources (DWR), "Report on Proposed Belridge Water Storage District" in 1961, describes the axial interface as not being any further east than the West Side Canal. If this is true, project pumping would induce flow of lesser quality water into the district. The same report contains groundwater quality data gathered from within BVWSD. Three wells were sampled immediately east of the proposed HECA wellfield. These wells contained water with TDS values ranging from 390 to 414 mg/L. Though data contained within this report is dated, staff is unable to identify more recent data that demonstrates that pumping would not induce flow of poor quality water into areas of higher quality groundwater. For instance, the Hydrogeologic Data Acquisition Report provides no further data or confidence that supports the applicant's claim that the axial interface is within BVSWD. TDS data from the 1961 DWR report also indicates that better quality water may exist in close proximity to the proposed Target Area B wellfield. The DWR report also generally describes a groundwater flow gradient within Belridge as being to the northeast. The applicant however proposes that water flowing from Belridge is flowing in a southeasterly direction. This evidence might explain the presence of higher TDS water in the north end of the Buttonwillow Service Area and lower TDS water in the southern portion of the district, which would also support the conclusion in the FEIR that groundwater south of 7th Standard Road is generally in the range of 300 to 1,000 mg/L TDS.

Waters containing 3,000 mg/L TDS or less qualifies as a potential source for municipal and domestic supply worthy of protection under the state Water Boards Drinking Water Policy (88-63), which was updated in 2006. Accordingly, staff does not view pumping 2,000 mg/L TDS water as reclamation, and labeling it as such is in conflict with 88-63 rather than complimentary. Staff also cannot find an example of where pumping a water body protected for municipal and domestic supply quality water qualifies as reclamation under state recycle, reuse, and reclamation policies.

Staff is unable to adequately address impacts to water quality from the proposed pumping for the following reasons:

- The quality of the supply is an important factor for staff to consider in determining the reasonableness of cooling versus other uses within the district. Staff does not have a clear understanding of the vertical and areal distribution of high TDS water within the aquifer and its implications for the long-term reliability of a 2,000 mg/L groundwater supply.

- BVWSD has identified beneficial uses of both the high and low TDS concentrations groundwater. Staff cannot understand the necessity of mixing and extracting relatively low TDS concentrations groundwater from the east with higher TDS concentrations groundwater from the west. Different well locations conceivably could accomplish the goal of removing high TDS concentrations groundwater without mixing and degrading the lower TDS concentrations groundwater from the east.

- No well water sample data was presented from areas west of the district. Staff therefore cannot conclude with any confidence that groundwater west of BVWSD's Buttonwillow Service Area and Target Area B is of sufficiently high TDS concentrations to justify pumping for project use.

- The proposed supply to the HECA project appears only marginally degraded and suitable for uses with or without treatment. Staff therefore cannot reconcile how this project's water supply would be considered reclaimed.

- The Zone of Influence from the proposed well extractions (the areal extent of water stored in the aquifer that will be removed by extraction) is not adequately defined.

DATA REQUEST

191. Please provide staff a map showing well-water quality data and the axial interface location between east and westward flowing water, groundwater TDS concentrations west of the proposed well field, the expected zone of influence of the well field. Include a quantitative estimate of expected long-term quality of water produced by the well field.

RESPONSE

Available total dissolved solids (TDS) data from within the Buena Vista Water Storage District (BVWSD) service area are presented on Figure 191-1, which is being submitted under separate confidential cover. This figure includes the most recent TDS data from BVWSD's water chemistry database (Database), collected from January 2000 to October 2007. It also includes TDS data collected during URS' Hydrogeologic Data Acquisition Report (HDAR) field program between September 2009 and January 2010. The TDS data from the HDAR field program were previously provided to the CEC on Revised Figure 4 in the Draft HDAR Addendum, dated April 2010. The data provided by BVWSD in their Database includes TDS data from July 1941 through October 2007 for wells throughout the BVWSD service area and some areas east of the BVWSD service area. BVWSD's Database does not include data west of BVWSD. Please note that the well locations from the Database are approximate (i.e., located to the nearest Township/ Range, Section, and 40-acre parcel).

Figure 191-1 shows an axial interface east of the proposed HECA Well Field between good-chemistry (i.e., low TDS) groundwater (<2,000 milligrams per liter [mg/L] TDS) and poor-chemistry (i.e., high TDS) groundwater (>2,000 mg/L TDS). The poor-chemistry groundwater area to the west of the axial interface is defined by TDS concentrations ranging from 2,900 mg/L (Well 96, east of the southern portion of the proposed HECA Well Field) to 4,300 mg/L (Well 70A, northeast of the proposed HECA Well Field). The good-chemistry groundwater area east of the axial interface is defined by TDS concentrations ranging from 530 mg/L to 1,510 mg/L.

The current location of the interface, as mapped by the recent BVWSD data, is based on a much higher density of data and reflects an aquifer condition that is 50 years more recent than that described in the "Report on Proposed Belridge Water Storage District, Kern County," published by the Department of Water Resources (DWR) in 1961 (1961 DWR publication), which was cited by the CEC in the "Background" section of this Data Request. The data in the 1961 DWR publication are almost 50 years old and include TDS concentrations from five wells within the proposed boundary of the Belridge Water Storage District and other wells east of the Belridge Water Storage District. The 1961 DWR publication acknowledges the limited nature of the data on page 40:

> *"It is apparent that, on the basis of the limited number of analyses available, these mixed, or 'axial' waters as they are often called, extend only as far west as the West Side Canal."*

In fact, the 1961 "Report on Proposed Belridge Water Storage District, Kern County," was a study of the feasibility of importing water, undertaken because groundwater chemistry within the Proposed Belridge Water Storage District was poorly suited for agricultural use.

The TDS data presented by the Applicant on Figure 191-1 were collected within the last 10 years from 15 wells within or near the eastern boundary of the BVWSD service area, and in some cases include data from multiple sampling events. Therefore, these data, which are more reliable, are reflective of current conditions, and constitute the appropriate basis for well-field analysis, demonstrate that the axial interface lies east of the proposed HECA Well Field.

The Applicant was not able to obtain groundwater chemistry data west of the BVWSD service area, but that part of the Belridge Water Storage District is not under active agricultural production (as shown on the Figure 191-1 aerial photograph base) and, because of poor groundwater chemistry, continues to be unusable for agriculture. The Applicant acquired an Environmental Data Resources, Inc. (EDR) Geocheck® report in October 2010, which identified wells within a 3-mile radius from a central point located 3 miles west of the proposed HECA Well Field. The EDR report identified mostly oil and gas wells, with some state and U.S. Geological Survey wells within the 3-mile radius search. However, TDS data were not provided for any of the wells.

Despite the lack of TDS data west of BVWSD, it is widely accepted that groundwater west of BVWSD is of poor chemistry due to high TDS concentrations. The 1961 DWR publication notes that TDS from the five wells within the Belridge Water Storage District range in concentration from 2,848 mg/L to 13,800 mg/L. The Applicant understands, from an October 2010 discussion with the Kern County Water Agency (KCWA), that the KCWA lacks data for the area west of BVWSD, because TDS is so high and groundwater is not used for either agricultural or domestic purposes.

