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CURE Data Response Set 4 (Responses to Data Requests 255 to 271)

Submitted to
California Energy Commission

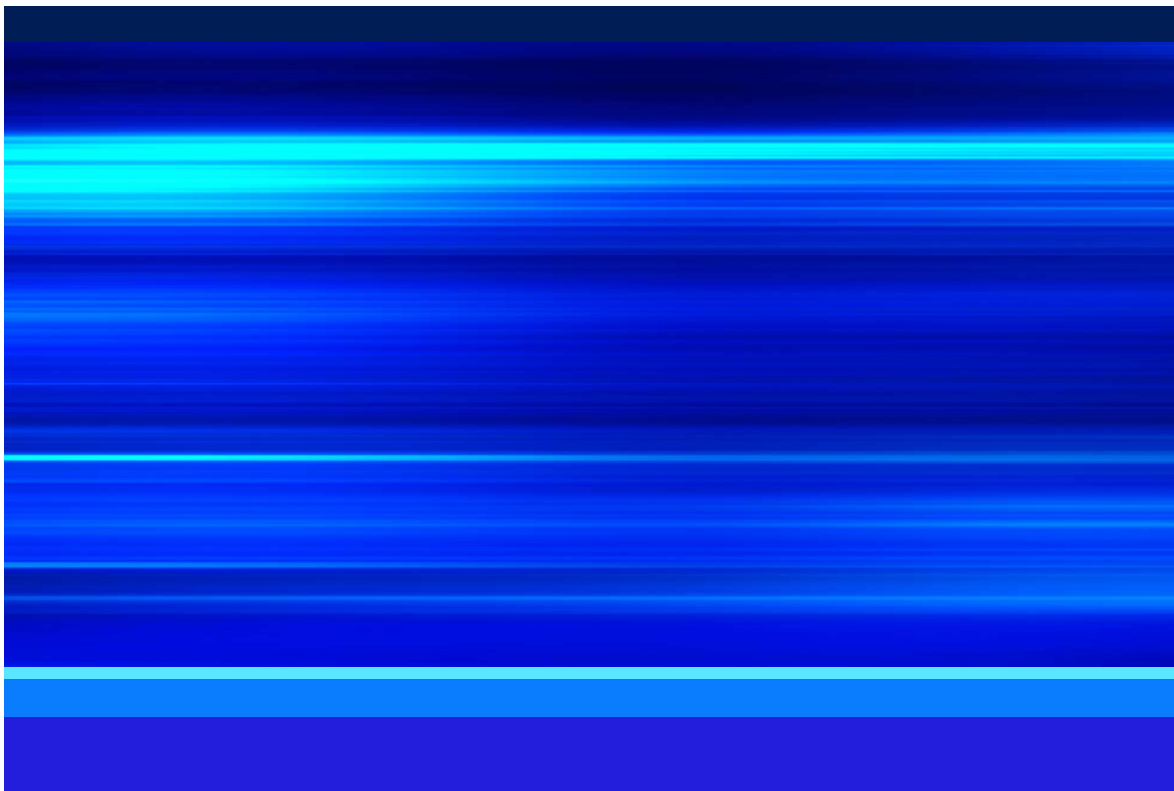
Prepared by
Black Rock Geothermal LLC

With assistance from

Jacobs

Black Rock Geothermal Project
(23-AFC-03)

February 21, 2024



Introduction

Attached are Black Rock Geothermal LLC's¹ (Applicant) responses to the California Unions for Reliable Energy's (CURE) *Data Requests Set 4* regarding the Application for Certification (AFC) for the Black Rock Geothermal Project (BRGP) (23-AFC-03). This submittal includes a response to Data Requests 255 through 271.

The responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as presented *CURE Data Requests Set 4* and are keyed to the Data Request numbers.

New or revised graphics or tables are numbered in reference to the Data Request number. For example, the first table used in response to Data Request 28 would be numbered Table DR28-1. The first figure used in response to Data Request 28 would be Figure DRR28-1, and so on. Figures or tables from the BRGP AFC that have been revised have a "R" following the original number, indicating a revision.