In Appendix O2 (Groundwater Model Documentation) of the Revised AFC, the Applicant stated (and, on Figure 11, illustrated) that the particle tracking results show the net movement induced

by Project pumping to be approximately 0.8 mile toward the proposed HECA Well Field. The net zone of influence caused by the net groundwater movement from Project pumping is illustrated on Figure 191-1. This net zone of influence does not consider actual groundwater conditions, only the net change in groundwater conditions caused by Project pumping as simulated by a numerical groundwater flow model and particle tracking model. As illustrated on Figure 191-1, the 25-year net capture zone is west of the axial interface between good- and poor-chemistry groundwater.

Based on the recent TDS data and the location of the net capture zone, the proposed HECA Well Field lies west of the axial interface, and the Project will pump poor-chemistry groundwater throughout the 25-year duration of the Project.

The data collected during the HDAR field program indicate that the local aquifer characteristics (hydraulic parameters) and groundwater chemistry in the west side of the BVWSD service area remain favorable for installation of a process water well field in Target Area B. The data also confirm that the hydraulic parameters assumed and applied to the groundwater model in Appendix O of the Revised AFC are appropriate. Therefore, the data collected during the HDAR field program substantiates the 0.8-mile net zone of influence calculated by the model which, based on the recent available TDS data (Figure 191-1), means that the proposed HECA Well Field will pump poor-chemistry groundwater during the 25-year duration of the Project.

DATA REQUEST

192. Please estimate the net benefit of the proposed pumping in terms of salt removal. Quantify the rate and mass of salt removed as a result of the project, considering appropriate boundary conditions for the areal extent of the impact/benefit, i.e., BVWSD, Kern County Subbasin.

RESPONSE

Figure 5.14-14 of the Revised AFC, dated May 2009, includes a graph of the rate of salt removal based on pumping rate and TDS concentration. This chart shows that at a proposed Project pumping rate of 7,500 acre-feet per year (afy), the mass removal of salts will range from approximately 10,000 tons per year at a TDS concentration of 1,000 mg/L to approximately 30,000 tons per year at a TDS concentration of 3,000 mg/L. Assuming a Project pumping rate of 4,700 afy, the mass removal of salts will range from approximately 6,000 tons per year at a TDS concentration for 1,000 mg/L to approximately 19,000 tons per year at a TDS concentration of 3,000 mg/L.

There are no known boundary conditions within the 0.8-mile net zone of influence, discussed above in the response to Data Request 191. As shown on Figure 5.14-3 of the Revised AFC, the proposed HECA Well Field lies within the Buttonwillow Subbasin, which extends approximately 7 miles to the east and west of the proposed HECA Well Field.

DATA REQUEST

193. Please estimate the volume of water that may be degraded by increasing TDS to greater than 3,000 mg/L over the life of the project.

RESPONSE

Groundwater chemistry will not be degraded over the life of the Project. As discussed in the response to Data Request 191 and shown on Figure 191-1, the proposed HECA Well Field lies west of the axial interface between good- and poor-chemistry groundwater, and the Project will pump poor-chemistry groundwater throughout its 25-year duration.

The specific intent of the BVWSD Brackish Groundwater Remediation Project (BGRP) Area B picket fence well field (the proposed HECA Well Field) is to improve local groundwater chemistry. By design configuration, the proposed HECA Well Field will use a line of extraction wells that will reduce the inflow of brackish groundwater entering from the west while promoting the movement of better chemistry groundwater from east to west (i.e., Data Requests 191 and 192 localized capture and removal of salts while shifting the axial interface of better chemistry groundwater to the west). For the BVWSD, the hydraulic effect of the proposed HECA Well Field's operation will significantly improve the groundwater chemistry in the zone of maximum benefit (presented on Figure 193-1, which is being submitted under separate confidential cover), providing the opportunity for local farming interests to grow more economically viable crops or, in some cases, put fallowed ground back into production.

As shown on Figure 193-1, there are two areas that will benefit from HECA Well Field operation.

Area 1, salt shadow, represents the zone of net TDS mass movement induced by Project pumping. This area includes the net capture zone, as described in the response to Data Request 191 and shown on Figure 191-1; and the area between the capture zone and the simulated net axial interface after 25 years of pumping, as described below. During Project operations, the zone of blending in Area 1 would be expected to increase to the east of the well field, as induced westward movement of lower TDS groundwater dilutes TDS within that zone of higher TDS groundwater.

Area 2 (zone of maximum benefit) is the area between the current estimated axial interface and the simulated net axial interface, and represents the westward shift of the axial interface during the 25 years of Project pumping. The simulated net axial interface is the net movement of the axial interface, simulated by tracking the movement of particles originating along the axial interface, using the groundwater flow model presented in Appendix O2 of the Revised AFC.

Both Area 1 and Area 2 lie entirely within BVWSD. The well field is specifically designed to benefit the local farmers by creating groundwater flow that lowers, not raises, TDS over time. The proposed HECA Well Field will not change the TDS of the groundwater to the west of the wells, where there is no active farming, but instead will reduce the TDS of the groundwater to the east of the wells, where active farming is taking place.

DATA REQUEST

194. Please discuss how BVWSD will reconcile the potential mixing of higher quality groundwater that has specified uses identified by the District with lower quality groundwater that limits or impacts other beneficial uses.

RESPONSE

As stated in the response to Data Request 191 and further elaborated in the response to Data Request 193, the proposed HECA Well Field will not pump good-chemistry groundwater. Because the axial interface between good and poor groundwater chemistry is east of the proposed HECA Well Field, HECA Project pumping will pull the axial interface between good- and poor-chemistry groundwater to the west, thereby increasing the volume of good-chemistry groundwater within the BVWSD service area. This will help to increase crop diversity and crop yield within BVWSD.

The Applicant does not expect the zone of mixing to widen, but does expect it to move westward, the same way that picket-fence well arrays retard marine saltwater encroachment into shoreline aquifers and are used for contaminant plume capture. The westward migration of the interface is the intended BGRP positive impact that BVWSD wants to achieve through the extraction of salty water from this specific well-field array and location.

DATA REQUEST

195. The "Term of Water Transfer" states that average TDS in the groundwater supply from BVWSD will be "about" 2,000 mg/L TDS and range between "about" 1,000 and 4,000 mg/L TDS. This quality specification does not appear to ensure water that could be considered a drinking water supply would be protected for future uses or use consistent with BVWSD's. Please explain what metrics shall be used and conditions put in place to reassure staff that only the described quality will be provided to and utilized by the power plant.

RESPONSE

Pursuant to California State Water Resources Control Board Resolution 75-58, entitled "Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling" (Resolution 75-58), "the source of powerplant cooling water should come from the following sources in this order or priority depending on site specifics such as environmental, technical, and economic feasibility consideration: (1) wastewater being discharged to the ocean, (2) ocean, (3) brackish water from natural sources or irrigation return flow, (4) inland wastewaters of low TDS, and (5) other inland waters." Resolution 75-58 defines "brackish waters" as ". . . all waters with a salinity range of 1,000 to 30,000 mg/L and a chloride concentration range of 250 to 12,000 mg/L." The water proposed for use by HECA meets this definition of brackish waters, and is therefore consistent with relevant policy regarding the use of inland waters for power plant cooling.

The interplay between Resolution 75-58 and State Water Board Resolution 88-63 (Resolution 88-63), cited in the background discussion, was addressed by the State Water Resources Control Board in a letter to CEC Executive Director Melissa Jones dated January 20, 2010. In that letter, the State Board stated the following:

> More specifically, your questions relate to Resolution 75-58's definitions of "brackish waters" and "fresh inland waters" and Resolution 88-63's treatment of "sources of drinking water." "Brackish waters" is defined by Resolution 75-58 as "waters with a salinity range of 1,000 to 30,000 mg/L and a chloride range of 250 to 12,000 mg/L" (State Water Board Resolution 75-58, p. 2). "Fresh inland waters" is defined by Resolution 75-58 as "those inland waters which are suitable for use as a source of domestic, municipal, or agricultural water supply and which provide habitat for fish and wildlife." *(Ibid.)* As a general matter, that means "fresh inland waters" for purposes of Resolution 75-58 does not extend to groundwater, which typically does not provide fish or wildlife habitat. On the other hand, State Water Board Resolution 88-63 generally provides that all surface waters and ground waters with a TDS of 3,000 mg/L or less shall be considered to be suitable for municipal or domestic water supply.
>
> The Commission's primary issue revolves around whether brackish waters with a TDS of between 1,000 and 3,060 mg/L should be considered to be fresh inland waters in the context of Resolution 75-58's Principle No. 2. The answer is typically yes for surface waters and no for ground waters. Due to the State Water Board's subsequent adoption of Resolution 88-63, which establishes the threshold of 3,000 mg/L TDS for suitability, or potential suitability, for domestic or municipal water supply, surface waters that support fish and wildlife habitat and have TDS concentrations of 3,000 mg/L or less should be considered to be "fresh inland waters" for the purposes of Resolution 75-58's Principle No. 2. As a result, such waters should only be used for these renewable energy projects upon a demonstration that the use of other water supplies or other methods of cooling

would be "environmentally undesirable" or "economically unsound." With respect to ground waters, they would not be considered "fresh inland waters" because they do not provide habitat for fish and wildlife.

Furthermore, evaluation of the specific circumstances of this project support the conclusion that the proposed cooling water supply is in conformity with state water policy. Water for the project would be supplied pursuant to Component 4 of BVWSD's water management program, the BGRP, which is described in the district's 2009 Final Environmental Impact Report. The purpose of the program is to remediate shallow perched and brackish groundwater that has adversely impacted plant growth and crop yield within the district. Thus, the proposed water supply plan is part of, and consistent with, specific objectives to improve the quality of groundwater in the vicinity of the project.

During the Project, groundwater from the proposed HECA Well Field will be monitored by BVWSD as part of their groundwater monitoring plan, as presented in Appendix B of the Final Environmental Impact Report (FEIR) for the BVWSD Buena Vista Water Management Program, dated December 2009. The goal of the monitoring plan will be to evaluate groundwater quality changes within the proposed HECA Well Field throughout the 25-year duration of the Project, and to verify that only poor-chemistry groundwater (i.e., TDS concentrations exceeding 2,000 mg/L) is pumped. If TDS concentrations are consistently below the threshold of poor-chemistry groundwater at any of the Project pumping wells, the affected well(s) will be turned off and the CEC will be notified.

The BVWSD proposes an operating plan that considers regular water chemistry monitoring at the Project well heads at frequencies adequate for statistically-representative reporting over time. This includes: 1) transient sampling until the newly installed wells have stabilized; 2) an initial stabilized general chemical/mineral and chemical of concern (COC) monitoring round to characterize water chemistry; 3) regular well-head proxy sampling (such as electrical conductivity [EC], pH, or temperature) for temporal trends and threshold monitoring (i.e., EC equating to TDS concentration threshold markers); and 4) general mineral/chemical and COC sampling annually or as deemed necessary for process control and/or trend analyses. The BVWSD proposes monitoring adjacent wells on a similar basis for detection monitoring and impact analysis, sufficient to meet Project objectives and requirements.

DATA REQUEST

196. Please describe what safeguards are in place to ensure if high quality groundwater that does not meet the water transfer terms will not be pumped and whether an alternative reliable supply is available.

RESPONSE

As described above in the response to Data Request 195, a groundwater monitoring/operating plan will be followed by BVWSD during the 25-year duration of HECA Project pumping. If TDS concentrations are consistently below the threshold of poor-chemistry groundwater, the affected well(s) will be turned off. There is no alternative reliable supply of groundwater for HECA process water. No alternatives have been identified as viable or reliable sources of on-demand and sustainable process water supplies for the HECA Project (respective of yield and appropriate water chemistry).

BVWSD proposes an operating plan that considers the following good-chemistry groundwater breakthrough mitigations: 1) isolating and plugging back aquifer zones to eliminate recovery of good-chemistry groundwater; 2) isolating or shutting down wells to eliminate recovery of good-chemistry groundwater; 3) using an existing well that is 0.25 to 0.5 mile away from the proposed BGRP well field and has acceptable TDS concentrations; and/or 4) drilling replacement wells, as necessary, in adjacent areas of elevated TDS.

There is an abundant alternative supply of high-TDS water along the western boundary of BVWSD immediately adjacent to the proposed HECA Well Field. The proposed HECA Well Field can be expanded both to the north and to the south into the broader area of poor groundwater chemistry. At 0.25- to 0.5-mile well spacings, a contiguous, three-well array is only 0.5 to 1 mile long; whereas the proposed area for the HECA Well Field is 2½ miles long, providing 2 to 5 times more linear target area than is needed to satisfy the 25-year extraction requirements of the Project. This extra area is equivalent to a primary supply 200 to 500 percent larger than necessary, or it may be seen as a primary supply surrounded by an alternate supply fully capable of completely replacing or augmenting the primary supply by 100 percent or more.

DATA REQUEST

197. Please describe other well configurations that could eliminate the need to mix better quality water with lower quality water for the project water supply. Are there other well configurations that could more effectively capture high TDS water without mixing it with the relatively low TDS concentrations water from the east?

RESPONSE

The Applicant and BVWSD believe that the current well configuration at Target Area B is optimal for the intended purpose of the BGRP Area B HECA Well Field process water supply, while providing maximum benefit to that local area of the BVWSD. As shown on Figure 5.14-2 of the Revised AFC, this configuration consists of five pumping wells located along the west-central edge of the BVWSD service area at 0.25-mile spacing. Two to three of the five wells would be pumping at any given time, depending on ambient conditions and plant operations. As discussed in the response to Data Request 191 and further elaborated on in the response to Data Request 193, this configuration will pump poor-chemistry groundwater during the 25-year duration of Project.