Additional tables, figures, or documents submitted in response to a data request (for example, supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of each discipline-specific section and are not sequentially page numbered consistently with the remainder of the document, though they may have their own internal page numbering system.

¹ An indirect, wholly owned subsidiary of BHE Renewables, LLC ("BHER").

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Acronyms and Abbreviations

AFC	Application for Certification
afy	Acre feet per year
BHER	BHE Renewables, LLC
BRGP	Black Rock Geothermal Project
BSA	Biological Study Area
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CURE	California Unions for Reliable Energy
DR	Data Request
DRR	Data Request Response
EDP	Equitable Distribution Plan
ENGP	Elmore North Geothermal Project
IID	Imperial Irrigation District
MBGP	Morton Bay Geothermal Project
TN	Transaction Number
WSA	Water Supply Assessment

1. Water Resources (DR 255-260)

Background: Water Shortages (DR 255-260)

The Project will rely on Imperial Irrigation District ("IID") supplied water. IID relies on the Colorado River for meeting water user demands. The Colorado River Basin continues to be largely in abnormally dry to severe drought conditions, continuing the historic decadal drought. Climate projections indicate these dry conditions are not expected to change dramatically either short-term or long-term. Several laws, regulations, and agreements control IID's water rights along the Colorado River and influence future decisions regarding water supply availability during periods of shortages.

For example, the U.S. Bureau of Reclamation ("BOR") responded to a multi-year drought in the Colorado River Upper Basin by developing the 2007 Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead ("2007 Interim Guidelines"). (TN 253195) The 2007 Interim Guidelines are in place from 2008 through December 31, 2025. (Id.) In 2007, BOR announced that "Conservation Before Shortage" was the selected preferred alternative for the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations of Lake Powell and Lake Mead ("Final Preferred Alternative"). (Id.) This Final Preferred Alternative is comprised of four key operational elements that guide operations of Lake Powell and Lake Mead through 2026. (Id.)

In October of 2023, BOR published the Revised Draft Supplemental Environmental Impact Statement ("SEIS") for Near-Term Colorado River Operations, which is intended to replace the 2007 Interim Guidelines under which the Colorado River has been operating and making water deliveries. The BOR is proposing to revise the 2007 Interim Guidelines for the operation of Glen Canyon and Hoover Dams beginning in the 2024 operating year to address the potential for continued low-runoff conditions in the Colorado River Basin. As stated in the SEIS, "[u]nder the Proposed Action, there is the possibility that the IID and [Coachella Valley Water District] could take additional shortages;..." (SEIS 2023 at 3-133) The SEIS also discusses the No Action and other Alternatives that may impact surface water deliveries to IID. BOR has not yet identified a preferred alternative, which will be identified in the Final SEIS.

Data Requests:

255. Please provide the minimum volume of average annual water demand in acre feet per year ("AFY") for the Project to operate.

Response: The minimum volume of annual water required to operate the Black Rock Geothermal Project (BRGP) at full load is 1,125 acre-feet per year (afy) based on site specific ambient conditions.

256. State the maximum volume of average annual water demand in AFY for the Project to operate.

Response: The maximum volume of annual water required to operate the BRGP at full load is 1,125 acre--feet per year (afy) based on site specific ambient conditions.

257. State whether the Applicant has identified alternative sources of water for the Project if IID does not meet the Project's total water demand.

Response: The Applicant has conducted an evaluation of alternative sources of water, including Imperial Irrigation District (IID) drain water and effluent from the town of Calipatria's water treatment system.

258. If alternative sources of water for the Project have been identified, please describe the alternative sources of water.

Response: The two alternative sources of water identified this evaluation are IID drain water and effluent from Calipatria's water treatment system. The IID drain water contains higher total dissolved solids content than the Project can accept, and withdrawal of drain water would impact desert pupfish. Further the use of IID drain water would reduce agricultural drain flows into the Salton Sea, resulting in further reduction in the sea's elevation. The quantity of effluent from Calipatria's water treatment system is insufficient to support the project. The Applicant is unaware of any reclaimed water sources in the Project area with sufficient supply to support the Project's water demand.