As stated in the response to Data Request 194, the Applicant does not expect the proposed HECA Well Field to induce any water quality mixing in the aquifer, nor does the Applicant expect the operation of the proposed HECA Well Field to change the nature of the aquifer mixing that presently occurs naturally along the interface. A linear well field array oriented perpendicular to the direction of groundwater flow and located between an upgradient source and a downgradient zone of benefit is the optimum configuration for COC interception and capture. There are no better well configurations for this purpose. Longer well arrays create wider zones of benefit, but the per-well size of the zone of benefit is approximately the same for all such linear arrays.

DATA REQUEST

198. The Final Environmental Impact Report (2009) for the BVWSD indicates that groundwater located south of 7th Standard Road is generally in the range of 300 to 1,000 mg/L TDS, whereas water to the north of 7th Standard Road is 1,000 mg/L TDS. The proposed project wells are located south of 7th Standard Road. Please explain why the proposed wellfield would be located in the portion of the district containing better water.

RESPONSE

The statement made in the FEIR is extremely general and, based on data presented on Figure 191-1, perhaps written to emphasize a different aspect of the BVWSD BGRP. Data presented on Figure 191-1, which were collected between 2000 and 2010, do not illustrate a TDS concentration "divide" at Seventh Standard Road. As shown, TDS concentrations north of Seventh Standard Road range from 593 to 4,300 mg/L and TDS concentrations south of Seventh Standard Road range from 673 to 3,900 mg/L. Therefore, the proposed HECA Well Field is not in the portion of the district containing better-chemistry water. As described in detail in the response to Data Request 191, the Project pumping wells will pump poor-chemistry groundwater throughout the 25-year duration of the Project.

The Applicant also notes that this statement is not consistent with Figures 6 and 10 of the BVWSD FEIR. Figure 6 clearly shows areas south of Seventh Standard Road where TDS concentrations range from 1,000 to more than 3,000 mg/L. Figure 10 shows the location of the BGRP Proposed Target Area B along the west side of the BVWSD (which includes the proposed HECA Well Field) and corresponds to those areas of elevated TDS south of Seventh Standard Road.

For the purposes of the proposed HECA Well Field, the relevant water chemistry trends within the drillable depths of the deeper aquifer have already been mapped and presented, in collaboration and agreement with BVWSD technical staff, as poor-chemistry, Project-acceptable water to the west of an interface running down the center of the water district in the vicinity of the Project. From the Applicant's reading of the BVWSD FEIR, it appears that any north-south hydrological distinction that might approximately coincide with the location of Seventh Standard Road would be related to the increasing presence of shallow, perched water to the north. This has no bearing on the placement or operation of the proposed well fields and the deeper zones of interest. The Applicant therefore concludes that the FEIR text regarding a perceived boundary dividing the area refers to a different hydrologic system, and thus is not relevant to the HECA Project.

BACKGROUND

Project Water Use

The project's average annual water use is projected at 4,775 AFY. The project signed an agreement for up to 7,500 AFY. Staff cannot verify why such a discrepancy exists between supply and demand.

The project's overall water use is very high relative to its project power output. Staff analyzed the water flow diagram included in the Application for Certification (AFC) and understands that a portion of the supply would be used for gasification. The project still however appears to use an unprecedented volume of water for evaporative cooling.

DATA REQUEST

199. As discussed above, the average annual water use is projected at 4,775 AFY, but HEI signed an agreement for a supply up to 7,500 AFY. Please explain the necessity for a supply that is greater than 50 percent more than demand.

RESPONSE

The water contract between HECA and the BVWSD was negotiated in 2008, when deepwell injection was the proposed method of water disposal for the Project. Deepwell injection increases overall Project water demand significantly, and the water contract was negotiated on that basis. Subsequent to contract enactment, HECA reanalyzed water processing for the Project and changed the method of wastewater treatment to zero liquid discharge (ZLD). This design has yet to be completed, so the final projected annual water use remains unchanged.

DATA REQUEST

200. Please explain why the proposed power plant appears to be such an inefficient user of water relative to power output. Please further explain how this power plant would use the least amount of the worst quality per unit of power production.

RESPONSE

Water use per unit of net power output is reflective of large internal parasitic demand of the carbon dioxide separation and compression equipment. This large internal demand decreases net output and artificially increases water consumption per net MW exported. In light of this and to reduce water footprint, the HECA Project has undertaken significant effort to reduce water demand. The most significant output of this activity was the selection of a ZLD design, which eliminated liquid water discharge from the Project and dramatically improved the water footprint of the facility. The HECA Project productively uses all water consumed, either by vaporization for cooling needs or via chemical consumption for fuel generation, without losses from liquid-phase water discharge.

BACKGROUND

Alternative Water Supply

The Revised Application for Certification contains a brief description of the alternative water supplies considered for the project. The description of the alternative, agricultural wastewater is very brief and general. BVWSD's Water Balance (FIER, 2009) indicates that surface outflow from the agriculture-dominated district may be significant. Staff is also aware that BVWSD is exploring methods for treatment and options for reuse of agricultural drainage, see "Low-pressure reverse osmosis (RO) membrane desalination of agricultural drainage water," published in Desalination in 2003. Staff also notes approximately 12,000 to 15,000 acres of the Buttonwillow Service Area located north of the proposed well field (Target Area B) is affected by a shallow water table. This area is drained by a shallow subsurface tile drainage system which may generate a significant volume of drainage water supply. Use of this alternative water supply by HECA could provide dual benefits of root zone salt balance and improved soil aeration in the affected area.

DATA REQUEST

201. Please quantitatively show that tile drainage or shallow extraction well-water from the Buttonwillow Service Area is not a feasible alternative water supply for the project.

RESPONSE

BVWSD does not have a tile drainage system. Instead, BVWSD captures runoff in the Main Drain and sells it to the Semitropic Water District. The shallow perched aquifer in the northern area of BVWSD (Target Area A) is not available to HECA due to other planned BVWSD projects. Therefore, neither tile drainage nor shallow extraction well-water is a feasible water supply alternative for the Project. The only potential source of groundwater for HECA is from the proposed HECA Well Field in Target Area B.

Technical Area: Soil and Water Resources (b)
Authors: Marylou Taylor

BACKGROUND

Revising Drainage Erosion and Sediment Control Plan

The "Preliminary Storm Water Drainage Plan" (Revised AFC: Figure 2-36) appears to maintain separation of the non-contact runoff from the potentially contaminated runoff. The conceptual plans, however, do not specify how potentially contaminated runoff would not seep into the soil, beyond stating that dedicated basins would include impermeable liners and the inactive feedstock storage would include a 12-inch clay liner. Staff is particularly concerned about the inactive feedstock storage area. The Revised AFC includes limited information on how the applicant would manage this stockpile and ensure there would be no runoff that could impact surface or groundwater resources.

DATA REQUEST

202. Please revise the draft Drainage Erosion and Sediment Control Plan (DESCP) to include: the potential contaminants that would most likely be found in each lined basin and sump, the type of lining proposed and reason(s) why, the method(s) of conveyance to the basin, and maintenance performed during the operational life of the proposed project.

RESPONSE

The revised Draft Drainage, Erosion, and Sediment Control Plan (DESCP) is provided under separate confidential cover as Attachment 202-1. The requested information is provided under "Post-Construction Stormwater Management" (see pages 23 through 28 in the revised Draft DESCP). Potential contaminants that would be present in the process areas of the Project Site are identified in Tables 4 and 5 of the revised Draft DESCP. All hazardous materials would be properly stored, and spill prevention measures would be implemented to prevent stormwater contact with these materials. Retention basins #4 and #6 and sumps #2 and #3 would receive stormwater runoff from the process areas, as shown on Figure B-1 in Revised Appendix B of the revised Draft DESCP. These retention basins would be lined with high-density polyethylene (HDPE) because this material is chemically inert with the materials listed in Tables 4 and 5, if they were to reach the retention basins. Stormwater runoff from the process areas would be conveyed to the retention basins or sumps via an underground network of pipes made of cast iron or carbon steel and HDPE. The maintenance schedule is discussed on page 28 of the revised Draft DESCP.

DATA REQUEST

203. Please revise draft DESCP to include a plan to address how storm runoff in contact with the storage pile would be collected and conveyed and how this area would not contaminate the surrounding soil.

RESPONSE

As described in the response to Data Request 202, the revised Draft DESCP is provided under confidential cover as Attachment 202-1. Please refer to the "Post-Construction Stormwater Management" section on page 28 for a discussion of how stormwater from the inactive feedstock storage area will be handled. The inactive feedstock storage pile is an emergency 30-day supply. This will allow the plant to maintain operations even if the feedstock inbound is disrupted for an extended period of time. The emergency storage pile will be placed on an existing 6-foot low permeability sandy silt/clayey silty layer, where the top 12 inches will be excavated and recompacted to create an impermeable liner. Surface water runoff from the inactive feedstock storage area will be conveyed via concrete ditches along the pile perimeter to Sump #1, located in the southeast corner of this area (see Figure B-1 in Revised Appendix B of the revised Draft DESCP). Tiles drains connected to Sump #1 will be installed at the bottom of the pile to collect any runoff.

BACKGROUND

Construction Storm Water Run-off

In the Preliminary Hydrology Study, the applicant calculated the volume of storm water for each retention basin as required by Kern County, but did not supply information showing that basins would sufficiently retain these volumes. Staff needs assurance that no post-construction storm water runoff would leave the proposed HECA site. In addition, no analysis was provided by the applicant to show no construction-phase runoff (from rain events as well as from construction activities) would leave the site.

DATA REQUEST

204. Please revise the drainage areas shown on the "Civil Preliminary Hydrology Map" to correctly reflect contributing areas to each retention basin/sump, as shown by runoff flow patterns on the draft DESCP's "Preliminary Grading and Drainage Plan."

RESPONSE

As described in the response to Data Request 202, the revised Draft DESCP is provided under confidential cover as Attachment 202-1. Please refer to Figures B-1 and B-2 in Revised Appendix B of the revised Draft DESCP for the revised drainage areas for the operation and construction phases, respectively. These figures show the contributing areas to each retention basin and sump.

DATA REQUEST

205. Please revise the draft DESCP to include:

A. additional analysis for the operational phase of the proposed project showing that all storm water runoff is accounted for and that the retention basins and sumps are adequately sized and designed to Kern County standards (i.e., freeboard, side slopes, drawdown time).

B. analysis to show no construction-phase runoff (from rain events as well as from construction activities) would leave the site.

RESPONSE

As described in the response to Data Request 202, the revised Draft DESCP is provided under confidential cover as Attachment 202-1.

A. Please refer to pages 4 and 5 of Revised Appendix B for the additional analysis for the operational phase of the Project, which demonstrates that the six retention basins and three sumps have been sized to meet or exceed the Kern County standards.

B. Please refer to page 5 of Revised Appendix B for the additional analysis for the construction phase, which demonstrates that the five retention basins will retain stormwater runoff with adequate freeboard.

BACKGROUND

Off-site Runoff

The applicant's conceptual plans for managing storm water propose to prevent runoff from outside the site boundary from flowing onto the site. However, preliminary storm drainage plans do not show offsite flows for each phase of the proposed project, and the Preliminary Hydrology Study does not address offsite areas that would produce flows to the proposed site. Furthermore, staff discovered that the existing onsite irrigation ditches are actually drainage ditches that convey irrigation runoff through the proposed site from adjacent properties. The applicant proposes to fill these ditches, but shows no plans to divert these flows around the proposed site. Without a clear plan showing how offsite storm runoff or irrigation runoff would be diverted around the proposed site, the project could result in flooding offsite.

DATA REQUEST

206. Please revise the draft DESCP to demonstrate that the proposed project would not cause offsite flooding during either the construction phase or the operational phase.

RESPONSE

The revised Draft DESCP, provided under confidential cover as Attachment 202-1, includes a discussion of offsite flows and the irrigation ditches that cross the Project Site (see "Watercourses and Critical Areas" on pages 5 and 6). As shown on Revised Figure 3 of the revised Draft DESCP, the topography in the vicinity of the Project Site is relatively flat, with a very gentle slope from the southeast to the northwest. In general, the roads in the vicinity of the site are slightly raised above the agricultural fields. Tupman Road, along the eastern boundary of the site, and the levee associated with the irrigation canal south of the site create barriers that limit runoff from upstream (i.e., from the east and south) areas flowing onto the site. Similarly, the roads at the downstream edges of the site (e.g., Dairy Road along the western boundary and Adohr Road along the northern boundary) limit the amount of runoff that leaves the Project Site.

An irrigation ditch crosses approximately three-quarters of the Project Site from south to north, and then runs diagonally northwest through the former natural fertilizer manufacturing plant area and ends just south of Adohr Road. This ditch feeds the smaller irrigation ditches that traverse the Project Site from north to south and east to west around the crop fields. These irrigation ditches are fed with water pumped from the canal south of the Project Site, which is supplied by the West Side Canal and the East Side Canal. The canal no longer connects to the property north of the Project Site. The canal crossing the Project Site is used only for irrigation and drainage within the Controlled Area of the Project; therefore, filling in the canal will not impact any offsite drainage paths of adjacent properties.

BACKGROUND

Pipeline Installation Across Waterways

Water course crossings where Horizontal Directional Drilling (HDD) would not be used would instead be crossed by traditional open trench methods. Potential construction-related impacts of an open trench crossing a water course include: increased sediment delivery to the water flow through disturbance of the channel bed and banks during construction; destabilization of the channel bed and banks resulting in long-term erosion; and introduction of foreign contaminants through the use of heavy machinery in the channel. The applicant lists several Best Management Practices (BMPs) in the draft DESCP to implement during construction of the proposed linear facilities, but no information was provided to address pipeline installation across waterways such as irrigation ditches.

DATA REQUEST

207. Please revise the draft DESCP to demonstrate that impacts to soil and water resources would be less than significant during pipeline installation across waterways such as irrigation ditches.