Background: Equitable Distribution Plan (DR 259-260)

The SB 610 Water Supply Assessment ("WSA") states that the water supply for the Project has been assured by Imperial County Planning and Development Services ("ICPDS"). (TN 253195) The WSA also explains that the proposed Project would be designated as a non-agricultural water user, and water will be supplied under an Industrial Water Supply Agreement with IID, or alternatively, under IID's Interim Water Supply Policy. (Id.).

Due to ongoing Colorado River drought conditions, Lake Mead's declining elevation, reduced inflows from Lake Powell, and the suspension of the federal Inadvertent Overrun and Payback Policy, the IID Board has implemented an annual apportionment program known as the Equitable Distribution Plan ("EDP"). In general, IID apportions the available water supply among all its water users equitably under the EDP. The intent of the EDP is to address times when customers' demand would exceed IID's Colorado River supply. (Id.) The EDP indicates that the basis for the equitable distribution for the industrial/commercial apportionment is based on the average of the previous three calendar years of water used. The EDP also has a provision that the apportionment may be changed for any calendar year prior to the notification period at the discretion of the IID Board of Directors.

Data Requests:

259. State whether the Applicant and IID have discussed the apportionment of water to the Project pursuant to the EDP.

Response: Yes.

260. If the response to Data Request No. 256 [259] is "Yes," please:

- a. Summarize this discussion(s) and any outcomes; and

Response: Potential apportionment of water to the Project pursuant to the Equitable Distribution Plan (EDP) was discussed with the Imperial Irrigation District (IID) to prepare a response to CEC Data Response Set 4, DR 37 and DR 38 (TN# 254503) , IID informed the Applicant that any proposed reductions to IID's water allocation will be distributed equally across all IID water users (i.e., a 10% reduction in IID's water allocation will mean a 10% reduction in all users' water allocation).

- b. Provide all documents referring or related to the Applicant's discussions with IID regarding the apportionment of water to the Project pursuant to the EDP.

Response: Please see CEC Data Response Set 4, DR 41 and DR 42.

2. Geologic Hazards and Resources (DR 261-267)

Background: Geothermal Reservoir Properties (DR 261-264)

The geothermal reservoir characteristics dictate the applicable technologies for energy production. In CURE Data Response Set 1 concerning the geothermal reservoir, the Applicant's response focuses on system state variables, namely temperature, pressure, and fluid chemistry rather than the reservoir properties. (TN 253375) Information regarding reservoir properties pertains to reservoir permeabilities and their distribution (heterogeneity), porosity, fracture density and orientations, thermal conductivity and heat capacity of reservoir rock, capillary pressure curves.

Data Requests:

261. *Provide data or documents describing reservoir permeability.*

Response: Please see the Applicants Notice Pursuant to 20 C.C.R. § 1716 for CURE Data Requests Set 4 submitted on February 12, 2024.

262. *Provide data or documents describing the reservoir porosity.*

Response: Please see the Applicants Notice Pursuant to 20 C.C.R. § 1716 for CURE Data Requests Set 4 submitted on February 12, 2024.

263. *Provide data or documents describing fractures in the reservoir.*

Response: Please see the Applicants Notice Pursuant to 20 C.C.R. § 1716 for CURE Data Requests Set 4 submitted on February 12, 2024.

264. *Provide data or documents describing the reservoir thermal conductivity.*

Response: Please see the Applicants Notice Pursuant to 20 C.C.R. § 1716 for CURE Data Requests Set 4 submitted on February 12, 2024.

Background: Hulen, Et Al (2002), Hulen Et Al (2003) (DR 265-266)

In CURE Data Response Set 1 No. 9 (TN 253375), the Applicant cited to Hulen et al. (2003); Geology and a Working Conceptual Model of the Obsidian Butte (Unit 6) Sector of the Salton Sea Geothermal Field, California; Proceedings GRC 2003; and Hulen et al. (2002); Refined Conceptual Modeling and a New Resource Estimate for the Salton Sea Geothermal Field, Imperial Valley, California; Proceedings GRC 2002, but did not attach these reports.