RESPONSE

The revised Draft DESCP, provided under confidential cover as Attachment 202-1, includes a discussion of the pipeline crossing water bodies like irrigation canals (see "Process Water, Natural Gas and Carbon Dioxide Pipelines" on pages 10 through 12). The revised Draft DESCP proposes to perform an assessment of the site conditions when the pipelines route crosses other water bodies like irrigation canals. The assessment will consider the canal-specific hydrologic conditions at the time of crossing, along with the landscape terrain features. If the open cut method is selected, the assessment will determine which variation of conventional open cut method would be used. When feasible, crossing of the canals will be performed when the canal is dry, using dry-ditch techniques. If water is present at the time of crossing a canal, sites will be evaluated on a case-by-case basis to determine if conventional open cut, flume variation of open-cut, or dam and pump variation of open-cut will be used.

BACKGROUND

Erosion-Control Best Management Practices

The applicant has proposed permanent erosion control measures to mitigate all potential soil related impacts from the operation of the proposed HECA project, stating in their draft DESCP that measures may include seeding, hydroseeding, and mulching of non-impervious areas. However, more information is needed to assure staff that all erosion-control BMPs would be properly applied after construction is complete and properly maintained during operation of the proposed HECA project.

Staff is particularly concerned about potential erosion that would occur in the following areas:

- the temporary laydown yards and temporary parking areas used during the construction phase (totaling about 145 acres) which would likely become compacted after 37 months of construction activity and traffic,
- the permanent earthen berms (located at the north and eastern-most fence line) which would be exposed to prevailing winds originating from north-west of the proposed site,
- the area surrounding the inactive feedstock storage pile which would experience occasional traffic from heavy mobile equipment accessing the pile.

DATA REQUEST

208. Please revise the draft DESCP to provide more information showing the type, location, timing, and maintenance plan/schedule of all erosion-control BMPs.

RESPONSE

The revised Draft DESCP, provided under confidential cover as Attachment 202-1, includes additional information on the type, location, timing and maintenance plan, and schedule of the erosion-control best management practices to be implemented after construction has been completed. See “Post-Construction Stormwater Management” on pages 23, 24, and 28 of the revised Draft DESCP.

BACKGROUND

Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) is proposed in selected areas to install underground pipelines. In response to Energy Commission's Data Request #106, the applicant submitted a "HDD Frac-Out Plan" on December 11, 2009. Staff recognizes that additional risks other than frac-outs are associated with HDD activities, such as soil heaving/settlement from drilling, water disposal from dewatering, erosion from work at entrance/exit pits, and damage/injury from inadvertently boring through existing utilities.

Staff requests a more comprehensive HDD Plan which includes the elements listed below. Note: Final approval of the HDD Plan by staff does not eliminate the need for the applicant to comply with and obtain encroachment permits from appropriate federal, state, and local agencies.

DATA REQUEST

209. Please provide a draft HDD plan that contains elements "A" through "G" below.

A. General description of work
- ***a. major equipment used, pipe materials and pipe sizes***
- ***b. pilot hole drilling procedure, reaming operation, pullback procedure, hydrostatic testing, and dewatering procedures***
- ***c. installation and monitoring of SWPPP facilities and conditions***
- ***d. site restoration plan***

B. Proposed pipe alignment
- ***a. typical layout of entrance/exit pits and staging areas, including distances from public and private properties***
- ***b. locate existing utilities near HDD activities***
- ***c. entry and exit point locations***
- ***d. profile showing angle of entry/exit and depth at every 50(?) feet***
- ***e. locations where pipe crosses roads, irrigation ditches, and the California Aqueduct (include distance between pipe casing and these facilities)***

C. Monitoring procedures
- ***a. pilot hole, reaming, and pullback***
- ***b. unintended frac-outs***
- ***c. ground surface movement (settlement or heave)***

D. Containment and control
- ***a. drilling fluids and additives used***
- ***b. drilling fluids delivery, recovery, and containment***
- ***c. method/location for final disposal of waste drilling fluids***
- ***d. frac-out contingency plan***

E. Hazardous materials contingency plan

F. Abandonment plan
- ***a. during pilot hole drilling***
- ***b. during reaming***

c. HDD realignment

G. Notification procedures

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

BACKGROUND

Feedstock Storage Area

The applicant proposes to store petroleum coke and coal at inactive feedstock storage areas on the site. No chemical analytical characterization of this material or potential runoff that could be generated from this material has been provided in the AFC. Staff is concerned that potentially contaminated discharges may originate from the inactive feedstock storage areas. Staff notes that applicant has proposed clay-lined and impermeable containment areas for feedstock storage areas but it is not clear why these are proposed or if they are sufficient to prevent migration of toxic and non-conventional pollutants.

DATA REQUEST

210. Please provide a complete characterization of wastes that could be generated during the above-described activities. Please provide all the information necessary for compliance with RWQCB requirements for onsite material storage and disposal systems (i.e., coal, petroleum coke and ash containments). The information provided should include copies of any ROWDs or Engineering Reports required by the RWQCB.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

Technical Area: Visual Resources
Author: Jeanine Hinde

BACKGROUND

Conceptual On-site Landscaping Plan

The Revised Application for Certification (revised AFC) prepared by the project applicant characterizes visual impact susceptibility and severity as "high" at key observation point (KOP) 1 and identifies a significant impact to visual resources at this location (see Tables 5.11-3 and 5.11-5 and p. 5.11-25 in the revised AFC). The revised AFC for the project includes a visual resources mitigation measure (VRMM-2) recommending preparation of a conceptual landscaping plan that includes on-site plantings to screen views of the project site (see p. 5.11-41 of the revised AFC). The visual resources section of the revised AFC does not provide a conceptual landscaping plan or visual simulations that Energy Commission staff need to assess the adequacy of on-site landscaping to screen views of the project site from KOP 1. Staff has concluded that additional project information is necessary before a significance conclusion can be reached for the impact at KOP 1. The Final Staff Assessment will include an assessment of the effectiveness of proposed on-site landscaping and other proposed conditions of certification to mitigate the impact at KOP 1.

DATA REQUEST

211. Please provide an electronic copy of a conceptual on-site landscaping plan for review by staff. The primary purpose of the plan is to show how landscaping at the project site will contribute to screening views to the maximum extent feasible for the view from KOP 1. Consistency with applicable sections of Chapter 19.86, Landscaping, of the Kern County Zoning Ordinance is required <http://www.co.kern.ca.us/planning/pdfs/ZO/2010_zo_updates.pdf.>). To ensure that the information provided in the on-site landscaping plan will allow for a thorough assessment of this impact, the plan will need to include these elements, at a minimum:

- ***Information on the type of plant species proposed; their size, quantity, and spacing at planting; expected height at 5 years and maturity; and expected growth rates. Staff requires preparation of this information by a qualified professional arborist or botanist familiar with local growing conditions.***
- ***Conceptual planting plan.***
- ***Use of landscaped earthen berms and/or other built screening devices to maximize the effectiveness of landscaping at the site. Electronic copies of 11-inch by 17-inch color photographic simulations at life size scale showing the landscaping 5 years after planting and at maturity from the viewpoint for KOP 1.***

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

Technical Area: Waste Management
Author: Ellie Townsend-Hough

BACKGROUND

Phase II Environmental Site Assessment

The Phase I Environmental Site Assessment (ESA) identified recognized environmental conditions (RECs) at the site. The RECs included staining on the ground surface, underground fuel oil storage tanks, and contaminated soil. In addition, there is an unidentified liquid discharge, and an uncontained tailings pile associated with the operation of the former Port Organics Products, LTD (POP) natural fertilizer manufacturing plant located on a portion of the proposed site. The presence of these conditions and derivation establishes the need for the applicant to complete and submit a Phase II ESA to staff.