Data Requests:

265. *Provide a copy of Hulen et al. (2003); Geology and a Working Conceptual Model of the Obsidian Butte (Unit 6) Sector of the Salton Sea Geothermal Field, California; Proceedings GRC 2003.3*

Response: Due to potential copyright concerns, the Hulen et al. 2003 study has not been included as part of this response package. However, the study is available online at:
<https://publications.mygeoenergynow.org/grc/1021914.pdf>.

266. *Provide a copy of Hulen et al. (2002); Refined Conceptual Modeling and a New Resource Estimate for the Salton Sea Geothermal Field, Imperial Valley, California; Proceedings GRC 2002.*

Response: Due to potential copyright concerns, the Hulen et al. 2002 study has not been included as part of this response package. However, the study is available online at:

<https://www.geothermalresourcegroup.com/publications/refined-conceptual-modeling-and-a-new-resource-estimate-for-the-salton-sea-geothermal-field-imperial-valley-california/>.

Background: Model Calibration (DR 267)

A summary explanation of the results of model calibration should include the estimated properties of the reservoir as well as measures of uncertainty. For example, estimates of permeability are averages, which should be accompanied by measures estimation error (variance or confidence intervals). When performing history matching (calibration), the modeler modifies reservoir properties (e.g., permeability, porosity, fractures, thermal conductivity) to determine the optimal values that lead the modeled pressures and temperatures to match the corresponding measured (historical) values. Information regarding the uncertainty associated with the estimated reservoir properties has not been provided. It is sufficient if the history matching is accompanied by a cone of (predictive) uncertainty. Figure DRR 10c-1 would not be considered adequate without some measure of uncertainty.

Data Requests:

267. Provide the reservoir numerical modeling report.

Response: Please see the Applicants Notice Pursuant to 20 C.C.R. § 1716 for CURE Data Requests Set 4 submitted on February 12, 2024. Without waiving its objection to this data request, the Applicant provides the following response.

The Black Rock Geothermal Project Resource Adequacy Report was docketed on May 8, 2023 (TN# 250040) and the CEC resource adequacy determination for this geothermal resource is provided in TN# 250454.

3. Air Quality and Public Health (DR 268-271)

Background: Mitigation Measures for Radon Emissions (DR 268)

Table 5.9-2 in the AFC at page 5.9-4 lists radon as a Toxic Air Contaminant ("TAC") that may potentially be emitted from the Project's operations. The AFC at page 5.9-5 includes radon emissions from the cooling tower in Table 5.9-3. Chronic exposure to radon in humans and animals via inhalation, for example, has resulted in respiratory effects (chronic lung disease, pneumonia, fibrosis of the lung, decreased lung function), while animal studies have also reported effects on the blood and a decrease in body weights. Radium and radon are potent human carcinogens. Radium, via oral exposure, is known to cause lung, bone, head, and nasal passage tumors. Radon, via inhalation exposure, causes lung cancer.

Data Requests:

268. Describe the mitigation measures to reduce impacts on people (i.e., workers, sensitive receptors) from radon emissions identified in the air quality analysis and health risk assessment.

Response: Please see CURE DR Set 1, DRRs 60 and 61 (TN# 253375) for radon emissions and health risk assessment. Like other geothermal facilities, conducting compliance source testing to measure radon emissions and periodic employee radiological dosimeter monitoring are appropriate radiological assessment measures.

Background: Valley Fever (DR 269)

In CURE Data Response Set 1 No. 62, the Applicant generally states that it "takes the health and safety of its employees and contractors seriously, and as part of the Project will prepare and submit a construction and operational health and safety plan that will provide the foundation. These plans will provide the foundation for protecting and reducing employee/contractors from physical, environmental, and chemical impacts, including Valley Fever." (TN 253375) However, it is unclear if the Applicant has surveyed the Project areas to be graded for the presence of Valley Fever spores. Valley Fever is endemic in Imperial County and spores in the soil that are disturbed during construction and/or windstorms may cause significant worker and public health impacts .

269. Describe any efforts undertaken or that will be performed to survey areas of the Project site for the presence of Valley Fever spores.

Response: The Applicant has not performed any surveys for the presences of Valley Fever spores. Prior to commencement of construction, the construction contractor's qualified health and safety professionals will prepare a health and safety plan to ensure workers are protected from potential physical/environmental risks, including conducting Valley Fever spore presence surveys if warranted.

Background: Cumulative Impacts (DR 270-271)

Page 5.1-44 of the AFC states that "[c]umulative multi-source modeling assessments, which are used to analyze impacts from the Project plus nearby new or modified sources, will be performed at a later date following consultation with the appropriate agencies and per the methodology described in Section 5.1.9.5." The AFC at page 5.1-45 states that both 24-hour and annual PM2.5 predicted concentrations during Project operation exceed their respective Significant Impact Level ("SIL") and will require a cumulative modeling analysis. The AFC at page 5.1- 50 states that 1-hour and annual NO2, 24-hour and annual PM10, and annual PM2.5 predicted concentrations during construction exceed their

respective SIL and will require a cumulative modeling analysis. Finally, the AFC at page 5.1-43 explains that impacts from the Project will be combined with other stationary emissions sources within a 6-mile radius that have received construction permits but are not yet operational or are in the permitting process. "The stationary emissions sources included in the cumulative impacts assessment will be limited to new or modified sources (individual emission units) that would cause a net increase of 5 tpy or more per modeled criteria pollutant." (Id.)

In CEC Data Requests Set 1 (TN 252096), CEC staff requested an update on the cumulative impacts analyses mentioned in the AFC, and for the Applicant to provide the modeling files if they are available for review. The Applicant responded that "[a] cumulative impacts analysis modeling protocol is included as Attachment DRR 12-1 and docketed on September 28, 2023 (TN 252438) for CEC Staff's consideration. This protocol outlines the proposed methodology for conducting the cumulative impacts analysis for the MBGP. The Applicant will conduct the cumulative impacts analysis once the cumulative impacts analysis modeling protocol was finalized and will provide the analysis on or before November 10, 2023." (TN 252491-1) However, the cumulative impacts analyses mentioned in the AFC have not yet been provided by the Applicant.

Data Requests:

270. Provide an update on the cumulative impacts analyses mentioned in the AFC.

Response: The cumulative air quality impact assessment was filed on November 13, 2023 filing as Attachment DRR 12-1 (TN# 253080).

271. Provide the modeling files if they are available for review.

Response: Access to the modeling files was previously provided to CURE on December 14, 2023 (TN# 253630). Attachment DRR 271 presents an email from the Applicant's consultant providing instructions on how to download the BRGP cumulative modeling files.

Attachment DRR 271
Cumulative Modeling Files
Downloading Instructions



From: Jerry.Salamy@jacobs.com
To: [Salamy, Jerry](#)
Subject: Black Rock Geothermal Project Cumulative Model Files
Date: Thursday, December 14, 2023 5:10:41 PM

Jacobs File Transfer System

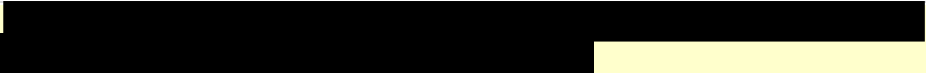
Jerry.Salamy@jacobs.com has sent you a file archive, with the following message:

Hi Tara and David,

This email is transmitting the Black Rock Geothermal Project Air and Public Health Model Files submitted in support of the Applicant's response to CEC Data Request Set 1.

Thanks,
Jerry

If you trust Jerry.Salamy@jacobs.com, use the URL below to pick up the file archive (you may need to copy and paste it into your browser):

Download URL: 

Download size: 407,947 KB

Download contents: cumulative.zip

Distribution:

To: dweber@adamsbroadwell.com, trengifo@adamsbroadwell.com

Cc:

You have 7 days to pick up this file archive; after 7 day(s) (Midnight 12/21/2023), it will be deleted. This is an automated e-mail. Thank you for using the Jacobs File Transfer System.