The historical use of the proposed project site was agricultural, which suggests that pesticides and herbicides were likely used on the site. Common agricultural practices can result in residual concentrations of fertilizers, pesticides or herbicides in near-surface soil. The Phase I ESA did not identify this land use as a REC. To ensure that the concentrations of agricultural chemicals do not pose a potential health risk or hazard, the applicant should provide soil sampling and characterization of the parcel/project site. The California Department of Toxic Substances Control (DTSC) has prepared the "Interim Guidance for Sampling Agricultural Fields for School Sites (Second Revision August 26, 2002)." Staff believes this guidance or equivalent may be appropriate for further site analysis (See below).

DATA REQUEST

212. Please provide results of field sampling and analysis which adequately characterize the presence of harmful chemicals or conditions and identify whether there will be any risk to construction or plant personnel due to the presence of these chemicals. Samples should be assessed for persistent agricultural chemicals, such as organochlorine pesticides that were applied to the project property.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

DATA REQUEST

213. Please confirm that there is no site contamination related to underground storage tanks located on the proposed project site.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

DATA REQUEST

214. Please provide an estimated date for the demolition of the fuel oil tanks on the proposed project site, along with a schedule and work plan for investigation and possible remediation of soils in the vicinity of the tanks.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

DATA REQUEST

215. Please identify what constituents are in the PO fertilizer plant's contaminated soil and tailing piles located on the proposed project site. Please provide a schedule and work plan for investigation and possible remediation of soils and tailing piles that may pose a health and safety risk.

RESPONSE

As described in *Applicant's Requests for Extensions of Time and Objections to Certain Data Requests by the Energy Commission Staff Regarding Data Request Set Three (Nos. 153-218)*, docketed on October 26, 2010, the Applicant is requesting additional time to address this data request.

DATA REQUEST

216. Please provide information on any soil sampling and analysis or regulatory enforcement action that may have been taken related to the discharge pictured in Photo 21 of the Phase 1 ESA or other discharges related to the PO operation.

RESPONSE

The Applicant found no additional information regarding soil sampling and analysis or regulatory enforcement action related to the liquid discharge from a Port Organics sump to a drainage ditch near the northwest corner of the HECA Project Site. The 2007 Inspection Report from the Kern County Environmental Health Services Department, which documents their observation of discharge, was included in the Phase I Environmental Site Assessment. This discharge was not included in the "Report of Violations" or the "Corrective Actions" that were attached to the 2007 Inspection Report. The discharge was not mentioned in the County's 2008 "Consent Order." No additional information has been found.

No record was found of any other liquid discharges related to the Port Organics operations. The Port Organics operations ceased shortly after the 2009 Phase I Environmental Site Assessment field reconnaissance.

BACKGROUND

Gasification Waste

The applicant states on page 5.13-12 of the Hydrogen Energy (HECA) Project revised Application for Certification (AFC) that similar gasification wastes from Integrated Gasification Combined Cycle (IGCC) facilities outside of California have been determined to be nonhazardous based on federal leachate tests. However, the applicant has not provided specific references to document their assertions nor provided other information to demonstrate that the gasification waste from the proposed project will be found to be nonhazardous based on California's leachate testing protocol, which is different than the federal leachate testing protocol.

DATA REQUEST

217. Please provide documentation that supports the applicant's statement in the revised AFC that similar gasification wastes from Integrated Gasification Combined Cycle (IGCC) facilities outside of California have been determined to be nonhazardous based on federal leachate tests.

RESPONSE

Because the HECA Project gasification solids have not yet been generated, it is not yet possible to conclusively demonstrate the nonhazardous nature of the HECA gasification solids. However, the Applicant has made projections of the anticipated nature of the gasification solids based on the available information on the gasification solids from existing Integrated Gasification Combined Cycle (IGCC) facilities. The Applicant has conducted literature searches to compile data on the composition and leachability of the existing gasification solids. Although one of the IGCC facilities was located in California (the Cool Water facility, which operated and closed in the 1980s), only federal Toxic Characteristic Leaching Procedure (TCLP) leachability data were found for any of the IGCC facilities. Table 217-1 presents a comparison of the federal TCLP laboratory results from these IGCC facilities. The table also presents the TCLP regulatory thresholds for regulation of each constituent as a hazardous waste under the federal Resource Conservation and Recovery Act (RCRA) regulations.

The following paragraphs summarize the similarity of the compared IGCC facilities to the HECA Project, and the process that each plant went through to define the nature of its gasification solids.

Polk Power Station – Tampa, Florida

Tampa Electric Company's Polk Power Station in Tampa, Florida, operates a General Electric (GE) gasifier (which was originally designed by Texaco) on coal and on blends of petroleum coke and coal. In late 2008, the Center for Applied Energy Research at the University of Kentucky published a report on gasification byproducts (Groppo and Rathbone, 2008). The study described in this report included collection and characterization of gasification byproduct samples from Polk Power Station. The TCLP test results demonstrated that the gasification solids are not hazardous by federal standards, even when the gasification solids are ground to a finer particle size.

Cool Water Demonstration Plant – Barstow, California (no longer in operation)

A technical paper (Choudhry and Hadley, 1992) presents an overview of the experimental work that has been conducted to characterize samples of gasification solids from various gasifiers, including the Cool Water Demonstration Plant. The Cool Water facility featured the Texaco gasification process that was subsequently acquired by GE and that is part of the HECA Project design. The paper stated that "the Cool Water slag was classified as nonhazardous under the RCRA regulations," but the paper did not present the data. A 2002 DOE report (DOE, 2002) contained a table of analytical data. These data have been presented in Table 217-1.

Wabash River Power Plant – Terre Haute, Indiana

A Wabash River Power Plant report that was issued in 2000 (Wabash River Energy, Ltd., 2000) presented TCLP data from 1997 and 1998. The report states that "Barium was the only constituent tested that presented leachable characteristics in the slag samples," but the report presented only the total TCLP leachate concentration for all metals, rather than separate leachate concentrations for each metal. However, the 1998 leachate total was below a detection limit of 0.12 mg/L, which is less than the lowest RCRA TCLP threshold for any metal. The 1997 leachate concentration was also below detection, but that detection limit is higher than one of the RCRA metal thresholds.

El Dorado Gasification Plant – El Dorado, Kansas

According to a 1999 report (DelGrego, 1999), gasification solids from the El Dorado Gasification Plant at Equilon's refinery in El Dorado Kansas passed the TCLP test. However, this report did not include any data, so it is not presented in Table 217-1. El Dorado also uses the Texaco gasification process that was acquired by GE and is similar to the one designed for HECA. Their gasifier operates on a feed of petroleum coke, according to the referenced 1999 study.

The feedstock used in the above-mentioned plants is similar to the feed that the HECA Project will use (i.e., coal or blends of coal and petroleum coke). Consequently, the Applicant anticipates that the HECA gasification solids would have a similar nature.

Table 217-1
Comparison of IGCC Gasification Solids Federal TCLP Leaching Analyses

Constituent	RCRA TCLP Regulatory Threshold	Polk Power Station, Ground[1]	Polk Power Station, Unground[1]	Cool Water[2]	Wabash River, 1997[3]	Wabash River, 1998[3]
	(mg/L) in Extract					
Arsenic	5	< 0.01	< 0.01	< 0.06	NR	NR
Barium	100	0.08	0.02	0.32	NR	NR
Cadmium	1	0.01	0.01	< 0.002	NR	NR
Chromium	5	1.43	0.07	< 0.005	NR	NR
Lead	5	0.01	0.01	< 0.08	NR	NR
Mercury	0.2	< 0.0001	< 0.0001	< 0.0004	NR	NR
Selenium	1	0.006	0.002	< 0.08	NR	NR
Silver	5	< 0.01	0.01	< 0.002	NR	NR
Sum of All Constituents for Wabash River					**< 0.682**	**< 0.12**

Notes:

[1] Polk gasification solids were generated from feedstock that was a blend of coal and petroleum coke. Source: Groppo and Rathbone, 2008.
[2] Source: DOE, 2002.
[3] Wabash River data were reported only as the sum of the constituents. Source: Wabash River Energy, Ltd., 2000.

< = Less Than (not detected)
mg/L = milligrams per liter
NR = Not Reported
RCRA = Resource Conservation and Recovery Act
TCLP = Toxic Characteristic Leaching Procedure

References

Choudhry, Vas and Steven R. Hadley, 1992. Praxis Engineers, Inc. *Utilization of Coal Gasification Slag: An Overview.* Clean Energy from Waste and Coal. December 23.

DelGrego, Gary, 1999. Texaco Power and Gasification. *Experience with Low Value Feed Gasification at the El Dorado, Kansas Refinery.* Gasification Technologies Conference October 17 through 20.

DOE (Department of Energy), 2002. *Major Environmental Aspects of Gasification-Based Power Generation Technologies, Final Report.* U.S. Department of Energy, Office of Fossil Energy, National Energy Technology Laboratory. December.

Groppo, J.G., and R. Rathbone, 2008. *Environmentally Safe, Large Volume Utilization Applications for Gasification Byproducts, Final Report.* Center for Applied Research, University of Kentucky. Prepared for the DOE under DOE Contract No. DE-FC26-04NT42203. September 30.

Wabash River Energy, Ltd., 2000. *Wabash River Coal Gasification Repowering Project, Final Technical Report*. Prepared for the DOE, Office of Fossil Energy, under DOE Contract No. DE-FC21-92MC29310. August.

DATA REQUEST

218. Please provide a discussion and documentation of why you believe the gasification waste from the proposed HECA Project will be found to be nonhazardous based on California's leachate testing protocol. Include in your response, as appropriate, a comparison between the federal and California leachate testing protocols.

RESPONSE

As noted in the response to Data Request 217, the HECA gasification solids do not yet exist, so they can not yet be analyzed by the California toxic leachability test (i.e., pursuant to the California Waste Extraction Test [WET] protocol in Title 22 of the California Code of Regulations). Also, no California WET data was found for existing IGCC gasification solids from other facilities, although the Cool Water Demonstration Plant was located in California (it is no longer in operation). Consequently, it is difficult to project the leaching results that the HECA gasification solids will have under the California WET protocol.

Table 218-1 presents the maximum TCLP leachate concentration found for each constituent that was presented in Table 217-1 in the response to Data Request 217. As explained in the response to Data Request 217, the HECA solids are anticipated to be nonleachable, based on available analytical results from federal leachability TCLP tests. The HECA Project has made a significant design effort to produce low-carbon gasification solids to minimize the potential leachability of the solids.

A comparison between the Federal and California leachate testing protocol is summarized from information presented on the California Department of Toxic Substances Control web site (DTSC, 2010) as follows:

- The federal TCLP method (U.S. Environmental Protection Agency Method 1311) involves an 18-hour extraction (plus or minus 2 hours) with an acetate buffer solution. The ratio of extraction solution to sample is 20-to-1. The test simulates contaminant leaching of waste materials that are disposed with municipal solid waste in a landfill.

- The California WET protocol involves a 48-hour extraction with a citrate buffer solution (except for chromium-VI, for which the extraction solution is deionized water). The ratio of extraction solution to sample is 10-to-1.

According to the CalRecycle website (CalRecycle, 2010), the California WET protocol is generally considered more aggressive than the TCLP. However, TCLP may present higher leachate concentrations for chromium because the TCLP test does not differentiate between chromium-III and chromium-VI species.

Table 218-1 includes the WET regulatory thresholds, for the purpose of rough comparison, although the Applicant acknowledges that the WET solvent and protocol may produce different leachate concentrations from the HECA gasification solids.

Table 218-1
Comparison of Maximum TCLP Results Against TCLP and WET Regulatory Thresholds

Constituent	Highest TCLP Concentration of Each Constituent from Table 217-1	Source of Data	RCRA TCLP Regulatory Threshold	California WET Regulatory Threshold [1]
	(mg/L) in Extract			
Arsenic	< 0.06	Cool Water	5	5
Barium	0.32	Cool Water	100	100
Cadmium	0.01	Polk	1	1
Chromium	1.43	Polk, finely ground	5	5
Lead	< 0.08	Cool Water	5	5
Mercury	< 0.0004	Cool Water	0.2	0.2
Selenium	< 0.08	Cool Water	1	1
Silver	0.01	Polk	5	5

Notes:

[1] Although the California WET Regulatory Thresholds appear to be the same as the federal RCRA TCLP Regulatory Thresholds, the California solution and protocol differ from those of the federal protocol.

< = Less Than (not detected)
mg/L = milligrams per liter
RCRA = Resource Conservation and Recovery Act
TCLP = Toxic Characteristic Leaching Procedure
WET = Waste Extraction Test

References

CalRecycle, 2010. Attachment 1 – Characterizing Burn Dumps in California: LEA Advisory #56. CalRecycle Home Page. Accessed October. http://www.calrecycle.ca.gov/LEA/Advisories/56/attach1.htm.

DTSC (Department of Toxic Substances Control), 2010. "Department of Toxic Substances Control – Waste Classification." Sac State College of Continuing Education – Online Learning Services. Accessed October 19. http://ccelearn.csus.edu/wasteclass/mod6/mod6_02.html.

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
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APPLICATION FOR CERTIFICATION FOR THE *HYDROGEN ENERGY CALIFORNIA PROJECT*

Docket No. 08-AFC-8

PROOF OF SERVICE LIST (Rev. 10/21/10)

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DECLARATION OF SERVICE

I, Dale Shileikis , declare that on November 12, 2010, I served and filed copies of the attached *Responses to Data Requests Set 3 (153-218)*, dated November, 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[www.energy.ca.gov/sitingcases/hydrogen_energy]**.

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

X sent electronically to all email addresses on the Proof of Service list;

___ by personal delivery;

X By delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

X sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (***preferred method***);

OR

___ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-8
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.